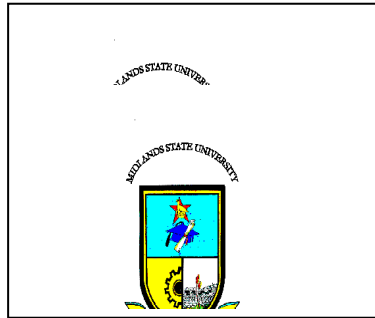


**MIDLANDS STATE UNIVERSITY**



FACULTY OF EDUCATION

DEPARTMENT OF APPLIED EDUCATION

**METHODS OF TEACHING MATHEMATICS AT ECE LEVEL LEARNERS  
IN KUMALO CLUSTER PRIMARY SCHOOLS OF  
BULAWAYO PROVINCE**

BY

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF EDUCATION OF  
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## **Abstract**

This study explored the best methods of teaching mathematics at Early Childhood Education in Khumalo cluster primary school in Bulawayo. The research was mainly focused on ECE teachers concerning the best methods in the teaching of mathematics and strategies that can be used to assist teachers so that they can use the best teaching methods. Data collection was done by use of structured interviews and questionnaires to guide in data collection. Questionnaires had had 88% response rate and 5 interviews which yielded 100 % response rate. The sample consisted of all the ECE teachers and TICs in Khumalo cluster primary schools and this yielded 35 ECE teachers and 5 TICs. Data accumulated was analysed and presented through graphs, tables and pie charts and rational conclusions were drawn from this.

The study found out that hands on methods, learner centered, play way, rote learning and lecture methods are the best methods of teaching maths at ECE level. Most teachers use the mentioned methods because they highly engage learners in the classroom activities. However major findings of the study suggested that many teachers face challenges when teaching mathematics such as shortage of resources, language and high enrolment. The study also showed some strategies that can be used to assist teacher employ the best methods of teaching which include, workshops, incentives as they are getting very low salaries and providing adequate resources.

## **Acknowledgements**

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I want also to thank my husband Livingstone Chikuni for the support and encouragement that you gave me throughout my research. Above all, I want to thank God for the gift of life and giving me spiritual guidance throughout this research project.

**DECLARATION**

I Patience Chikuni do hereby declare that except for references cited and acknowledgements, this research is my own original work and that it has not been in any part or been presented anywhere.

SIGNATURE.....

## **DEDICATION**

I would like to dedicate this study to my husband Livingstone Chikuni for his lovely encouragement and support throughout this process and being my pillar of strength.

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## **Acronyms**

ECE: Early Childhood Education

TICs: Teachers In Charge

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## **CHAPTER 1: THE RESEARCH PROBLEM**

### **1.1 INTRODUCTION**

This chapter seeks to present the background of the study, statement of the problem, the research question, delimitations and limitations of the research, the significance of the study definition of key terms and finally rounding off with a summary.

### **1.2 Background of the study**

Mathematics is one of the important subjects in Zimbabwe which need to be given more attention especially if the learner intends to venture into sciences projects and jobs. Mathematics is an essential component of communication for scientists and also provides an effective way for children to process and share their discoveries (Winnett, Rockwell, Sherwood and Williams, 2002).

Mathematics concepts at Early Childhood Education (ECE) level should be taught carefully using the best methodologies, since the ECE level lays the foundation of the learner's education visions or life. Charlesworth and Lind, (2003) states that the only key to build learners 'mathematics interests is to catch them young. It is vital therefore for the teachers to teach maths concepts effectively at ECE level.

In teaching ECE learners at one of the primary schools in Bulawayo, the researcher discovered that learners face problems in grasping mathematics concepts. In most cases learners are failing to apply different mathematics skills in different scenarios. The problems faced by learners in mathematics concepts have hampered effective mathematics teaching methodologies. Mathematics skills are very important in most people's daily activities and businesses such as finance management and time management.

There has been some concern over children with difficulties in mathematics skills and how best they can be assisted. Stewart (2003) have carried out the research on the learners who are failing to grasp the concepts in mathematics and discovered that 70% of the learners at ECD level cannot pick up fast in mathematics. The researcher therefore discovered that the methods that are being used in teaching the subject are ineffective and there is need for thorough research on the best methods of teaching mathematics.

Chapin and Johnson (2000) viewed that there was much research that indicates that the school environment and teaching methods have important influence on the mathematics performance. Suurtamm and Vezina (2010) also alluded that it is more useful to know how to teach mathematics than to know a lot of mathematics hence teaching methodologies are a powerful weapon in engaging the minors in mathematics.

Moreover, most teachers in schools fail to deliver mathematics concepts clearly. The researcher intended to carry out a research so that best ways of teaching mathematics concepts will be revealed. This has however, prompted the researcher to carry out the same research to investigate whether she will come out with the same results.

#### **1.4 Statement of the problem**

A key element for children in understanding mathematics knowledge on the early childhood level is through active, creative, intellectual engagement (Charlesworth & Lind, 2003). Most learners can do basic mathematics but face difficulties in the application of some concepts in their daily activities. It is therefore the objective of the researcher to carry out an investigation into the best methods of teaching mathematics to learners at ECE level in Khumalo cluster, Bulawayo province.

## **1.5 Research questions**

1. What are the best methods of teaching mathematics at Early Childhood Education level?
2. How can teachers be assisted to employ the best methods in teaching mathematics at ECD level?

## **1.6 Significance of the study**

This research is very important because it will help some teachers to use appropriate methods of teaching to learners with difficulties in mathematics. It will enable teachers to evaluate their teaching methods. It will also help change the attitudes of teachers who lack mathematical knowledge and provide them with the best methods of teaching mathematics. The study findings will help improve maths pass rate of schools in Bulawayo province under Khumalo cluster.

Furthermore, other authors will use it as their source document to write their own researches and textbooks that may be used by the whole country and the whole world at large. The research is also important to other researchers as they will use the document as a guide to do their own investigations to find out whether they can come up with the same results.

## **1.7 Delimitations of the study**

Leedy and Omrod (2010) defined delimitations as those characteristics that limits the scope and define the boundaries .The researcher should therefore centre on her topic only. This research is focusing on the best methods of teaching mathematics at EC E level and how best

can the teachers be assisted in employing the best mathematics methodologies in Khumalo cluster, Bulawayo province.

### **1.8 Limitations of the study**

Limitations are factors that can make the researcher find it difficult to research (Leedy and Omrod, 2010). Therefore the researcher faced challenges on the following;

#### **Time**

The researcher needed time to go to college to consult her supervisor who is helping her in writing the project. This was a challenge because the researcher had to attend the co-curricular activities at her work place. This therefore was clashing with the days for consultations. The time was also not enough because there was a lot of work that needs to be done at school, for instance the researcher should plan daily, prepare media, mark the learners' books and design some charts. However the researcher adjusted her time and the research was being done after work.

#### **Resources**

The researcher also faced challenges on resources. The researcher had no access to the internet every time to help her do her research and the books were not readily available since there were many who were using the books. However the researcher had to buy a laptop with the little salary she got so that she can access the internet.

The researcher also faced financial constraints especially with the cash shortages. The researcher needed money for transport to travel to and from Gweru to the college here and again for consultations since she was based in Bulawayo. She also needed money to buy stationery like books, pens and manila for preparing media. The researcher needed money to



access the internet. However, in order to overcome the problem of cash shortages the researcher started a small scale business which sponsored the project from the beginning up to the end.

### **1.9 Definition of key terms**

Mathematics is the science of structure, order and relation that has evolved from elementary practices of counting measuring and describing the shapes of objects Grouws (2004). Mathematics therefore is the study of the measurement, properties, and relationships of quantities and sets, using numbers and symbols.

Method of teaching according to Petty (2009) it is a systematic way of teaching which implies an orderly logical arrangement. This means that a teaching method is a way of teaching comprises of the principles and system used for instructions.

### **1.10 Summary**

This chapter clearly looked at the introduction, the background, the statement of the problem, the research question. The chapter also looked at the delimitations, limitations, significance of the study and finally the definition of the terms.

## **CHAPTER TWO: REVIEW OF RELATED LITERATURE**

### **2.0 INTRODUCTION**

This chapter focuses on the best methods of teaching mathematics at ECE level and how best can the teachers be assisted in employing the best mathematics methodologies at ECE level. The researcher will also focus on what some authors say about the best methods of teaching mathematics at ECE level.

#### **2.1 Best methods of teaching mathematics at Early Childhood Education level.**

Gross, (2016) says, in Europe they believe that cooperative learning guided discovery, laboratory approach, simulations, problem solving, investigations and exposition are the best methods for teaching mathematics. Barnes (2009) alluded that, moving away from the traditional teacher dominated way of learning, active learning approaches encourage pupils to participate in their own learning through discussions, project work, practical exercises and other ways that help them reflect upon and explain their mathematics learning. Therefore this explains that these methods enable learners to interact, solve problems on their own and to be critical thinkers.

Critical thinking is often linked to the ability to analyse, synthesise and evaluate information that is gathered through observation, experience or reasoning (Bayer, 2012). The methods of teaching mathematics in Europe enable learners to discover things on their own and become critical thinkers. Hattie (2009) alluded that, in Europe they believe the combination of cooperative learning, guided discovery, laboratory approach, simulations, problem solving, exposition and investigation these methods will make mathematics easily understood.

Kane (2008) entails that, cooperative learning is helpful in eliminating competition among learners, pupils work in small groups of about four to six and it encourages learners to

discuss, to solve problems and fosters positive intergroup attitudes in the classroom. Cooperative is an effective method of teaching mathematics since it enables learners to interact and scaffold each other as well as creating a comfortable environment to learners since some learners are shy to ask teachers questions if they happen to have any queries, but will feel free to ask their colleagues (Stewart, 2003).

Stewart (2003) states that, expository method in Australia has been considered effective in teaching mathematics at ECE level. It is also relatively easy to organise and it often requires little teacher preparation. It involves a clear and proper sequenced explanation by the teacher of the concept and some teacher people dialogue. Expository method is a fast and efficient way of giving information (Hattie, 2009). Robertson (2013) says, expository teaching method is basically direct instruction, teacher is in the front of the room lecturing and students are told what they need to know. With expository it is therefore believed that, when students discover information on their own, they can get distracted and confused by unnecessary information and have difficulty determining what's important.

Bergeson (2000) in America carried out a similar research and provides evidence that pupils with memory problems find it difficult to remember the concepts in mathematics. Froebel (2006) states that play way method is the best method of engaging learners with memory problems because it involves a serious teaching along with playing games. Froebel also pointed out that mathematics teacher should provide some simple games and make the pupil play for acquiring concepts. Therefore the teacher can use as many apparatus for gaming such as objects. Pupils can carry out, for example, addition by adding objects through playing. Play way method will make pupil to learn mathematics more easily and with more desire. Looney (2009) says, a game is a procedure which employs skills and has a winner and predominantly used to practice and reinforce basic skills and carries an advantage of excitement. Young learners love to play and they participate in a game with more enthusiasm

than in any other classroom task. Chapin and Johnson (2000) state that minors learn better when they are active.

Confrey cited in Hansen (2002) provides evidence that children are active learners who master concepts by progressing through three levels of knowledge which are concrete, pictorial and abstract. Therefore the use of manipulatives enables pupils to explore concepts at first or concrete level of understanding. Confrey (2001) adds on to say that when pupils manipulate objects they are taking the necessary first step towards building understanding and internalising mathematics procedures.

There is evidence that pupils should be given time to practice what they have learnt. Johnson (2009) from a teacher training agency in London, carried out a similar research and provides evidence that after teaching a concept, teachers should give pupils time to practice what has been taught, therefore pupils can master the concept and they do not easily forget.

Singapore learners learn through manipulation of real objects first, without any internal representation of the objects. Learners interact with the world by exploring and manipulating objects. Johnson (2009) alluded that, learners may be likely to remember concepts and knowledge discovered on their own. Teng (2008) posits that, Singapore curriculum aims at moving away the rote learning and to focus instead on teaching children how to problem solve.

Qin (2017) alluded that, education in China is divided into six years of elementary school, three years of middle school and three years of high school. This means that primary education in China is for three years. Reynolds (2014) says Chinese students begin learning their maths facts at an early age and maths text books begin with multiplication in the first semester when children are seven years old. Gibb (2017) says, Chinese classrooms traditionally have been organised in such a way that student's discussion is difficult. Zhuan

(2017) posits that, Chinese teachers have begun to recognise that student discussions can benefit learning, and they have begun to encourage student to engage in discussions, even though their classrooms are not set up for discussions.

Sebele (2000) says, Mathematics is a subject that is regarded as a prerequisite in South Africa for many careers, because of its status every child must study this subject up to grade 9 or grade 10 level. Zientek (2010) says, the methods used in teaching should equip the child with the skills to cope with any relevant numerical or mathematical situation outside the classroom. Sebele adds on that, the assignment method has been approved effective method in ECE mathematics teaching in South Africa in 2005. The student is given responsibility for his/her learning. The teacher prepares assignment in each topic for the students to tackle individually, while the teacher is always available to advise and guide the student in case of any difficulty he may encounter. Waite (2000) states that, assignment method encourages initiative, independence, and provides students with the maximum amount of individual practice. Assignment should always be a task which is within the capability of the student and has some interest for him.

Benson (2009) alluded that, a project method had been initiated in the Northern Province to address the problem of students failing in mathematics. In this method the teacher assigns particular projects to the students. The teacher's task in a project is simply to guide the children as they find the need for his help and to encourage his students by showing a lively interest in their work. The value of the project is determined by the quality of learning shown in the work they produced (Olivia, 2012). It makes learning effective because it helps the children know that they had succeeded. This method also socializes the child because it is a

combined effort; each individual contributes his knowledge and skill to the success of group work. Ernest (2009) posits that the project method enables children to learn Mathematics from their own experiences, out of which they build meaning for themselves. Benson (2009) adds on that, learners assemble their own knowledge that arises from a range of problem solving experiences and through collaborating in discussions they make mathematical sense of it.

Adedayo (2007) says, Mathematics is a compulsory subject offered in Nigeria primary and secondary schools and is taught daily in all the schools at least four times in a week. Bornstein (2011) says, there is no best method of teaching mathematics. The teacher should use variety of methods depending with the topic taught, and the teacher should consider the zone of proximal development of learner's. Anaduaka (2010) posits that, a successful teacher especially of mathematics must, use several methods in one lesson for example when teaching a concept like subtraction a teacher can use play way method, project method and demonstration method.

The former minister of education Dr Dokora in 2016 stated that, the curriculum review seeks to position mathematics as a vehicle to acquire 21<sup>st</sup> century skills, provoke critical thinking and develop well-rounded learners who can effectively contribute in Zimbabwe's development. Baloglu (2006) alluded that mathematics depends not only on cognitive abilities but also on emotional factors and attitudes. The teacher should use teaching methods which enables learners to engage into group work, or dramatization. Mushava (2016)says, mathematics education in Zimbabwe from primary to secondary levels should help learners to prepare for the challenges they may face further in life. Makanda (2017) says ministry of primary and secondary education in Zimbabwe bent on improving mathematics education to

make it more operational and socially relevant in the light of the challenges. Machingambi (2012) alluded that mathematics is a tool which forms the basis for specialised occupations like science, engineering, economics and computing among others. The methods of teaching mathematics should enable the learners to acquire the concept taught since mathematics is an important subject in Zimbabwe.

## **2.2 Ways of assisting teachers to employ the best methods in teaching mathematics at ECE level.**

The main goal of mathematics education in schools is the mathematisation of the child's thinking. Some teachers have the idea that maths is all about getting the right answer and their own perception of mathematics is very stunted. Teachers are not subject specialists, they have diplomas or university degrees in education, possibly with a specialisation in early childhood education, but with no particular mathematical background at all.

Olson (2005) says the knowledge, skills and attitudes of each of Europe's 6 million teachers are of great importance and the quality of their teaching has a direct effect upon learner's attainment. Council of Europe (2013) says for teachers across Europe, the e twinning website offers a range of free professional development seminars, events and workshops on best methods of teaching mathematics. Barnes (2009) says e-Twinning is a free and secure online network, where teachers from more than forty European countries can find partners and discuss on best methods of teaching.

Olson (2005) says every year Europe organises two teacher's workshops in the Netherlands as part of its education programme, the summer edition takes place in July, and the autumn

edition in October for staff development. Glattenhorn (2007) defines staff development as the development of a person in his or her professional role.

Cavanagh (2012) says, staff development is about life-long learning and growing as an educator. Therefore it enables teachers to have potential to progress and refine teaching skills and best teaching methods of mathematics. For education practitioners there is always more teaching methods to learn and new skills to attain. Staff development can help the teacher to make certain decisions when choosing methods of teaching mathematics. Olson (2005) goes on and say, staff development can overcome failures, as an opportunity for improvement, if the teacher had past failures in his or her classroom.

Masini (2007) says, during staff development teachers learn to overcome the problems they will be facing in the classroom. Teachers will gain confidence by learning new methods and information about their field (Bavaria, 2009). Staff development for a teacher is important for both new teachers and veteran teachers. Gibb (2017) says, life-long learning will keep the teacher motivated and thinking positively and will help him gain confidence to overcome any obstacles he faces in the classroom. The teacher may also be updated with the best methods of teaching mathematics in a staff development. Klein (2005) says, staff development is about becoming the best equipment teacher a person can be, and so it should be an important part of teacher career development. Therefore, for teachers to be aware of best methods of teaching mathematics they should attend staff development meetings.

Majumder (2015) says, with the internet and increased technology new ideas and tools are being explored and implemented every day, it is important for teachers to stay up to date. Workshops are also a way of improving the teacher's efficiency. Majumder (2015) says, a workshop is designed to teach something or develop a specific skill. Romberg (2006) posits



that, a workshop does not necessarily have to present original research, it is directed more towards teaching and learning in an interactive environment. It is important for teachers to have ongoing and regular opportunities to learn from each other.

Manion (2004) alluded that teacher's workshop in Philippines is not just important to schools but it is vital to the teacher and the learner's because workshops give the teacher a greater understanding of teaching methods, and it build their confidence. Achiele (2010) alluded that, major changes to the curriculum in the Philippines in the past eight years has led to significant professional development programs, particularly in primary education. Jacobs (2012) alluded that, these professional development activities were mostly in the form of seminars or workshops where teachers attended designated training centres. Achiele (2010) posits that, they all became aware that Mathematics in Primary schools could be taught in different ways such as the use of hands on method. Jacob (2012) says it was observed that teacher's used a variety of resources and allowed learners into group activities. Manion (2004) adds on that, they changed their Mathematics teaching from one based on a teacher centred classroom to one where there was sharing of learning between teacher and students.

Sabean (2009) entails that, seminars are arranged to discuss current issues and problems or to share ideas. Klein (2005) says a seminar has the function of bringing together small groups for recurring meetings, focussing each time on some particular subject, in which everyone present is requested to participate.

Anho (2011) alluded that, teachers education in Nigeria revolves around the policies and procedures designed to equip prospective teachers with the knowledge, methods of teaching and skills required in the performance of effective duties in the classroom. Akudolu (2006) says one of the key elements in Nigeria is the provision of adequate opportunities for teacher's personal growth and professional development. They consider the education of

teachers as of more importance. Okoye (2013) alluded that, research in Nigeria has indicated, need to regularly provide opportunities for teachers to improve their skills and methods of teaching. Nigeria calls for teachers to always attend staff development and workshops. Fakoye (2009) alluded that, we live in a rapidly changing world, such that whatever knowledge and skills teachers acquired in their pre-service training stale very fast new challenges and realities emerge in the socio-economic and political environment. Mohammed (2006) has indicated two most commonly used models in Nigeria the workshop model and the school based teacher support model. Guskey (2000) states that one constant finding in the research literature is that notable improvements in education almost never take place in the absence of staff development.

Ministry of education, Singapore (2017) alluded that, teaching is a highly respected profession in Singapore, not simply because it is part of the Confucian culture to value teachers, but because everyone knows how hard it is to become a teacher. The teacher development centre in Singapore has recently started the process of developing and supporting educators. Teachers have access to several types of professional development opportunities through the teacher development centre. The teachers are equipped with skills and methods of teaching mathematics at the development centre. Ming (2015) posits that, teachers can improve their practice through at the National Institute of Education (NIE) or at the academy of Singapore.

The education minister of Singapore, Heng Swee Keat (2013) says primary school years are an important part of the education journey, and designing lessons and activities for children at this age will help them best. Keat (2013) stressed that these formative years should foster children's curiosity and love for learning, help them grow socio-emotionally and give them a strong foundation in numeracy, by using the best methods of teaching. Seminars bring teachers together to share and learn from each other best methods of teaching the early

childhood learners. Teachers might come up with best methods of teaching which make children enthusiastic to learn mathematics after attending seminars. Ming (2015) Says, the review of primary education in 2009, schools have introduced several initiatives to improve learning for children.

### **2.3 Summary**

In this chapter, the researcher identified the best methods used to teach mathematics at ECE level from literature and ways of assisting teachers to employ the best methods in teaching mathematics at ECE level.

## **CHAPTER 3 : RESEARCH DESIGN AND METHODOLOGY**

### **3.0 Introduction**

The research was carried out in Khumalo cluster in Bulawayo which is comprised of 5 primary schools. In this chapter, the researcher will define what methodology is as well as research design. Furthermore, the researcher will focus on two research designs which are surveys and interviews. Research instruments which are the questionnaires and interviews guides will be used. Population, samples and sampling techniques will also be looked at in this chapter.

### **3.1 Research Approach**

The researcher used the qualitative and the quantitative paradigms. The researcher used both paradigms for triangulation. Bryman (2013) say that triangulation is whereby the researcher uses different sources of information in order to increase the validity of a study. This implies that triangulation indicates that two or more methods are used in a study in order to check the results.

Kathari (1985) defines methodology as the process used to collect data and information. The method may include interviews, surveys and other research techniques and can include both present and historical information. Blakstad (2008) view methodology as the general research strategy that outlines the way in which a researcher project is to be used in it. A methodology therefore gives a justification for the approach a research is going to use.

### **3.2 Surveys research design**

William (2009) views a research design as a detailed outline of how an investigation will take place.. Burns and Grove (2003) define a research design as a blue print for conducting a study with maximum control over factors that may interfere with the validity of the findings. In

support, Macmillan and Schumacher (2003) view research design as a plan and structure of investigations used to obtain evidence to research question. Therefore a research design is how the researcher collected data and in this case the researcher used research methods which include questionnaires and interviews.

The purpose of the research design as stated by Burns and Grove (2001), is to achieve greater control of the study and to improve the validity of the study by examining the research problem. Research design enables the researcher to come up with solutions to the problems and guide the researcher in success of all research and it is dependent upon the appropriateness of the research design is the crucial because whatever results obtained lingers upon it.

### **3.3 Population and sample**

In this research, the population was comprised of all teachers, and all Teachers In Charge(TICs) of the primary schools in Khumalo district in Bulawayo province. According to Fischer (2004), Population is the total number of with the characteristics one wishes to understand.” Wengraf (2001) postulates that population is any group of individuals that have one or more characteristics in common that are of interest to the researcher.

Thirty five Early Childhood Education teachers from the 5 sampled schools completed the questionnaire. The 5 TICs participated in interviews. According to Harrison (2006), “A sample is a small part of anything or one of a number intended to show quality, style or nature of the whole. In statistics, a sample is a subset of a population.’ Therefore a sample is a small population selected from the whole population by observing characteristics of the population from which it is drawn.

### **3.4 Research instruments**

The researcher used questionnaires and interviews. Fischer (2004) view research instruments as what the researcher employs to extract mass data or manipulate the extract meaning from them. Harrison (2006) says, research instruments are measurements tools, for example questionnaires or scales designed to obtain data on a topic of interest from research subjects.

### **3.5 Questionnaires**

In this study, the questionnaires were administered to 35 Early Childhood Education teachers in person. Fischer (2004) says, “A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondent.” Burns and Bush (2010) views it as a list of questions usually printed, submitted for replies that can be analysed for suitable information. A questionnaire therefore is simply a tool for collecting and recording information about a particular issue of interest.

The researcher used questionnaires because large amounts of information can be collected from a large number of people in a short period of time and in relatively cost effective way. Questionnaires also reduce bias. Wengraf (2001) states that there is uniform question presentation and no middle-man bias. The researcher’s own opinions do not influence the respondents to answer questions in a certain manner.

However respondents may answer superficially especially if the questionnaire takes a long time to complete. To overcome this, the researcher avoided the common mistake of asking too many questions. Another disadvantage of a questionnaire is that open ended questions generate large amount of data that can take a long time to analyse. The researcher spared the space on questionnaires so that the responses will be concise.

Taylor (1999) explains that questions cannot be explained. This means that the question can be misinterpreted and so respondents may not be able to read the questionnaire. To overcome this, the researcher avoided overly complex language and structure. The questions were very clear.

### **3.6 Interviews**

In this study the researcher constructed the interview guide for TICs from the research questions so that it relates to the study. 5 TICs from the 5 schools were interviewed. Cooper (2002) defines an interview guide as, “a list of topics, themes or areas to be covered in a semi-structured interview. This was created in advance of the interview by the researcher and was constructed in a way to allow flexibility and fluidity in the topics that are to be covered.

Hewson (2003) defines an interview as a conversation between two or more people where questions are asked by the interviewer to elicit facts or statements from the interviewee. Therefore an interview is a meeting between people when questions are asked and answered. The researcher used interviews because there is collection of primary information. Bryman (2001) explains that an interview can help to collect the fresh, new and primary information as needed. Sufficient information can also be collected through the interview process because the interviewer can ask any question to the interviewee.

However, some applicants may feel uncomfortable during personal interviews causing them to forget key points or give a bad impression. Therefore, the researcher established good rapport by being friendly and responsive to the interviewee.

### **3.7 Data collection procedure**

Inception of this study was twofold, to conduct academic excellence and to add body of knowledge to academic world. The researcher requested permission to gather data from the

Ministry of education in Bulawayo. After the approval by the Ministry, the researcher also requested permission from the school administrations to administer questionnaires to teachers and interview them. The researcher applied for permission from the schools authorities to use their premises for interviews.

### **3.8 Pilot study**

A pilot study was done by the researcher two weeks before the actual gathering of data was done. Haralambolos and Holborn (2008) define a pilot study as a small scale preliminary study conducted before the main research in order to check the feasibility or to improve the design of the research. Tejlingen and hundley (2001) define pilot study as a mini version of a full-scale study or trail run done in preparation of the complete study. This can also be called feasibility study. Best and Khan (2003) indicate that a pilot study serves to avoid unnecessary wastage of time and financial resources on a research that is in sufficiently designed.

A pilot study gave the researcher the opportunity to modify and fine-tune the data gathering instruments before they are administered to the sample members. The pilot study also allowed the researcher to find out and make corrections to her instruments before sending questionnaires with anomalies on instruments since respondents could not be in position to understand the requirements of the whole process. It greatly reduced the number of unanticipated problems because one has an opportunity to design parts of the study to overcome difficulties that the pilot study reveals. The results obtained from the pilot were not used in the actual data analysis of the data collected from the sample members.



### **3.9 Data presentation plan**

Leedy (2001) states that interpretation of data involves discussion and findings from the accumulated facts. The researcher presented data in the form of frequency distribution. A frequency distribution is a table used to summarise categorically or numerical data. Frequency tables show how often each response was given by respondents. Pie charts and graphs were also used to describe the data which is to be collected. One variable at a time (each method) was plotted against the responses. All methods were then be presented on a single graph.

### **3.10 Data analysis plan**

The data was analysed using Statistical Package for Social Sciences (SPSS). James, (2000) defines SPSS as a software used to perform quantitative analysis and used as a complete statistical package that is based on a point and click interface. In this study the data on demography was analysed using bar graphs were two variables will be looked at, that is age against professional qualification. Methods of teaching mathematics at ECE level were analysed using frequencies. Frequencies provide statistics and graphical displays for describing many types of variables (methods of teaching mathematics at ECE Level).

### **3.11 Summary**

This chapter looked at the methodologies and stated the research design. The researcher also stated the research instruments used. Population and sample were defined. The researcher rounded up by stating the sampling techniques used.

## **CHAPTER 4 : Presentation and Analysis of Findings**

### **4.0 INTRODUCTION**

This chapter focuses on the presentation, interpretation and analysis of data accumulated from field research conducted in Khumalo cluster primary schools through questionnaire administration and interviews. The data presented and analyzed hereafter provides a basis for answering the research and sub-research questions appropriately, and assist the researcher in deriving research conclusions. Data obtained from the research was presented, interpreted and analysed in relation to the following themes:

**Theme 1:** What are the best methods of teaching mathematics at Early Childhood Education level?

**Theme2:** How can teachers be assisted to employ the best methods in teaching mathematics at ECD level?

### **4.1 Presentation and Analysis of Findings**

#### **DEMOGRAPHICAL DETAILS**

**Table 1: Gender of the respondents (N = 35)**

<b>Respondents</b>	<b>Number</b>	<b>Percentage (%)</b>
<b>Male</b>	<b>1</b>	<b>3</b>
<b>Female</b>	<b>34</b>	<b>97</b>
<b>Total</b>	<b>35</b>	<b>100</b>

Table: 2 indicates that 3% of the Early Childhood Education teachers were males and 97% were females. Khumalo cluster is therefore staffed with more females. This could be because

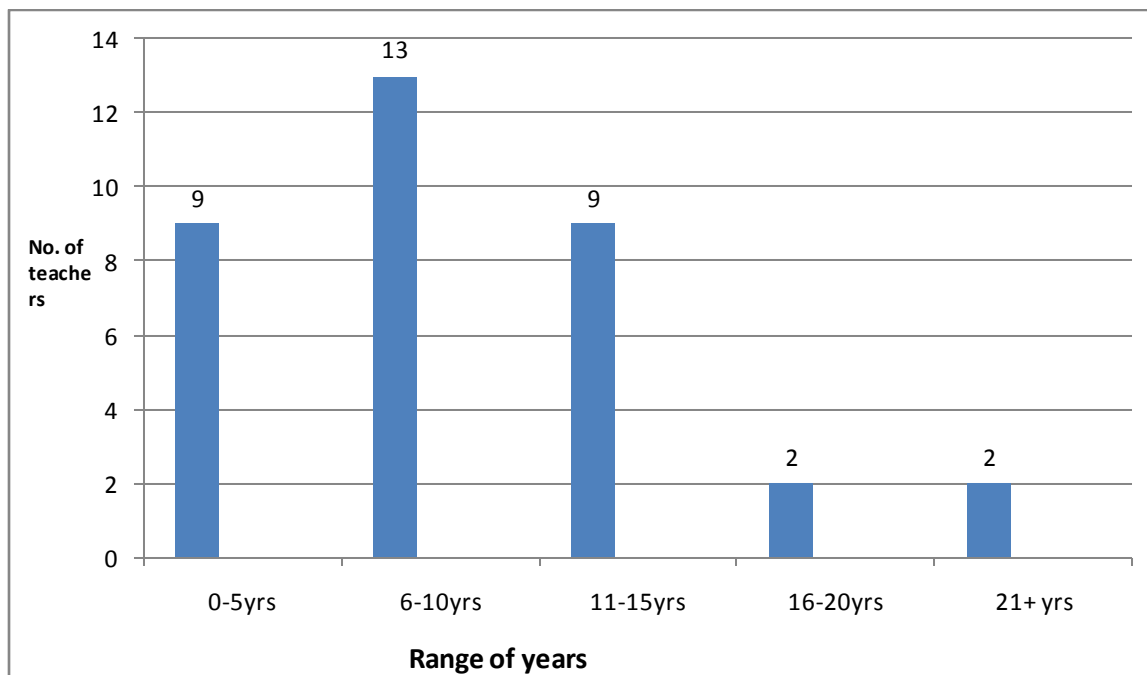
females are more loving to young children than males therefore females prefer much to be with the young ones most of the time.

**Table: 2 Teachers responses on professional qualifications (N=35)**

<b>Qualification</b>	<b>No. Of teachers</b>	<b>Percentage (%)</b>
Diploma in ECE	7	20
Diploma in general primary education	16	46
Diploma in junior education	5	13
Degree in ECE	3	9
Degree in general education	3	9
Masters in education	1	3
Total	35	100

Results from table: 2 indicate that all the respondents had formal teaching qualifications. 3% of the respondents were holding masters in ECE, 9% of the respondents were holding degrees in general primary education, 9% were holding degrees in ECE, 5 were holding diploma in junior education. The highest percentage 46% of the respondents was holding diploma in general primary school education, 20% were holding diploma in ECE. Generally, the results show that only 26% of the total population received a formal training in ECE and possessed either a diploma or a degree in ECE. This explains the issue of unspecialised teachers who lack knowledge of child development and various developmental aspects of young children. An emphasis thus needs to be laid on a specialised, professional teacher training in ECE in order to make a difference in teaching and learning process in ECE. The encouragement is therefore that most of them could perhaps be sent for an up gradation in their qualifications.

**Figure : 1 Teachers’ responses on teaching experience**



Results from Fig 1 indicate that 26% of the teachers range between 0-5 years of experience in the teaching field, 37% range between 6-10 years, 26% range between 11-15years, 6% range between 16-20 years and the other 6% have more than 21 years experience. Overall, the findings show that many ECE teachers in Khumalo cluster primary schools range from 6-10 years experience. The five Teachers in charge interviewed ranged from 10-40 years experience. This shows that the participants are in a good position to provide reliable information from their experience since most of them are well experienced in ECE teaching.

**Theme 1: Best methods of teaching mathematics at Early Childhood Education level?**

**Table 3: Teachers’ responses on best method of teaching mathematics at ECE level (N =35)**

Method	No. Of teachers	Percentage (%)
Play way	7	20
Hands on	10	29
Learner centred	15	42
Rote learning	2	6
Lecture	1	3
Total	35	100

Results from table 3 indicate that 20% of the ECE teachers stated that play way method is the best method of teaching mathematics at ECE level, 29% indicated that hands on whilst 43% indicated learner centred method. Only 6% indicated rote learning method and 3% indicated lecture method as best methods of teaching ECE mathematics. One of the Teachers in charge interviewed stated that she uses a variety of teaching method depending on the concept being taught whilst the other four agreed with the ECE teachers on the use of methods that involve learners much. Therefore the results clarify that play way, hands on and learner centred methods are the best methods of teaching ECE mathematics. In support of this Darling-Hammond (2000) states that hands on and learner centred methods make lessons interesting since they have maximum involvement of learners in the learning and teaching process unlike lecture and rote learning methods.

**Mathematical skills developed in learners through the use of what are considered to be the best methods.**

**Table: 4 Teachers responses on mathematical skills developed in learners through the use of what are considered to be the best methods. (N= 35)**

Skills	No. Of teachers	Percentage (%)
Counting	2	6
Adding and subtraction	1	3
Recalling	8	22
Problem solving	1	3
Critical thinking	23	66
Total	35	100

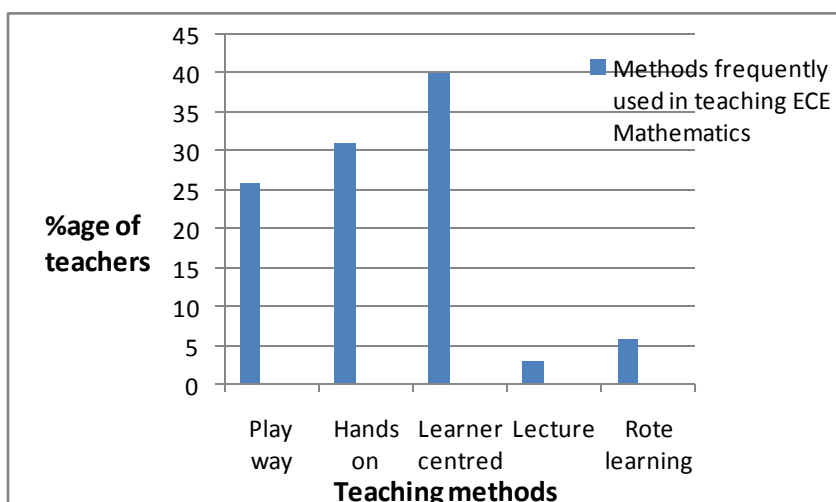
Table: 4 shows that there are several competences developed in learners through the use of what are considered to be the best teaching methods at ECE level. 6% of the ECE teachers

stated learners develop counting skills, 66% indicated that learners develop competences in critical thinking, 3% indicated that learners develop recalling skills. Only 3% indicated that learners develop adding and subtraction skills whilst the other 3% stated that learners develop recalling skills. Some other teachers indicated that one teaching method may help learners develop multiple skills at a time for instance hands on method helps in development of critical thinking, problem solving and recalling skills when used in a single lesson. THE TICs also agreed that the learner centred methods and hands on methods helps learners develop a variety of skills. They uttered that learners become critical thinkers and problem solvers.

Therefore play way, hands on and learner centred methods as indicated by the results automatically become the best methods of teaching mathematics at ECE level as they lead to the development multiple skills in learners. Hattie (2009) states that an effective method of teaching mathematics should be in a position to induce more than one skill in learners.

**Methods frequently used to teach mathematical concepts in class.**

**Figure: 2 Teachers responses on methods frequently used to teach maths concepts at ECE level.**



Results on figure : 2 indicate that 20% of the ECE teachers frequently use play way method, 40% frequently use learner centred method, another 40% use hands on method, 3% use

lecture method and 6% uses rote learning method. Results from the Teachers in charge interviewed also took the same route as they all agreed that they use either one of the already mentioned methods when teaching maths at ECE level. On probing further the TICs alluded that the methods highly engage learners in the classroom activities and helps learners to grasp concepts fast. Play way, learner centred and hands on methods are mostly used by many teachers which means that they are the best methods of teaching mathematics at ECE level because they largely involve participation of learners in class. In support of that, Bayer (2012) states that involvement of learners in the teaching and learning process makes teaching very easy and lead to the fast understanding of concepts especially in mathematics.

## **Discussion**

The information that has been revealed by the respondents shows that there are few males in the teaching of ECE Level. From the sample, 3% were males and 97% were females. Lack of patience to children and low teacher salaries are some of the reasons that there are few males in the field. In support of that, Charlesworth & Lind (2003) states that males are normally breadwinners in most of the southern African countries and the fact that teachers are underpaid in Southern Africa males are reluctant to partake in teaching jobs. There is a need therefore of revisiting teachers' salaries so that more males will join the field and make a difference in ECE.

All respondents were in agreement that play way method, hands on method and learner centred methods are the best methods of teaching mathematics at ECE level. Slow learners and those with a short listening span mostly concentrate if they are involved in the learning and teaching process. In support of that, Looney (2009) states that effective ways of teaching are the ones that involve high participation of learners either in or out of classroom. It is therefore quiet important to engage learners in classroom activities. In support of this

Bergeson, (2000) states that young learners forget fast if they here, remember fast if they see and know if they do or touch. Methods like hands on and play way methods make learners remember concepts learnt as they will be having last images and memories of exciting moments.

The results also revealed that there are a few teachers who are specialised in Eearly Childhood Education. Most individuals do not possess the prerequisite skills that they need in order to teach ECE level. Robertson (2013) postulates that insufficient knowledge and inadequate skills by the classroom practitioners lead to poor concepts delivery. To curb such problems teacher should be sent for up gradation of their qualification so that they will have full knowledge of the ECE system. Though it may be the case, the strategy is meant to compliment the implementation of best teaching methods at ECE level.

As revealed from the study, there are mathematics skills that learners develop when best teaching methods are used. It has been revealed that learners become critical thinkers, problem solvers and analysts. Learners also develop counting skills, recalling skills as well as adding and subtraction skills through the use of best teaching methods. Looney (2009) states that a teaching method is regarded as best if it helps learners to develop multi- skills.

**Theme2: How teachers can be assisted to employ the best methods in teaching mathematics at ECD level.**

**Table: 5 Teachers’ responses on attendance of out of school workshop on the teaching of mathematics in the past two years. (N = 35)**

<b>Responses</b>	<b>No. Of teachers</b>	<b>Percentages (%)</b>
<b>Yes</b>	<b>14</b>	<b>37</b>
<b>No</b>	<b>21</b>	<b>63</b>



Results from figure: 5 indicate that 63% of the ECE teachers never attended any out of school workshops and only 37% attended the workshops. This clearly explains why teachers are facing challenges in implementing the best methods of teaching mathematics at ECE level. Most teachers lack exposure and socialisation with other ECE teachers from other clusters so that they share skills and strategies in teaching mathematics at ECE level.

### **New methods and strategies learnt from out of school workshops**

**Table: 6 Teachers' responses on new methods and strategies learnt from out of school workshops. (N = 13)**

No. Of teachers attended workshops	Percentage (%)	New strategies learnt	New method learnt
5	38	Remedial teaching and use of readily available media/ resources	Outdoor teaching method
5	38	Regrouping of learners according to ability	Peer to peer / discussion method
3	24	Staff development at school level and remedial teaching	Excursion method

Results from Table: 6 shows that 13 teachers have attended out of school workshops on the teaching of mathematics in the past two years. The 13 teachers indicated that they have learnt new methods and strategies of teaching mathematics at ECE level. Thirty- eight percent of the teachers who attended out of school workshops indicated that they learnt that regrouping of learners according to ability helps in effective implementation of best teaching methods in maths concepts. They also indicated that Peer to peer / discussion method was one of the new methods of teaching that they learnt. Twenty – four percent indicated that they learnt that staff development at school level and remedial teaching should be done and this can be fully put to action through the use of outdoor teaching method. The other thirty- eight percent indicated that they learnt that use of readily available media/ resources is a strategy that can

help teachers to fully implement the best teaching methods in mathematics. They also indicated excursion method as the new method that they learnt from the out of school workshops that they have attended.

The results therefore explain that out of school workshops are very important when teaching ECE as they equip teachers with new strategies and methods of teaching. Out of school workshops also give ECE teachers opportunity to socialise and share teaching ideas with other ECE teachers from different schools. In support of that, Stewart (2003) states that out of school programmes or workshops are a crucial way of helping and motivating teachers to improve their teaching ways.

#### **Workshops or seminars for the teaching of mathematics at ECE level.**

**Table: 7 Responses on the organisation of workshops or seminars on the teaching of mathematics at ECE level. (N = 35)**

Responses	No. Of teachers	Percentage (%)
Always	8	23
Never	18	51
Sometimes	9	26

Results from table: 4 shows that only 23% ECE teachers said that their schools always organise workshops and seminars on mathematics teaching at ECE level, 26% said that their schools sometimes organise mathematics workshops and 51% indicated that their schools never organised any workshop or seminar on teaching of mathematics at ECE level. Most teachers never attended workshops on the teaching of mathematics and this is evidenced also by the failure of teachers to implement the best method of teaching mathematics at ECE

level. It is therefore the role of the school to organise workshop for teachers so that they become equipped and effective in the teaching of mathematics at ECE level.

**Strategies to assist teachers so that they can use best methods in teaching mathematics at ECE level.**

**Table: 8 Teachers’ responses on the strategies to assist teachers so that they can use best methods in teaching mathematics at ECE level. (N =35)**

Strategies used	No. Of teachers	Percentage (%)
-Provision of adequate resources -send to out of school workshops and staff developed frequently	22	63
-Provide good working conditions and incentivizing teachers	13	37

Results from table: 8 indicate that various strategies should be used to assist teachers so that they can use best methods in teaching mathematics at ECE level. Sixty three percent of the ECE teachers said that teachers should be provided with adequate resources, send to out of school workshops and staff developed frequently at school level. Thirty seven percent indicated that teachers should be provided with good working conditions and incentives so that they implement best method of teaching at ECE level. To add on that the five teachers in charge interviewed also uttered that in-service training of teachers, workshops and team work are some of the strategies to assist teacher to employ best methods of teaching mathematics at

ECE level. Some of the important strategies that enhance child centred methods such as exploration, experimentation and manipulation for example, did not surface in the examples given out clearly by the teachers. This perhaps could be due to lack of specialisation of the ECE teachers.

### **Discussion**

Results indicated that in the teaching of mathematics, teachers face problems such as shortage of resources, unqualified teachers in schools, high enrolment and language problems from learners. Strategies such as staff development at school level, provision of adequate teaching resources and out of school workshops should be put in place to help teachers implement the best methods of teaching mathematics. Froebel (2006) postulates that out of school workshops help teachers socialise and share ideas with other teachers in the learning area.

Results also revealed that most school do not organise seminars for ECE teachers. This however led to poor quality of teachers in school as they would be lacking new strategies and methods of teaching concepts. Results also revealed that strategies such as staff development at school level, workshops and seminar as well as providing teachers with adequate teaching resources may help teacher to employ the best teaching methods at ECE.

### **4.3 Summary**

In this chapter, the researcher presented, interpreted and discussed the results obtained from the interviews and questionnaires. The results in the data presentation and analysis provided answers for the research problem.

## **CHAPTER 5: Summary, Conclusion and Recommendations**

### **5.0 Introduction**

In this chapter, the researcher is going to summarise the whole study and giving conclusions based on the findings. Furthermore, the research will also suggest possible solutions and recommendations.

### **5.2 Summary of Chapter 5**

The purpose of the research was to explore the effective methods of teaching mathematics at ECE level. The researcher focused on the background of the problem, research questions and the significance of the study. Furthermore literature from other scholars which was relevant to the research project was reviewed and was used to support the research. The researcher also focused on research design and methodology. Definitions of the key terms were given. The research instruments which are interview guide and questionnaire were clearly described and explained as well as how the research was carried out. Data was collected and presented in the form of tables, graphs and pie charts.

The study showed the best methods of teaching mathematics at ECE level and how teachers can be assisted to implement the best methods of teaching mathematics at ECE level. The research revealed that learner centred methods, hands on methods and ply way methods are effective in the teaching of mathematic concepts at ECE level because they fully involve learners in the teaching and learning process.

## **5.4 Conclusions**

### **Best methods of teaching mathematics at Early Childhood Education.**

The study revealed that ECE there are a variety of best teaching methods in mathematics at ECE level which include hands on, learner centred and play way methods because they give learner opportunity to handle, observe and do. These are also said to be the best methods because they help learners develop multi-skills such as problem solving, counting and recalling. The study also gives promising insights pertaining to teaching of mathematics in Khumalo cluster primary schools.

### **Strategies that can be used to assist teachers employ best methods of teaching mathematics.**

The teachers' attempts are however, thwarted by the fact that they have limited scope of knowledge and resources with regard to ECE mathematics and hence children's engagement is restricted to fewer mathematics related activities. To curb such disturbances strategies such as constant staff development, provision of adequate teaching resources and incentivising teachers are of great importance.

## **5.5 Recommendations**

The findings of this study prompt the following recommendations to be made:

- The study proves that ECE teachers need empowerment to be able to carry out the daily life activities in schools, and in turn teach the children the mathematical concepts at ease. This support could be in the form of some organised workshop, or some short courses or some refreshers' courses, which could empower them with skills to work with the young ones in ECE level.

- An idea of a mathematics centre where the children could be taught using varying methods, very basic mathematical concepts in a very simple and play way method could be well articulated at this point. Such mathematics centre could even be used to train ECE teachers on the usage of basic, real life activities to teach mathematics concepts at ECE level.
  
- The results also emphasise the importance of resources. Provision of mathematics corners with appropriate materials could not be undermined. The school's administrations need to take note of such essential resources as today's learners need to gain a wide variety of knowledge and skills in mathematics and this cannot be achieved without relevant materials, supporting curriculum coupled with teacher competencies and skills.
  
- The issue of empowerment of ECE teachers is most crucial. Currently, most ECE teachers are not qualified or trained in ECE and they need specialised training, and a provision needs to be made both for in-service and pre-service training. They need to be empowered with teaching of mathematics on an equal footing. The ECE teachers need to be prepared to do activities indoors, as well as outdoors as they are the catalysts of the learning process and the success of education rests on them.
  
- An emphasis on comprehensive specialised training in ECE needs to be made. Just any teacher training programme cannot prepare them to work with the young ones at various set ups.
  
- A well formulated curriculum should also be put in place for providing guidance to ECE teachers, which is currently not clear in Zimbabwe. There is an urgent need therefore to review educator programs offered in the country to establish the extent to which they prepare teachers for teaching mathematics.

- The government should also expedite full implementation of the national early childhood curriculum.

It should be noted that all the recommended options can make a difference in the current status quo. This will provide a yard stick for teaching mathematics at ECE level.



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