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DEGREE IN MATHEMATICS

EFFECTIVE USE OF THE GROUPWORK METHOD IN THE TEACHING AND LEARNING OF MATHEMATICS AT FORM TWO LEVEL A CASE STUDY OF SECONDARY SCHOOLS IN MASVINGO DISTRICT

BY

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DECLARATION FORM

I declare that this dissertation is the product of my own work and that it has not been submitted before for any degree or examination in any other University and that all the sources l have used or quoted have been indicated and acknowledged as complete references.

Signed .....

APPROVAL FORM

The undersigned certify that they have supervised, read and recommended to Bindura University of Science Education for acceptance a research project entitled: ***Effective use of Groupwork method in the teaching and learning of Mathematics A Case study of Secondary schools in Masvingo District***

Submitted in partial fulfillment of the requirement of the Bachelor of Science Education Honours Degree in Mathematics

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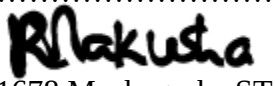

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DEDICATION

This study is dedicated to my caring husband Makusha Garikai who encouraged me through all circumstances to reach beyond the stars. To my son Dylan, I am thankful for all the encouragement and support you have given me.

ABSTRACT

The study was designed to investigate the effective use of group work method in the teaching and learning of Mathematics at Form Two level. The study also investigated the perception on the use of group work method, the merits and demerits of group work method and some strategies to improve the effective use of the group work method. The research paradigm used was informed by the theory of constructivism . The theory suggests that humans construct knowledge and meaning from their experience. Methodology Descriptive survey method was used in this study as a research design. This design provides the extension of the general overview of the effective use of the group work method to the development of further insights and more precise research. I used twenty learners fo my sample reseach. The sample size ot teachers who were interviewed was six chosen equally from the selected schools. Random sampling technique was used. The data was collected using questionnaires and interviews. The data from the questionnaires and interviews was analyzed and presented. The data from the study was tabulated. The study reveals that both teachers and learners have positive perceptions towards the group work method. However, some teachers have negative perceptions on the use of the group work method. The findings of the study also revealed that the group work method can be utilized effectively in teaching and learning as it improves pupils' performance. It also revealed that the group method increases teacher-pupil interaction and enhances critical thinking in pupils. The study recommends that Mathematics teachers should make effective use of the group method in the teaching and learning of Mathematics at Form 2 level. Teachers should also monitor pupils so that they could easily identify where there are some group problems and assist

in solving problems. The research would conclude that the use of Groupwork Method was very effective in the teaching and learning of Mathematics. Lastly, the study recommends other researchers in the same field of study to take a larger sample than the researcher did. For further research, the study recommends that there is need to include other secondary schools so that the research depicts a national outlook on the effective use of the group method. This may perhaps bring much more realistic views on the actual attitude of pupils and teachers towards the effective use of the group method in the teaching and learning of Mathematics.

Table of Contents

CHAPTER 1 : RESEARCH PROBLEM AND ITS SETTING

INTRODUCTION

This chapter focused on background of study, statement of the problem, purpose of the study research questions, significance of the study, research questions, delimitations, limitations and definition of key terms.

1.1 Background of the Study

The groupwork method has proved to be one of the effective methods of teaching mathematics at form 2 level As a teacher of mathematics I opted for the groupwork method because it is learner centred. Teaching and learning processes in schools are changing and active learning has become an important focus in this time of pedagogical change. The groupwork method was one of the methods used in teaching and learning of mathematics in secondary schools. Research had shown that students learn best when they were actively involved in the process, (Weimer, 2014). The root of the research project lies in the researcher's experiences as a teacher of mathematics at form 2 level in Masvingo Province, Masvingo district during teaching lessons. I had observed that different methods of teaching mathematics were meant to enable learners to grasp different concepts that were being taught and to encourage critical thinking which would prepare learners to become problem solvers in future life.

As a teacher aspiring to be effective, it was imperative that I had to find alternative teaching methods that provide significant improvement in learners' performance hence the research on the effective use of the group method in teaching and learning of Mathematics among form 2

learners. The researcher was also motivated by the new paradigm in teaching which portrays a social constructivist approach to teaching and learning which promotes cooperative learning as an alternative to the traditional lecture method (Brookfield, 2006). Selecting a method that caters for the diversity of learners' ages, academic performance and content to be taught was a major challenge for teachers.

According to Barkeley et al (2005), if the group method was incorporated in the teaching and learning environment, the amount of student practice was increased. Research by Woodward (1995) had shown that all lessons have limited time thirty-five to forty minutes while they were many students such that during a teacher led activity, only a few students took an active part in the lesson. This shows that there was need for the teacher to involve the whole class by use of the group method. Also according to Blowers (2000) cited in Beebe and Masterson (2003) research has shown that employers want college graduates who possess the ability to work in groups and had developed suitable teamwork skills. Therefore, the group method should be nurtured in the early stages. The researcher also observed that the group method relieves learners from individualism that may characterize most lessons and also sharing of ideas was promoted.

According to Garvey and Knig (1977:18), a teacher who wishes to interest his pupils in the subject they were studying must devise a variety of methods of teaching them and a multiformity of activities for them to engage in and not rely simply on the diversity of topics which had to be treated like the syllabus. Taruvinga and Moyo (2000) echo the same sentiments when they argued that the group method served the learning needs of pupils.

1.2 Statement of the Problem

The group method as a method of teaching has many advantages. However, it seems that most teachers who were teaching Mathematics in secondary schools were relying on other methods of teaching at the expense of the group method. This research therefore sought to explore effective use of the group method in teaching and learning of Mathematics among Form 2 learners at two secondary schools in Masvingo cluster Masvingo District.

1.3 Purpose of the Study

The purpose of this study was to explore the effective use of the group method in teaching and learning of Mathematics at form two.

1.4 Objectives of the Study

The following are the objectives of the study;

1.4.1 To find out learners' perception on the group method in the teaching and learning of Mathematics at Form 2 level.

1.4.2 To determine the merits and demerits of using the group method in the teaching and learning of Mathematics at Form 2 level

1.4.3 To establish the strategies to be employed for the effective use of the group method in the teaching and learning of Mathematics at Form 2 level .

1.5 Research Questions

1.5.1 What are learners' perception on the group method in the teaching and learning of Mathematics at Form 2 level?

1.5.2 What are the merits and demerits of using the group method in the teaching and learning of Mathematics at Form 2 level?

1.5.3 How can be the groupwork method effectively employed in the teaching and learning of Mathematics in Form two level?

1.6 Significance of the Study

The following contentment explains why this research is significant;

The results of this research wouldl help education planners and curriculum reviewers to ensure that teachers used the group method for successful teaching in Mathematics. They would also make some topics in the syllabus to be solved in groups. The research would also give the research more insight into the effective use of the group method in teaching and learning Mathematics among form two learners. The research would also be of great importance to many teachers when they discovered that the findings of the research could be put into effective use of the group method in teaching and learning of mathematics and also other subjects. The researcher also hoped that the findings of the research would help to improve the pass rate of Mathematics at form two level due to the effective use of the group method. The research was also expected to benefit not only teachers in Zimbabwe but also those abroad.

The research would attempt to identify weaknesses and difficulties which teachers may encounter in the teaching and learning of Mathematics using the group method. It would also

explore solutions which teachers may use among learners in the effective use of the group method.

Through this research, teachers were going to be reminded of the pivotal role they had to play in ensuring the achievement of educational goals through the effective use of the group method in the teaching and learning of Mathematics. On successful completion of this research project, the researcher would be conferred with a Bachelor of Science Mathematics Education by Bindura State University.

The researcher also had a thorough understanding of the effective use of the group method in the teaching and learning of Mathematics and thus help to improve learners' performance and pass rate. Learners of Mathematics would also benefit through the implementation of the findings of the research by the researcher. The findings of the research would also be a base for future studies in related topics.

1.7 Assumptions of the Study

The following were the basic assumption of this study;

It was assumed in this study that the time for data collection was adequate and the study was completed in good time. The finances were available to successfully carry out the study. It was also assumed that the researcher made questionnaires available to learners and that the learners and teachers cooperated in answering the questions. It was also assumed that there would be clear access to data required by the researcher to carry out the research in a meaningful way.

1.8 Delimitations of the Study

The following were the delimitations of the study;

The research concentrated on the effective use of the groupwork method in the teaching and learning of Mathematics among Form 2 learners at two selected secondary schools in Masvingo cluster, Masvingo district. The study was confined strictly to Form 2 learners doing Mathematics at the two selected schools and teachers teaching Mathematics at Form 2 level at the two selected schools The topics which were mainly used when teaching groupwork methods were Quadratic Equations,Laws of Indices and Trigonometric Ratio.. In a bid to find the effective use of the groupwork method, one school in Masvingo urban and the other in Masvingo peri-urban

1.9 Limitations of the Study

The following were the limitations of the study;

The numbers of schools chosen for investigation were going to be confined to two schools due to shortage of time and resources to use. It was the researcher's wish to get in touch with many schools in the country so that the research project was going to depict a national outlook. The researcher did not have enough financial resources to conduct a research of this magnitude and had to forgo some of the family budgets to cater for this research.

1.10 Definition of Key Terms

The following are definitions of key terms;

Effective; Jewell (2002:442) defined effectiveness as the achievement of objectives. If an educator sets up objectives and achieves them as intended, this reflects that he or she is

effective.

Group Method; Gwarinda (1995) described the group method as an assignment or a piece of work to be tackled by two or more pupils in one group but with same objectives. A group could therefore be seen as the combination of the efforts of two or more learners in one group who have the same objective. It could be described as any number of learners with similar norms, values and expectations who regularly consciously interact. Effective use of the group method was the extent to which the group could achieve any set goals or objectives in the teaching and learning of Mathematics.

Learning; Farrant (1988:07) defines learning as, '' a process by which we acquire and retain attitudes, understanding, skills and capabilities that cannot be attributed to inherited behaviour patterns or physical growth''. From this definition, one can say that learning was a change in behavior through an experience and this change is normally influenced by the environment the learners are exposed to.

Teaching; Rwambiwa (2001:13) defines teaching as, "the provision of an environment for effective learning". Teaching is therefore, a combination of learners' activities supported by the use of suitable resources to provide a particular learning experience (process) and to bring about the desired outcome (the product).

1.11 Chapter Summary

This chapter introduced the problem and the background to the study, statement of the problem under study, aim of the study, the objectives, research questions as well as the significance of the study. The chapter focused on the assumptions of the study, limitations and delimitations of the study. The next step is to discuss the nature and scope of the group method based on theoretical foundations and empirical literature as stated and viewed by

different writers and authorities on the effective use of the group method in teaching and learning of Mathematics. The next chapter would entirely deal with the review of related literature.

CHAPTER TWO

2.0 REVIEW OF RELATED LITERATURE

2.1 Introduction

The purpose of this study was to explore the effective use of the group method in the teaching and learning of Mathematics among form 2 learners. This chapter will focus on the review of related literature where the researcher will focus on the theoretical framework of constructivism on the teaching and learning of Mathematics. It would also highlight on learners' perceptions on the group method, the demerits of the group method and the strategies to improve the effective use of the group method in the teaching and learning of Mathematics among form two learners.

2.2 Theoretical Concept Framework

2.2.1 Constructivism and the Group work Method

This research would be based on the constructivism theoretical approach to effective use of the group method in the teaching and learning of Mathematics. According to the constructivist theory, humans generate knowledge and meaning from an interaction between their experiences and ideas. According to Tobias and Duff (2009), constructivism is often

associated with pedagogical approaches that promote active learning or learning by doing such as the group method. Constructivism was a theory based on observation and scientific study about how people learn. It also said that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences.

Social constructivism not only acknowledges the uniqueness and complexity of the learner but also encouraged utilizes and rewards it as an integral part of the learning process. Wertsch (1997) in Mathews (2005) shows that the learner as a member of a particular culture inherits historical development and symbol system such as language, logic and Mathematical systems and these are learned throughout the learner's life. This also stressed the importance of the nature of the learner's social interaction with knowledgeable members of the society.

According to Tobias and Duff (2009), without social interaction with other more knowledgeable people, it was possible to acquire social meaning of important symbol systems and learn how to utilize them. Therefore, this makes the group method an important technique as it encourages interaction. In the classroom, the constructivist viewed of learning could point towards a number of teaching practices. It usually means encouraging learners to use active techniques such as the group method and real problem solving. Mathews (2005) shows that the social constructivist teacher provides tools which students formulate and test their ideas, draw conclusions and inferences and pool and convey their knowledge in a collaborative learning environment. Constructivism also transforms the learner from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than mechanically ingesting knowledge from the teacher or textbook (Mayer, 2004).

According to the theory of constructivism, young children develop their thinking abilities by interacting with other children, adults and the physical world. According to Glasersfeld (1989) in Mayer (2004), social constructivism emphasizes the importance of the learner being actively involved in the learning process unlike previous educational viewpoints where the responsibility rested with the instructor to teach and where the learner played a passive role. Mayor (2004) also shows that learners construct their own understanding and that they do not simply mirror and reflect what they read. Learners look for meaning and will try to find regularity and order in the events of the world even in the absence of full or complete information.

According to the social constructivist theory, scholars such as Vygotsky (1978) in Mayor (2004) say learning is an active process where learners should learn to discover principles, concepts and facts for themselves, hence the importance of encouraging the group method and intuitive thinking in learners. Kutla (2000) in Mathews (2005) argues that our own activities and students construct reality together as members of the society can invent the properties other world. Other social constructivists emphasize that individuals make meanings through interactions with each other.

Constructivists also argue that instructors have to adopt the role of facilitators and not teachers. Whereas teachers give a didactic lecture that covers the subject matter, a facilitator helps the learner to get his or her own understanding of the content. Duff and Jonassen (1992) in Mayer (2004) shows that learners with different skills and backgrounds should collaborate in tasks and discussions to arrive at a shared understanding of the truth in a specific field. Underlying the notion of the learner as a processor of knowledge is the assumption that there is no one set of generalized learning laws with each law applying to all domains? Thus cognitive apprenticeship had been proposed as an effective constructivist model of learning

that attempts to calculated students into authentic practices through activity and social interaction.

According to Tobias and Duff (2009), learners should also be constantly challenged with tasks that refer to skills and knowledge just beyond their current knowledge of mastery. This captures their motivation and builds on previous successes to enhance learner confidence. This is in line with Vygotsky's zone of proximal development, which can be described as the distance between actual development and the level of potential development.

2.3 Perceptions on the Groupwork Method

2.3.1 Learners Perceptions on Groupwork Method

According to Gokhale (1995), contributing factors affecting group dynamics include members' attitudes and willingness to cooperate and contribute as a team, the composition of the group, students' competing demands on students' time and attention, heterogeneity from the natural abilities of students and the varying cultural values and beliefs held by group members. The research by Gross (1993) indicates that most students highly valued the significance of classroom group discussions where they could interact with students from other cultures and backgrounds. They saw opportunities to improve their language skills, to enhance their cultural understanding through such intercultural encounters, to broaden the understanding of the subject or assessment-related issues.

According to Gross (1993) most students in his studies show that they liked to enter into group discussions because different students have different ideas. Gross (1993) found that most students in his research shows that they could gain many useful insights from other students.

They perceived the group method as helpful as they could see things from new perspectives. They also found that they are lots of benefits from the group method because different people

had different knowledge and they come up with a wide range of their ideas. Some learners felt that small groups help reduce anxieties arising from a large group where shy personality do not fit and could share ideas and views with other students without much apprehension (Gross (1993). Research has also shown that in group method, students identified that they got more and more different perspectives, enhancing their understanding (Gross, 1993). It has also been found that the group method gives opportunities to express one's opinion, giving an opportunity to influence others' points of view (Gokhale, 1995). The experience of the group method enables learners to clarify, challenge and reflect on their own thinking and their problem solving and conflict resolution skills.

Researchers have shown that students valued highly the significance of the group method where they could interact with students from other cultures and backgrounds, improve their language skills, enhance their cultural understanding and provide them with opportunities to make friends (Gokhale, 1995). However, some students hold intensely negative views about group assignments that require students to complete a task as a group which share marks determined by the performance of the group.

According to Gupta (2004), most students enjoyed the group methods where they could discuss their academic issues but unanimously disliked group assignments where all members shared the same mark regardless of the contribution made by the members. Too many participants argued that this practice seemed to penalize bright and hardworking students and reward dull and lazy ones, and promote laziness and irresponsibility at the sacrifice of the efforts of hardworking students. Students felt intensely negative about this experience and found it to be an unfair and unreasonable practice. Other members do not really cooperate with each other.

Most participants mentioned free riders as a source of stress and a disruptive force (Gupta, 2004). Many said that, without free riders, they would enjoy the group method (Gupta, 2004).

According to Gross (1995), resentment by those who worked hard was a common feeling towards students who received good marks for little or no contribution, Gokhale (1995) said that these slack students and free riders do nothing in the group, and they simply copy what other good and hardworking students would have done but they are allocated the same marks as a group. Thus most participants view groups negatively when the individual's contribution to the irrespective of their contribution.

Research has also shown that setting goals and some ground rules for the assignment task were identified as important, especially if some group members' wanted a high mark rather than just a pass (Gross,1995). Maintaining group harmony rather than challenging each other's views could be interpreted as disrupting group harmony (Gross, 1995). Modesty, respect for authority l and assertiveness are not encouraged in many societies (Gokhale, 2004). Many students are reluctant to identify and acknowledge their strengths, making it difficult to assign particular tasks.

2.4 Merits of the Groupwork Method

Numerous research studies in diverse school settings and across a wide range of subject areas indicate promising possibilities for academic achievement with this strategy. For example, advocates have noted that students completing cooperative learning group tasks tend to have higher test scores, higher self-esteem, improved social skills, and greater comprehension of the subjects they are studying (Barkeley et al, 2005). Numerous other benefits for students have been attributed to this learning technique. Perhaps the most significant characteristic of group learning is that it continually requires active participation in the learning process. According to Beebe and Masterson (2003), group method promotes critical thinking skills and develops higher level thinking skills in learners (Webb 1982 in Barkeley et al 2005). Students working together are engaged in the learning process instead of passively listening

to the teacher presenting information or reading information. Pairs of students working together represent the most effective form of interaction, followed by threesome and larger groups (Swartz, Black, Strange (1991) cited in Davies (1993). When students work in groups members are listening while the other partner is discussing the question under investigation. All are developing valuable problem solving skills by formulating their ideas, discussing them, receiving immediate feedback and responding to questions and comments by their partners Barkeley et al, (2005). Gross (1993) also emphasize that students learn from one another because in their discussions of the content, cognitive conflicts will arise, inadequate reasoning will be exposed, disequilibrium will occur, and higher quality understanding will emerge. The interaction is continuous and all students are engaged during the session as compared to the lecture class where students may or may not be involved by listening to the teacher or by taking notes (Barkeley et al, 2005).

When students work in groups and express themselves orally three benefits occur. First, the more advanced students demonstrate appropriate ways of approaching a problem, how they analyze content material and formulate arguments and justification for their approaches (Barkeley et al 2005). Gokhale (1995) argues that through the process of questioning by peers, students become more aware of the thinking process they are using. Second instead an individual thinking about a problem in small increments, in isolation, a group will often look at a problem from a wider perspective and consider many more options as possible solutions than one person thinking alone would. Third, by discussing various aspects of a problem solution and questioning the more advanced students, the novices in the group can participate in actually solving the problem and eventually learn how to solve problems without the help of their peers (Gokhale, 1995).

Group Method also creates an environment of active, involved, exploratory learning (Davis 1993). The entire focus of collaborative learning is to actively involve students in the learning

process. Whenever two or more students attempt to solve a problem or answer a question they become involved in a process of exploratory learning. According to Beebe and Masterson (2005), students interact with each other, share ideas and information, seek additional information, make decisions about the results of their deliberations and present their findings to the entire class. Students have the opportunity to help structure the class experience through suggestions regarding class format and procedures. This is a level of student empowerment which is unattainable with lecture format or even with a teacher- led whole class discussion (Beebe and Masterson, 2003).

The group method encourages students' responsibility for learning, (Davies, 1993). Primitive interaction, a foundation principle of cooperative learning, builds students' responsibility for themselves and their group members through reliance upon each other's talents, and an assessment process which rewards both the individual and groups. Students assist each other and take different roles within their groups (such as reader, recorder, and time keeper among others).

An emphasis on student involvement is created in the development of the process which the group follows. The empowerment of students produces an environment which fosters maturity and responsibility in students for their learning. Beebe and Masterson (2003) found out that another benefit of using the group method is that students engage in the skills and practices of the subject within the classroom. These practices include reading and understanding programs designing and writing programs, complexity analysis, problem solving, writing proofs, scholarly debate, teaching one another, negotiating meaning, using alternative forms of presentation (for example drawing of trees, graphs and other data structures) and building collegial relationships. By working in small groups, students can be encouraged and helped by their peers and the instructor, and they learn from one another by watching and imitating them (Beebe and Masterson, 2003). According to Davis, (1993), the

group method also enables students to develop oral communication skills. When students are working in pairs, one partner verbalizes his/her answer while the other listens, asks questions or comments upon what he or she has heard.

Clarification and explanation of one's answer is a very important part of the collaborative process and represents a higher order thinking skill (Barkeley et al 2005). Students who tutor each other develop a clear idea of the concept they are presenting and orally communicate with one another.

Gross (1993) describes the benefit of developing oral skills which are discipline specific. As in other disciplines, Mathematics learners used specialized language to precisely communicate with one another. Acquiring the language of the discipline opens the portals to the vast store of knowledge within the subject under study, which is Mathematics (Barkeley et al 2005).

The group method fosters metacognition in learners. Metacognition involves learners' recognition and analysis of how they teach Davis, (1993). It helps learners to monitor their performance in a course and their comprehension of all the content material. This includes detecting errors and learning how to make corrections while monitoring one's performance.

Cooperative learning approaches create learning strategies that are independent of content and thus are transferable to different content areas. The social setting of the group method provides this opportunity. This is where it may be better that the students are interacting with one another rather than with experts, because they are less concerned about looking foolish, about being novices, about not being fluent in the new language of the discipline, about being foreign tourists in a foreign land (Beebe and Masterson,2003).

2.5 Demerits of the Groupwork Method

Beebe and Masterson (2005) found out that the major disadvantage of the group method is that there is a strong tendency for individuals in the group to want to conform to consensus. This can be for a variety of reasons, including the need to feel liked, valued or respected, and tends to make people sensor their ideas accordingly (Doel, 1999). The comparative status of the individuals present also has an important influence. Senior members often want to maintain their image of being knowledgeable, while junior members want to avoid appearing inexperienced 'upstart'. Because agreement on ideas can be gained quickly in a group setting groups tend to select and approve solutions quickly, without exploring all the possibilities (Beebe and Masterson, 2003).represents a higher order thinking skill (Barkeley et al 2005). Students who tutor each other develop a clear idea of the concept they are presenting and orally communicate with one another.

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2.6 Strategies for Effective use of the Groupwork Method

According to Barkeley et al (2005) one strategy to be done to ensure effective use of the group method is to consider the size of the group. Barkeley et al (2005) shows that the dynamics of group size is an important component of the group method. A small group is considered to consist of three or more people (Beebe and Masterson, 2003). Groups of two are called dyads and are not encouraged for the group method because there are no sufficient number of individuals to generate creativity and a diversity of ideas. In general, it is suggested that groups of four or five members tend to work best (Davis, 1993). Larger groups decrease each member's opportunity to participate and often result in some members not actively contributing to the group. In situations where there is a shorter amount of time available to complete a group task it is suggested that smaller groups are more appropriate. Assigning the members of the group is integral to the success of the group. Some teachers prefer to randomly assign students to groups. This has the advantage of maximizing heterogeneity of the group (Davis, 1993) and is an effective way of assigning group members in large classrooms. If the class size is small and the instructor is familiar with most of the learners, the instructor can select the group members based on known attributes of the class. For example, the instructor can form the groups while taking into account performance levels, academic strengths and weaknesses, ethnicity, and gender (Gibbs, 2009).Research by Beebe and Masterson (2003) shows that one way of improving the group method is to avoid self-selection by members into groups. Some instructors allow the class to self-select their

group; however, this has some advantages. Self-selected groups often gravitate towards friends and roommates (Barkeley et al, 2005). This can result in the learners self-segregating and spending more time socializing than working on the group project. Research suggests that groups which are assigned by the instructor tend to perform better than self-selected groups (Davis, 1993) According to Weimer (2014), there is need for teachers to assist students on how to conduct group assignments. Many learners have never worked in a group before or lack the skills to work with others. Instructors cannot assume that learners know how to work together, structure time or delegate tasks. Secondly, the instructor needs to reinforce listening skills and the proper methods to give and receive constructive criticism. These skills can be discussed in class and modeled during class activities. Some teachers use various exercises that are geared toward helping students gain skills to work in groups (Davis, 1993). Small in- class group activities help reinforce cohesion and group unity. Thirdly, the instructor needs to help the learners manage conflict and disagreements. The instructor should avoid breaking up the groups. When a group is establish goals for a successful group (Davis, 1993).

According to Peek and Winking (1995), conflicts in groups need to be avoided for they may disrupt the group method. One way to help prevent conflict and group members who shirk duties is to keep the group small. It is difficult to be a ‘’loafer’’ or a ‘’ slacker’’ in a small group (Davis, 1993). Additionally, matching work assignments to skill sets will help separate the ‘’loafers’’ from the students who are generally struggling. Beebe and Masterson (2003) suggest that instructors should help the students understand the benefits of working together as a group for the group as a whole, which will help students who are struggling. Furthermore, the group should be encouraged to have assigned roles and responsibilities. It is more difficult to be a slacker if the goals are clearly outlined for each member. Instructors

should organize small groups of approximately 3 to 6 members so that students are mixed heterogeneously, considering academic abilities, ethnic backgrounds, race, and gender (Weimer, 2014). Research has shown that students should not be allowed to form their own groups based on friendships or cliques (Atkins, 2010). They also tend to become tolerant of diverse viewpoints, to consider the thoughts and feelings of others, and to see more support and clarification of various opinions. Teachers should also provide directions and instructions that contain in clear, precise terms exactly what students are to do, in what order, with what materials, and when appropriate, what students are to generate as evidence of their mastery of targeted content and skills (Herpic et al, 2007). These directions need to be given to the learners before they engage in their group learning efforts.

According to Weimer (2014) each student and group should be provided the amount of time needed to learn the targeted information and/ or abilities. If learners do not spend sufficient time learning, the benefits will be limited. Research suggests that many of the positive values, social skills, and academic advantages of cooperative learning tend to emerge and be retained only after learners have spent several weeks together in the same heterogeneous group (Barkeley et al 2005).

Weimer (2014) points out that students should be positioned and postured to face each other for direct eye-to-eye contact and face-to-face conversations. Just because learners are placed in groups and expected to use appropriate social and group skills does not mean they will automatically use these skills. To work together as a group, learners need to engage such interactive abilities as leadership, trust-building, conflict management, constructive criticism, encouragement, compromise, negotiation and clarification (Herpic et al 2007).. Instructors may need to describe the expected social interaction behaviors and attitudes of students, and to assign particular students specific roles to ensure that they consciously work on these behaviors in their groups (Davis, 1993).

According to Peek and Winking (1995), group members should be accountable and responsible for the group. The main reason that learners are put into cooperative learning groups is so that they can individually achieve greater success than if they were to study alone. Thus, each learner must be held individually responsible and accountable for doing his or her own share of the work and for learning what needs to be learned. As a result, each learner must be formally and individually tested to determine mastery and retention of the targeted learning outcomes.

David Johnson, Roger Johnson, and Karl Smith performed a meta-analysis of 168 studies comparing cooperative learning to competitive learning and individualistic learning in college students (Johnson et al., 2006). They found that cooperative learning produced greater academic achievement than both competitive learning and individualistic learning across studies, exhibiting a mean weighted effect size of 0.54 when comparing cooperation and individualist learning. What was of significant in this study was that the academic achievements measures were defined in each study, and ranged from lower level cognitive tasks (e.g., knowledge acquisition and retention) to higher level cognitive activity (e.g., creative problem solving), and from verbal tasks to Mathematical tasks (Johnson et., al 2006). This study which was done is also evidence on the effective use of the group method.

Springer, Stanne, and Donovan (1999) confirmed these results in their meta-analysis of 39 studies in university STEM classrooms. They found that students who participated in various types of small-group learning, ranging from extended formal interactions to brief informal interactions, had greater academic achievements, exhibited more favourable attitudes towards learning, and had increased persistence through STEM courses than students who did not participate in STEM small grouping. This study again is further evidence of the effective use of the group method in learning.

Weimer (2014) emphasize the importance of teamwork. Before the groups are formed and the task is set out, teachers should make clear why this particular assignment is being done in groups. Learners are still regularly reporting in survey data that teachers use groups so they have to teach or have as much work to grade. Most of the teachers are using the group method because employers in many fields want employees who can work with others as a team (Gibbs, 2009).

2.7 Summary

This chapter looked at the conceptual framework which is informed by the theory of Constructivism. It also looked at learners' perception on the group method, the merits and demerits of the group methods and the strategies to employ to make the effective use of the group method in the teaching and learning of Mathematics. In the next chapter, (Chapter 3), the researcher will look at the Research Methodology.

CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the methodology of the research, research paradigm, research design, population, sampling and sampling procedures, data collection instruments, data presentation and analysis, validity and reliability and some ethical considerations.

3.2 Research Paradigm

A research paradigm is "the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed" (Kuhn, 1962). The research paradigm to be used in this research was informed by the theory of constructivism. I justified the use of this research paradigm as the most appropriate for this research topic because it was learner centred rather than teacher centred. Constructivism is a theory which asserts that all knowledge was a product of individuals' interaction with ideas, social milieu and environment in which these ideas were interpreted and applied as stated by Levi Vygotsky.

Constructivism suggests a more student –centred approach to instruction and the group method was one of those approaches. Through interaction with the environment, students were thought to actively build up and re- organize mental structures of knowledge and skills, the teacher was said to be a facilitator of an active, self-directed construction of knowledge not a direct transmitter of knowledge. Thus learning according to constructivism was a

process happening within an isolated mind. Under the research paradigm of constructivism reality has to be interpreted using the appropriate tools. It was used to discover the underlying meaning of events and activities in a consistent manner. The research was qualitative in nature. In general, the researcher was biased towards qualitative methods. Qualitative research was employed because it envisages direct contact with participants and involvement of the researcher and research participants. The researcher aimed on interpretivists research paradigm because it includes social research made in the field. Qualitative research was used because it emphasized direct contact with participants and involvement of the researcher in exploring the effective use of the group method in the teaching and learning of Mathematics at form 2 level.

The social data obtained was analyzed in non-statistical ways. Norman (2011) says use of interpretive paradigm take the stance of emic or insider perspective of the people themselves. He further argued that the experiences and valueof both research participants substantially influence the collection of data and its analysis.

3.3 Research Design

A research design was a detailed outline of how an investigation will take place (Shumbayawonda, 2011). Makore-Rukuni (2001) says research design is a plan or structure for an investigation. It was a set of plans and procedures that reduce error and simultaneously help the researcher obtain empirical data about isolated variables of interest. Creswell (2008) said research design was a master plan specifying the methods and procedures for collecting and analyzing data. In this study the descriptive survey was going to be used. Surveys are meant to describe and explain beliefs, attitudes, opinions and values of a selected sample so

as to make a generalized conclusion. Makore-Rukuni (2001) says surveys interpret, integrate and synthesize data so as to point on implementation and interrelationships and it demands specialized knowledge, experience, originality and resourcefulness from the researcher. The researcher used qualitative method which produced textual data in order to understand phenomena from the perspective of the research participants.

Mouly (1978) showed that surveys were oriented towards the determination of status of given phenomena rather than isolation of causative factors accounting for its existence. Surveys were done not merely to uncover data but also to interpret, synthesize and integrate data in relation to the problem research. Descriptive survey approach was also important in that it was decision-oriented rather than conclusion-oriented. It was going to provide information on which high quality decisions could be made. For example, by identifying the merits of the group method in the teaching and learning of mathematics at form two level, decisions could be made in order to improve the effective use of the group method.3.4 The Population In research, population was the entire group to be studied. Isaac and Michael (1998) in Schawarts at el (2011) defined population as a group of individuals who had one or more characteristics in common. The population in a research context was any target group of individuals that has one or more characteristics in common that was of interest to the researcher for purpose of gaining information and drawing conclusions (Best and khan, 1993; Tuckman, 1994). In the context of this research, the researcher was going to target form two learners studying mathematics at two selected secondary schools in Masvingo district, Masvingo cluster. Learners at two selected secondary schools and also teachers teaching Mathematics at the two selected secondary schools were the target population.

3.4.1 Research Sample

The sample described the actual population under study (Schawarts et al, 2011). Newman (2000) said a sample was that part of the target population that was ultimately selected for the study. In this research, a sample of 20 form two learners doing mathematics was going to be selected. 10 learners were selected from each of the two schools where the research is going to be conducted. 6 form two teachers teaching mathematics at form two levels were also going to be included in the research, 3 from each of the respective two selected secondary schools. Such a sample provided the researcher with a database for interpretation and analysis.

3.4.2 Sampling Procedures

Jackowitz (200:137) defines sampling as the deliberate selection of a number of people who are to provide data from which one draws conclusions about the group. Sanders et al (2008:83-96) asserts that not every member of the population under study is measurable for reasons of cost, time limit and the possibility that there is need to choose a sample which is representative of the target population through the process of sampling. Newman (2000) says stratified random sampling technique can be used to select respondents. In stratified random sampling, the population was divided into two or more subpopulations which are called strata, and then simple random samples were taken in each stratum and then combined to give the desired sample (Munzara, A.T. 2014). This method was suitable where the subpopulation consists of study units with similar characteristics and had to be adequately represented in the final sample for example boys and girls in a school. In order to ensure that this is the case, the sample sizes in each stratum are made to be proportional to their frequency in the population. The sample size 10% of the total population was used. The girls were 12 and boys were 8.

The researcher selected participants at random from within each group. The sub sample results were added together to obtain the figures for the overall sample.

3.5 Research Instruments

Research instruments were defined as systems used to collect data in a research, (Borg and Gall, 1989). Best and Khan (1993) assered that research instruments were methods and resources that could help scholars conduct research more effectively. In the researcher's view, research instruments could be seen as methods and resources and tools used in collecting data when carrying out a research. In an attempt to elicit adequate data from this study, the researcher was going to employ triangulation collection of data method. That means that more than one instrument was going to be used to collect data in order to come up with possible solutions to some challenges.

Consequently, interviews and questionnaires which complement each other where one fell short are going to be used. The Observation method was also used. Cohen and Manion (1993) said that in triangulation, shortcomings of one instrument or method could be compensated for by strength of another. The research instruments used for the purpose responses from the subjects.

3.5.1 Questionnaires

Ben (2012) defines a questionnaire as a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. He further asserts that questionnaires were a series of structured questions which address a specific topic or issue and can be administered personally, via post or through email.

The questionnaires gave the participants space to answer without any influence from this researcher. They were useful to this researcher to gather confidential information. For this researcher questionnaires were cheap, easy to structure and were easy to analyze after completion by participants. This researcher hand delivered the questionnaires and collected

them as soon as they were completed and therefore were convenient for data collection. This researcher personally administered the questionnaires and therefore it was easy since none was lost or failed to get a response. This researcher incurred costs in administering the questionnaires such as printing them and travelling to selected schools for completion. Some learners had poor understanding of the English language and failed to understand simple questions on the questionnaire.

3.5.2 Interview

This was one of the research instruments that are often used to collect data. An interview involves obtaining data from respondents orally. Makore- Rukuni (2001) says it involves direct personal contact with the respondents who are asked to answer questions that are structured and unstructured depending on the researcher. Newman (2003) says an interview is the best way of getting perceptions, feelings and beliefs which is not possible with other methods. The researcher was able to capture the perceptions, feelings when personally carrying out the interviews. Van Dalen (1979) states that interviews involve friendly interactions on a face to face basis. When doing a face to face meeting an investigator is able to probe deeper into a problem. In the interviews carried out the research was very friendly so that information can be obtained deeper into the research problem. The researcher encouraged the interviewee to feel at home and speak their minds. This researcher rephrased or repeated the questions so that the respondent understood what was meant by the questions where there can be some ambiguities. Since this researcher was present requested respondents not to give collective responses. With regard to the disadvantages of interviews, Sidhu (1997) states that interviews tend to obtain data that agrees with the personal conviction of interviewers. Sidhu argued that the very presence of the interviewer may affect the responses. This research encouraged the respondents to speak their minds and not give

answers that appear to have a personal conviction of the researcher.

Robson (1993) also stated that they might be interviewer bias where the interviewer probably unwittingly influences the responses through verbal and non-verbal cues that data may be affected by the characteristics of the interviewer that include personality, the researcher's motivation, skills and experience. This research did not make an influence on respondents through non-verbal cues or facial expression to influence the outcomes from respondents.

3.5.3 **Observation**

Observation instrument was also used in the research. Observation is a process of watching and recording the behaviour of groups or individuals to gather information. Here the researcher actually obseved individuals performing an activity assigned. The observation was carried out on learners actually working on an assigned group activity and the results were noted. The researcher involved direct observation of learners working in groups .The observation instrument was also not limited to learners only but also to the teachers.

3.5.3 Trustworthiness

"Trustworthiness is defined as whether the findings are worth paying attention to". Lincoln and Guba (1985:1) They further suggested that they were four issues to consider under trustworthiness and these were conformability, credibility, dependability, and transferability.Conformability refers to a measure of how well the inquiry's findings were supported by data Lincoln and Guba (1985). Credibility was an evaluation of whether or not the research findings represent a credible concept interpretation of data drawn from the participants' original data Lincoln and Guba (1985). The researcher ensured the credibility of the data by collecting it in the field from participants in the research and analyzed the raw data to draw conclusions from the findings. Lincoln and Guba (1985) refered to transferability as the extent to which findings of the enquiry could be applied beyond the project.

3.5.4 Pilot Testing

Shumbayawonda (2010) says a pilot study involves testing the actual programs on a small presentation sample taken from the target population. The researcher carried out a pilot study before the actual data collection. The process was done to respondents who had similar characteristics with the selected respondents. A pilot study was done in one school in the same district and same cluster but not participating in the study. This was done to find out any difficulty or ambiguities that may be identified, and for their rectification before administering them to the sample that is going to participate in the actual study. The pilot study involved five learners studying Mathematics at form two level and three teachers teaching Mathematics at form two level. The learners were requested to complete

questionnaires; the three teachers were interviewed, and were all be from a selected school not participating in the actual study.

Results from the test of the instruments informed the researcher on whether the participants understood the questions, they were being asked. This offered the researcher the opportunity to improve or modify the instruments. The questionnaires and interview questions were fine-tuned based on the outcome of the testing.

3.6 Ethical Consideration

Manga (1996) advises that the researcher ought to give great deal of attention to measures of ethical consideration. These measures called for the research to be conducted with respect and concern for the dignity and welfare of the informants. The researcher in this research had an obligation to respect the rights, needs, values, desires as sensitive information may be revealed, and the respondents' identities need not to be revealed. The researcher asked for the respondents' consent to complete the questionnaires. The respondents were also informed that the answers provided were confidential and would not be disclosed to anyone but used for the purpose of the research only.

3.7 Data Collection Procedures

Data collection was done through questionnaires and interviews. This section provides a detailed description of the exact steps that were followed to conduct this research. The researcher produced a departmental letter signed by the chairperson of the department of Science Educational from Bindura State University where she was studying seeking for permission to collect information at the schools. The researcher requested permission from

the school heads of the two respective schools to collect information from learners and teachers using questionnaires and interviews respectively. The researcher told the teachers and learners that no names were going to be written on the interview forms or questionnaires for confidentiality purposes and anonymity to maintain privacy of respondents. The researcher personally administered 20 questionnaires to form 2 learners studying Mathematics that is 10 questionnaires to selected learners at each of the two schools and also interviewed 6 teachers that is 3 teachers teaching Mathematics at form 2 level at each of the selected two secondary schools. The researcher personally distributed the questionnaires to learners and collected them after they were completed in the stipulated time. The research made sure that the learners did not share ideas in answering the questionnaire by telling them to complete individually without discussing their answers with colleagues. Interviews were conducted with the selected individual Mathematics teachers and all the responses were neatly recorded.

3.8 Data Presentation and Analysis Procedures

Data analysis was a statement that described the statistical tests that would be used to address research hypothesis (Rudenstam and Newton, 1992). Research results for this study were analyzed through descriptive statistics. Descriptive statistics were used to summarize data collected as tables. On the other hand, data was arranged according to logical themes that used tables. Data analysis was carefully and critically analyzed in order of research questions. The data was sorted, categorized, evaluated and synthesized.

3.9 Chapter Summary

This chapter focused on the research methodology used on this research. It discussed the research paradigm, research design, population, sample, sampling procedures and techniques,

data collection procedures, data presentation and data analysis, trustworthiness and some ethical considerations. The focus of the next chapter was on data presentation, analysis and interpretation. The research would personally distributed the questionnaires to learners and collected them after they had completed in the stipulated time. The research would make sure that the learners would not share ideas in answering the questionnaire by telling them to complete individually without discussing their answers with colleagues. Interviews were conducted with the selected individual Mathematics teachers and all the responses were neatly recorded. Observation instrument was also used in the research and data was collected.The observations was carried on the learners and the teachers involved.

CHAPTER FOUR

4.0 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the findings from the research, using the research methods presented in the previous chapter. The data was collected from two schools in Masvingo district from learners and teachers on the effective use of the group method in the teaching and learning of Mathematics at form 2 level. Data was collected through questionnaires administered to students and interviews were carried out from identified teachers. The information was presented in the form of tables. For analysis and interpretation purposes, the findings of this study were presented in the following order: students' perception on the use of the group method, teachers' perception on the use of the group method then merits and demerits of the group method and strategies to enhance the effective use of the group method.

4.2 Analysis of Bio Data

Table 4.1 Questionnaire Response Rate

	Number	Percentage
Recovered	20	100%

Unrecovered	0	0
Total	20	100%

Of the twenty questionnaires distributed, the researcher managed to recover all of them since the researcher personally administered the questionnaires to the students. The table above shows the statistics. Hubber (2004) posits that a recovery rate on the seventy-five percentile and above is adequate for a practical study. Therefore, the results of the study can be relied upon since the study achieved 100% against a benchmark of 75% by Hubber (2004).

4.3 Teacher Characteristics

Table 4.2 Teacher Experience

Experience in years	Number	Percentage
Less than 3 years	0	0%
3-7 years	2	33.3%
8-12 years	3	50%

13-20 years	0	0%
Over 20 years	1	16.7%
Total	6	100%

Results from the interviews revealed that four (4) out of Six (6) teachers have more than eight years teaching experience while two (2) teachers have less than eight years teaching experience.

Teachers also had adequate experience in the teaching field as shown in Table 4.2. They had between three (3) to more than twenty (20) years of teaching experience. Craig et al, (1998) highlighted that teachers with more experience were likely to change the classroom environment and improve the performance of their students. Therefore, the teachers had adequate qualification and experience.

4.4 Perceptions on groupwork method

4.3.1 Table 2: Teachers' Perception on Groupwork Method

Perception	Number of teachers

Group method is not suitable for large classes	3
Groupwork method is time consuming	3
Groupwork method lead to loss of class control	2
Groupwork method is slow in syllabus coverage	4

According to research findings as shown on the above Table 4.3, most teachers were of the opinion that the group method was time consuming. Three (3) out of six (6) teachers expressed that sentiment. This clearly explained why most teachers avoid incorporating the method in the teaching and learning of Mathematics. One Mathematics teacher commented, “With a class of sixty (60) students, the group method was very difficult if not impossible to incorporate during teaching”. Two (2) teachers revealed during interviews that the group method leads to lose of classroom control. Some teachers interviewed also argued that lack of textbooks is a great challenge for implementing the group method as pupils were depending solely on the teacher as a source of information. Other teachers also mention lack of instructional media and poor internet connection and overcrowding in the use of material

resources such as computers. The majority of learners on their questionnaires indicated that the group method is time consuming.

On group composition, the majority of the teachers five (5) out of six (6) revealed from the interviews that group selection is very important for the effective use of the group method in the teaching of composition can bring a lot of problems to the teacher if not handled well. The teacher was encouraged to use homogenous or ability grouping methods Farrant (1988). For effective use of the group method based on the research findings, teachers were encouraged to use homogenous or ability groupings if he/she considers competition to result in increased pass rates. This was revealed by seven (7) pupils. Five (5) of the pupils said, "The group method is a waste of time if the group wasl not properly constituted with the right mixture of learners that was the academically gifted and the less academically gifted". Mahembe (2002), however, argues that in such circumstances teachers should first realize that the group method works only when there were one or two intellectually competent students in a group who can be used to help other students. The other two (2) pupils mentioned that the usage of group method could be properly done only when the teacher was present and monitoring the groups but once he/she leaves, the classroom would become a hullabaloo of noise and the use of the method would not be effective in teaching and learning. Van Ments (1983) pointed out that the unpleasant experiences are caused by not organizing the activity properly. This was supported by Carlson and Schodt (1995) who state that some students feel the group method brings in fun during learning.

However, a different viewed by Sajjad (2009) in his study revealed that the group method enables learners to make their own notes as they listen to each other's points, noting down key points. One (1) pupil wrote, "The group method removed the stigma associated with poor performing learners as we will be working together as one to achieve a common goal for the

group". This was supported by Nanan and Lamp (1994) who say the group method decreases the chances of feeling stigmatized of low performing students.

According to a research conducted in Kenya, Bunyi et al, (2013) found out that the group method was applied to a lesser extent. Findings above reveal that some teachers were aware of the benefits of group method while others are skeptical about its benefits, they regarded it as time consuming and leads to lose of classroom control. On the other hand, some pupils have also a negative attitude towards the use of group method as they regard it as time consuming and a waste of time. This is in line with Frost (2007) conclusions that when students learn in groups, the groups introduced more unpredictability in teaching since groups may approach group tasks and solve problems in novel ways.

However, findings from the interviews carried out revealed that most of the teachers were of the view that they had made effective use of the group method. Four (4) out of six (6) teachers interviewed alluded to that fact. One of the teachers had this to say, "Learners in Mathematics perform much better if they had previously practiced working in groups than if they had common mistakes which need to be attended to in order to avoid silly errors when solving Mathematical problems. Three (3) out of six (6) teachers highlighted that the group method creates a conducive learning environment. Some learners feel relieved with the group method because they understand better from their peers than from the teacher. The results of the research also indicated that the group method increases teacher pupil interaction. Two (2) teachers alluded to the fact that through giving group tasks and having them presented in front of the class, teachers knew who are good presenters and those who are not good and devise methods to make sure that everyone improves. Five (5) teachers pointed out in the interview that the group method increases the performance of learners and thereby enhances

teacher motivation. One teacher had this to say, “if the overall performance of the various groups is good I feel motivated to continue using the group method because I achieve my objectives”. Students have the opportunity to reveal their existing ideas and to provide rich interactions for creating connections among concepts (Spitulink et al, 1998). The following **Table 4.4 shows the statistics**

Table 4.4 Response from Teachers on frequency of use of the Groupwork Method.

Number of teachers	Response from teachers	Percentage of teachers
2	More often	33%
3	Often	50%
1	Rarely	17%
6	Total	100%

Results of the research from interviews carried out on teachers indicated that two (2) out of six (6) teachers often use the group method in the teaching and learning of Mathematics. Three (3) out of six (6) teachers use the method often while one (1) out of six (6) teachers rarely use the group method. The statistics shows that most teachers use the group method. This could be an indication that interactive teaching methodologies are more effective as advocated by writers like Paulo Freire Nun (2003). Twelve (12) out of twenty (20) learners concurred in their questionnaires that their teachers often use the group method in the teaching and learning of Mathematics. Five (5) out of twenty (20) learners wrote on their questionnaires that the group method is used more often while three (3) learners out of twenty (20) learners indicated that the group method is rarely used in the teaching and learning of mathematics. The statistics are summarized on Table 4.5 Response on frequency of use of the Group Method.

Number of learners	Response from learners	Percentage
12	Often	60%
5	More often	25%
3	Rarely	15%

20	Total	100%

From both Table 4.4 and Table 4.5, the response data in terms of percentages were not equal but were similar in terms of the proportions in percentages terms. This indicated from the research findings that both teachers and learners were concurring on the use of the group method in the teaching of Mathematics.

According to research findings of interviews carried out four (4) out of six (6) teachers emphasized the importance of group feedback. The majority of the teachers said that they get group feedback through written group work and group presentations. This research finding is supported by Farrant (1988) who says that the group method can be made more effective provided that there was a sensible feedback technique. However, eight (8) out of twenty learners said there is usually not enough feedback on what was covered in groups due to time constraints.

4.. Table 4.6 Comparing Individuals vs Group Performance

Group number	**Marks**	**Individual No.**	**Marks%**
1	65	1	62
2	80	2	75
3	70	3	54
4	58	4	10
5	68	5	48
Total	341		249
Mean	68.2		49.8

The data from the above table was extracted from the sample of twenty learners in the study and are the results of observation carried out on the learners. Fifteen learners were put in groups of three to make five groups. They were compared with five learners who did their work individually and the results were tabulated .It was observed that generally those in groups outperformed individuals on average. However, it is possible for an individual to perform more than those in groupwork.It does not mean always the group dominate.Observations where also carried out on the six teachers who where included in the sample. It was also observed that the majority had preference for groups to perform tasks.

4.5 Merits and Demerits of the Group Method

The results of this study indicated that most of the students saw the group method as advantageous. Out of the twenty (20) students who responded to the questionnaire fourteen (14) of them agreed that they can discuss issues together rather than being told. These responses were most likely to have come from those students who attach value to team work, who see student as active rather than passive recipients in the teaching and learning process. Similarly, eighteen (18) out of twenty (20) students answered in their questionnaires that they learn more by asking questions in a group and ten (10) learners agreed that the group method can provide an opportunity for them to get more individual attention. The teachers indicated that the group method give learners freedom to express themselves among their peers. Two (2) teachers out of six (6) teachers were of this view. Four (4) teachers out of six (6) teachers interviewed revealed that learners in a group give each other more individual attention than in a large class. On the contrary, twelve (12) students out of twenty (20) indicated that some people do not participate in a group. They only benefit from the contribution of active group members. This shows that some pupils see the group method as less advantageous. Pupils who are aware of some of the limitations of the group method may hinder participation. For example, in a larger group, any member will feel less personally responsible for what takes place in it. The researcher observed that groupwork promote team work that was sharing of ideas and it encourages critical thinking and decision making.If too many members follow the natural tendency to observe rather than act, a group may lose its efficiency and thereby find it

much difficult to reach its aims (Wood, 1997) Probably students who responded in this way are those who do not participate in group tasks, who believe in jug-mug relationship between teachers and students. Most of the teachers reiterated that even if some learners are not active participants in a group, they are more likely to recall what was discussed in the group even if they are asked individual questions on the concepts covered in a group.

4.5 Strategies to improve the effective use of the Groupwork Method

Teachers were encouraged to devise some strategies to improve the effective use of the group method in the teaching and learning process. According to findings of this study all the six (6) out of six (6) teachers strongly suggested the following strategies to improve the effective use of the group method; to monitor students in groups and to mix gifted with less gifted learners. Interviewed teachers explained that if students in groups are monitored, they could not divert from group tasks. Those who agreed on mixing gifted with less gifted learners openly pointed out that this was the major strategy to enhance the group method. They reasoned that the less gifted learners would be assisted to fully grasp the concepts under discussion.

Table 4.4 Appropriate Group Size

Group size	Number of teachers

2to3	0
3to 6	3
6to9	2
9to12	1
12to15	0

From the interview data shown on Table 4.4 teachers had mixed reactions on the appropriate group size. Half of the interviewed teachers three (3), concurred that teachers should make small groups of about three (3) to Six (6) students each while the other three (3) out of six (6) teachers reasoned during the interview that making small groups is not possible with large classes since it will not be possible to get group feedback from all the groups within the allocated 35 minutes for a lesson. The above research findings are supported by Beard (1967) who made an enquiry among Mathematics and Business studies teachers in London and

showed that it was common practice to note that a group of six is the most ideal although others argue that it depends on the type of topic and the instructional media on use. Fourteen (14) learners out of the twenty (20) learners also revealed that not more than six people can constitute a reasonable group.

4.6 Chapter Summary

This chapter focused on the presentation, analysis and interpretation of collected data. Data was presented, analyzed and discussed around the research objectives and questions under the following sub-headings; perceptions on group method, the merits and demerits of the group method and strategies to be employed for effective use of the group method. The next chapter will focus on research summary, conclusions and recommendations.

5.1 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to explore the effective use of the group method in the teaching and learning of Mathematics among form two learners. This chapter will provide a summary of the major aspects for which the study is designed to present, discussion of the main findings, result based conclusion and subsequent recommendations.

5.2 Chapter Summary

The present study would make a comparative analysis of the effective use of the groupwork method in the teaching and learning of Mathematics among form two learners in Masvingo cluster, Masvingo district. The research targeted form 2 Mathematics learners and their teachers. The target population was of form 2 learners at two selected schools in Masvingo district, one in Masvingo urban and the other 20km away in Masvingo peri-urban. The research sample in this study consisted of 20 Form 2 learners who were selected and divided into two groups of 10 each from each of the two schools. In addition, 6 Form two teachers were also considered as respondents, 3 chosen from each of the two schools.

Descriptive survey method was used in this study as the research design. This design was chosen because it provides the extension of the general overview of the effective use of the group method in the teaching and learning of Mathematical concepts. One of the advantages of the descriptive surveys in this research is that it allows the researcher to investigate phenomena in the natural setting, in this case the school environment. Self-report questionnaires and structured interviews were used as research instruments to collect data from respondents.

Questionnaire A was administered to learners describe their perception on the group method.

The questionnaire consisted of 15 items focusing on students' perception of the group method its advantages and disadvantages. Interviews were done with selected teachers and it consisted of 16 items on teachers' perceptions on the effective use of the group method as well as various strategies to improve effective use of the group method. Thus a total of 20 questionnaires were administered to 20 learners and 6 teachers were interviewed. In this study all the data will be presented in tables. From the study, the researcher found out that most form 2 learners have a positive perception on the use of the group method. They perceive the group method as providing an opportunity for the teacher to give personal feedback on learners' ideas (90 %). Similarly, all learners agreed that with the group method, the teacher is able to achieve his or his lesson objectives.

The research findings also confirmed that most learners who were taught using the group method performed very well. Thus the researcher established that the group method is very effective in the teaching and learning of Mathematics. It was also surprising from the research findings to find out that most teachers have negative perceptions about the group method, a method which promote interaction between learners and which also promote active and participative learning. All teachers (100%) who responded to the interviews indicated that the group method is time consuming. Thus, from these results, the researcher was able to confirm why most teachers avoid this method in teaching and learning. It was however interesting to find out that teachers made vivid suggestions on improving both methods which is quite promising that they will eventually employ the method in the teaching and learning process.

5.3 Discussion

The study investigated learners' perceptions on the group method, the advantages and disadvantages of the group method. The study also looked at the perception of teachers themselves on the group method and various strategies to improve the effectiveness of the group method. Researches have shown that teachers are neglecting child-centred approaches to learning while sticking to the traditional method of chalk and talk. Research confirms that these negative perceptions on the group method were the main reasons why teachers are not employing the method in the teaching and learning of mathematics. In this study, the respondents were randomly selected form 2 learners. Borg and Gal (1989) are in conformity with the selection of the sample. The authors reported that random sampling ensures that each member has an equal chance of being chosen and the procedure ensures representativeness of the entire population.

However, the main limitation of this study was its failure to consider the intellectual or learning ability of learners, a factor which could have provided more vivid results on their class performance and it also failed to include all the secondary schools, an exercise which would have given more general picture on the effectiveness of the group method in the teaching and learning of Mathematics.

The major perceptions of most students on group work were that the teacher is able to achieve his or her lesson objectives (100%) and that the group method provides the opportunity for the teacher to give personal feedback on learners' ideas. These findings were supported by Gross (1993) whose research indicated that the experience of the group method enable the teacher to give personal feedback, helping clarify and elaborate on issues which

seem challenging to learners. These positive perceptions on the group method by learners accounts for their good performance which in turn makes the method more effective in the teaching and learning of Mathematics.

In this research, findings on the advantages of the group method show that 90% of the respondents agreed that they can discuss issues together rather than being told. A similar percentage shows that in groups they could learn more by asking questions to group members and 70% indicated that the group method provides an opportunity for them to get individual attention. This was supported by Gokhale (1995) who reported that students learn from one another. Beebe and Masterson (2003) came up with similar observations that when two or more students interact with each other, they not only share ideas and information but also make decisions about the results of their deliberations. One possible explanation for these arguments was that groups had a greater well of resources to tap and more information available because of a variety of backgrounds and experiences. This showed that the group method is very effective in the teaching and learning process.

Recent studies (Beebe and Masterson, 2003) on the effective use of the group method had revealed more advantages than what this study had revealed. The authors reported that group works stimulate creativity and in regard to problem solving, the old adage can be applied that two heads were better than one. In addition, students engage in practices of the subject such as reading and understanding, communication skills, writing skills, all of which were limited when using other methods such as the lecture based setting.

However, from this study, it was revealed that most teachers have negative perceptions on the group method. This was contrary to the views held by students in the research. All teachers, (100%) interviewed argued that the group method was time consuming and 90% said that the group method was not suitable for large classes while they indicated that the lecture method was suitable for large classes. From these findings, it appeared that teachers prefer other teaching method to the group method. This explained why the group method was not employed by most of the teachers when teaching. Other studies (Barkeley, et al, 2005) revealed the limitation of the group method, but on the part of learners. The authors had indicated that the group method promotes laziness on some group members who act as free riders, did nothing in the group. Although this point was suggested in this study, it was not quite clear whether laziness was on the part of students or teachers.

Research findings on learners' class performance revealed that the group method was by far more effective in the teaching and learning of Mathematics as compared to other teaching methods. Results of the study showed that 80% of the learners attain good marks as a result of the effective use of the group method. The higher performance of learners using the group method was largely due to the fact that people remember group discussions better. This was supported by Barkeleyet al, (2005) who indicated that when working in small groups, learners have a tendency to learn more of what is taught and retain it longer than when the same material is presented in other instructional formats. The research also investigated on the strategies to improve the effective use of the group method.

This was important because this research has established that each of the instructional method was associated with its own limitations and problems. The findings of this research revealed

the following highly rated strategies to improve the group method; as Monitoring students in groups (100%); mixing gifted with less gifted learners (100%); assisting students in groups (70%) and making small groups of about 3-6 each (50%). This means that if these strategies were implemented, the group method wouldl be used effectively even more than what this study revealed.

In support of these findings, Beebe and Masterson (2003) reported that the dynamics of group size was an important component of the group method and that groups of two (dyads) are not encouraged for the group method because there was no sufficient number of individuals to generate creativity and a diversity of ideas.

5.4 Conclusions

The following was a list of research based conclusions of this current study;

-Learners had positive perceptions on the group method.

-The findings of this study showed that learners were able to discuss issues rather than being told. They also indicated that they learn more by asking questions in a group situation.

- Learners pinpointed that the group method made concepts learnt easy to understand and they hardly forget what they would have been taught.

-The results indicated that the group method enables cross pollination of ideas and creates a conducive learning environment.

- It was also noted that some pupils felt overburdened by the use of the group method.

- The results had also revealed that the group method ha many advantages. This position was established by the learners who highlighted numerous advantages of the group method.

- The study also revealed that teachers had

negative perceptions on the group method. Most teachers agreed that the group method was time consuming and was not suitable for very large classes. However, it should be noted that the study was confined to only two selected secondary schools and teachers from other schools were not consulted in this study to provide their own perception. This would have provided a clearer and general picture on teachers' perceptions on the effective use of the group method.

- Teachers felt that the group method needs a lot of time in preparation and use in the lesson.

- Teachers said that the group method improves pupils' participation and performance.

- The findings also indicated that the group method also increases motivation and analytical skills in pupils.

- Results of this study strongly revealed that teachers and learners could make effective use of the group method of instruction in the teaching and learning of Mathematics among form 2 learners.

- Some intervention strategies were important to improve the effective use of the group method.

-Results from this study showed major strategies for effective use of the group method as strictly monitoring learners in groups as well as mixing the gifted learners with less gifted

learners. These strategies among others if incorporated would enhance the effective use of the group method.

5.5 Recommendations

The following recommendations were based on the findings of this study. The study recommends that;

5.5.1 The groupwork method should be employed all teachers as a classroom instructional technique. It is imperative that this method will increase learners' participation during teaching and learning process be employed so that learners take an active role.

5.5.2 Teachers should vary teaching methods to cater for individuals with various learning needs. Teachers should attend staff development workshopson the use of groupwork method. The Curriculum should redesigned so as to cater for groupwork methods.

5.5.3 Schools and teachers should adopt various strategies to improve the effective use of the group method in teaching and learning.

5.5.4 Educational trainers should motivate teachers to employ instructional techniques which promote active participation and participative learning.

5.5.5 Policy makers in the Ministry of Education are encouraged to come up with a blueprint on the implementation of strategies that enhance the effective use of the group method.

5.5.6 There is a need for further research on the group method of teaching and learning. Firstly, there is need to consider the learning ability of the learners when grouping them so

that their innate ability will not affect the results. Secondly, the research must also be being carried out on different secondary schools so as to give a wider picture of the effective use of the group method in the teaching and learning of Mathematics.

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Appendix 1

TEACHER'S INTERVIEW GUIDE

This interview seeks to explore the effective use of the group method in the teaching and learning of Mathematics among form 2 learners. Feel free to provide information that will assist to develop our education system. The answers provided will be treated with strictest confidence and will not be disclosed to anyone but used for the purpose of this research.

1. How long have you been teaching Mathematics?
2. How often do you use group method in Mathematics?
3. How do you place pupils in groups?
4. Which teaching aids assist pupils in learning Mathematics using the group method?
5. How much time is set aside for group method when teaching Mathematics?
6. What do pupils benefit from learning Mathematics using the group method?
7. What are the demerits of using the group method in the teaching and learning of Mathematics at form 2 level?
8. How do you assist the learners in using group method when teaching Mathematics?
9. How do you assign roles in groups when teaching Mathematics?
10. How do pupils give feedback on their group findings when teaching Mathematics?
11. How does your department prepare you to use group method in teaching Mathematics?
12. How do pupils find the use of group method in learning Mathematics?
13. What should be done to improve the use of the group method in the teaching and learning of Mathematics?
14. How do other teachers view the use of group method when teaching Mathematics?

15. Any additional information that can improve teaching of Mathematics using group method?

Appendix 2

LEARNERS' QUESTIONNAIRE

I am Rowesai Makusha, a student at Bindura University of Science Education (BUSE) is studying towards a Bachelor of Science Education in Mathematics. I am conducting a research on "Effective use of the group method in the teaching and learning of Mathematics among Form 2 learners acase of two secondary schools in Masvingo District Masvingo cluster". The information provided in this questionnaire will be treated with the utmost confidentiality and will be used for the purposes of this research only. Please do not write your name or the name of your school.

Thank you for your cooperation.

INSTRUCTIONS.

Please respond by ticking in the spaces provided/ giving information where applicable.

Section A: Biographical data

Tick the most appropriate point

1. Gender: Male..... Female .....

2. Age : 12-13..... 14-15 .....16-17 .....

3. Which form are you?

Form 1..... Form 2..... Form 3 ....Form 4

"A" Level

4. Are you studying Mathematics as one of your subjects?

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5. Does your teacher use the groupwork method when teaching Mathematics?

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6. How often does your teacher use the groupwork method when teaching Mathematics? ---

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7. How do you feel when learning Mathematics using the groupwork method?

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8. What is the ideal groupwork size you are comfortable working with when using the group method in learning Mathematics? ---

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9. Which teaching aids assist you when learning Mathematics using groupwork method? ---

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10. How much time is set aside for groupwork method when learning Mathematics? ---

---.

11. What do you benefit from learning Mathematics using groupwork method? ---

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---.

12. What are the demerits of the groupwork method when learning Mathematics?

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13. How do you assist other learners when learning Mathematics using groupwork method? --

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14. What methods do you use to improve the effective use of the groupwork method when learning Mathematics? ----------

15. How do you give feedback to your teacher on your performance using the groupwork method when learning Mathematics? ----------

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16. How does your teacher prepare you to use groupwork method in learning Mathematics? ---

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17. How do you find the use of groupwork method in learning Mathematics? ----------

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18. What should be done to improve the effective use of groupwork method in learning Mathematics? ----------

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19. How does your teacher view the use of groupwork method when teaching Mathematics? -

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APPENDIX 3

OBSERVATION GUIDE

The teacher shall observe the following :

a) Teacher pupil ratio .....

.....,.....

b)Teaching instruction and methodologies used in groups .....

.....,.....

c)Behaviour of students .....

.....

d)Participating of members in the group .....

.....

e)Feedback of groupwork .....

.....

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