

Practice and Perception of Group Learning Method by Teachers of Mathematics in selected Secondary Schools of Mazabuka District

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ABSTRACT— *The purpose of this study was to determine the practice and perception of group learning method by teachers of mathematics in selected secondary schools of Mazabuka District. The schools comprised of 2 co-education and 2 single sex schools out of a total of eight (8) secondary schools in the district. The study was guided by three research questions namely; “How do teachers of mathematics in secondary schools practice the group learning method?”, “How do teachers of mathematics perceive group learning method in the teaching and learning of mathematics at secondary school?”, “What is the relationship between the practice and perception of group learning method in the teaching and learning of mathematics at secondary school among teachers of mathematics?”.*

During this study data was collected over a period of six (6) months at two different stages. In the first stage, the lesson observation check list was used to record the amount of time spent on various teaching strategies and learning activities practiced in mathematics lessons. During the second stage, a questionnaire was administered to the teachers of mathematics.

The research has established that group learning method was not often practiced and in cases where the method was practiced, the practice lacked the basic principles needed for successful implementation of the method. Secondly, the study established that the teachers of mathematics who took part in the study possess the conceptual knowledge about group learning method and perceived that the method had overwhelming benefits. The study established that teachers of mathematics had negative attitude towards group learning method as they pointed out that group learning method was time consuming, difficult to measure individual level of understanding, and that some pupils do not participate. Thirdly, the findings of this study further suggest that there was a mismatch between the teachers of mathematics' perception about group learning method and how they practiced it. The study concluded by making some recommendations that teachers of mathematics should consider integrating strategies that create opportunities for pupils to actively participate in the lesson. Furthermore, the teachers within the department of mathematics should be planning lessons together where group learning method is integrated with other methods, observe each other and discuss such lessons with the aim of establishing effective ways of practicing the group learning method. The study also challenges policy makers and other stake holders in education that have a responsibility of monitoring teachers to ensure that teachers adhere to the demands of pupil centred methods like group learning method.

Keywords— Practice, Perception, Group and Learning

1. INTRODUCTION

The world over, educators have seen the need for pupils to make a prominent role in the learning process and advocate for the pupil centred methods. According to Wandiba, Thuraira and Baya (2004), learning within pupil centred teaching is mostly by discussion, discovery, group learning, question and answer methods among others. However, in this study the focus was on group learning method. Group learning method is a technique through which individuals acquire, share and combine knowledge through experience with one another (Argote, Gruenfeld and Naquin,2001). Furthermore, group learning method involves pupils of different understanding abilities working together in small groups, usually with the goal of completing a specific task and participants striving for mutual benefits so that all group members gain from each other's effort (Kagan, 1994). For this study group learning method was looked at as a pupil centered, teacher-facilitated instructional strategy in which small groups of pupils are responsible for their own learning and the learning of all group members within a lesson. This method is indispensable as it gives pupils the opportunity to work together and thereby develop essential skills (Kagan, 1992). However, many teachers may have been concentrating

on the wrong classroom practices which negatively impact on pupils' accomplishment and do not create an enabling environment that make pupils have direct interaction with each other on what they are learning (Waters, Marzano, Robert and McNulty, 2003). This could have resulted into what the researcher has experienced as a teacher of mathematics, where it has become a common feature in schools that pupils, who get a question wrong, show different weaknesses in most cases that could have been avoided if they had an opportunity to share ideas. For instance, a question was given to a grade ten (10) class to work out individually and the solutions from three (3) pupils among those who got the question wrong are as displayed below.

Question: Given that $6x + 8 = -3x - 13$. Find the value of x

Solutions

Student 1

$$\begin{aligned}
 6x + 8 &= -3x - 13 \\
 6x + 8 - 8 + 3x &= -3x + 3x - 8 - 13 \\
 6x + 3x &= -8 - 13 \\
 9x &= -21 \\
 X &= \frac{-21}{9} \\
 X &= \frac{-3}{7}
 \end{aligned}$$

Student 2

$$\begin{aligned}
 6x + 8 &= -3x - 13 \\
 6x + 3x &= -8 - 13 \\
 9x &= 21 \\
 X &= \frac{7}{3}
 \end{aligned}$$

Student 3

$$\begin{aligned}
 6x + 8 &= -3x - 13 \\
 6x - 3x &= 8 - 13 \\
 3x &= -5 \\
 X &= \frac{-5}{3}
 \end{aligned}$$

The three pupils got the question wrong with each pupil exposing a unique challenge. From this scenario, the researcher has a strong conviction that if these pupils worked together and not individually, they would have arrived at the correct solution because group learning method takes advantage of the diversity of pupils' experiences and understanding by promoting interaction among pupils in small groups (Kagan,1989). Therefore, this study endeavoured to determine the practice and perception of group learning method by teachers of mathematics in selected secondary schools of Mazabuka District where the researcher hails.

1.1 Research Questions

The following questions were used in conducting this study.

1. How do teachers of mathematics in secondary schools practice group learning method?
2. How do teachers of mathematics perceive group learning method in teaching and learning of mathematics at secondary school?
3. What is the relationship between the practice and perception of group learning method in the teaching and learning of mathematics at secondary school among teachers of mathematics?

2. BASIC FEATURES OF GROUP LEARNING METHOD

The proponents of group learning method have developed some common basic elements to be considered when constructing a lesson involving group learning method which are discussed below.

2.1 Planning

Among the fundamental principles of group learning method is planning on how the lesson will progress. In support, Gillies, Ashman, and Terwel (2008), stated under group learning method that, the teachers are expected to plan a lesson which contains both academic and social skills objectives. The role of the teacher is to design the social interaction structures as well as learning activities (Kagan ,1989). Tasks for group learning method need to be sufficiently open-ended and challenging to engage pupils in higher-order thinking without being too confusing thus preparation is essential.

2.2 Holding every pupil accountable

When first introducing a group activity it is useful to establish some rules for pupils, that is, they should be informed that they are always responsible for their own learning and must be willing to help any group member who asks for help (Garfield, 1991). If they have questions on an activity they should first ask each other, and may ask the teacher only if no one in the group can answer their question. They need to listen carefully to each other and share the leadership, making sure everyone participates and no one dominates. In addition, pupils need to know that each group member's effort is required for group success and each group member has a unique contribution. Pupils in a group must be accountable for

contributing their own share of work and mastering all the material to be learnt for the group's success. Under group learning method the teacher ensures that pupils are actively involved in the intellectual work of organizing material, explaining it, summarizing it, and integrating it into existing conceptual structures (Johnson, Johnson and Holubec, 1998). Members set group goals, describe what member actions are helpful, periodically assess what they are doing well as a group, and identify changes they will make to function more effectively possibly in the future assignments (Johnson and Johnson, 1999; Johnson, Johnson and Holubec, 1991; Kagan, 1994). This is quite a contrast from the role they may be used to in most lessons where they passively listen to a teacher. Nevertheless, systematically structuring basic principles into group learning situations help ensure the controlled implementation of group learning method.

2.3 Face-to-face interaction

According to Davidson (1990), tasks for group discussion require face-to-face interaction, an atmosphere of cooperation and mutual helpfulness, and individual accountability. In other words, arranging pupils so that they face each other for a direct eye-to-eye contact is very important if group learning method has to be effective. Although some of the work during a lesson may be packaged out and done individually, some must be done interactively, with group members providing one another with feedback, challenging reasoning, conclusions and perhaps most importantly, teaching, helping, supporting, approving as well as encouraging one another in order to reach the group's goals. Furthermore, Dejarnette, Dao, and Gonzalez (2014), in their research on group work found that strategies of asking questions, sharing the mathematical authority, pupils productively challenging one another on their mathematical ideas within the group arise and consequently pupils support each other in a positive way.

2.4 Heterogeneous group processing

Group learning method requires grouping pupils heterogeneously because some groups of pupils, especially pupils of poor understanding abilities, are more inclined to function better in group settings than individually. According to Neyland (1994), group learning method is a valuable approach based on the premise that each pupil has an individual thinking style that needs to be identified and shared. That is each pupil in the same group has a unique contribution to make towards the joint effort and members depend on one another to achieve the goal. Each group member's effort is required and is indispensable for group success. It is for this reason that groups are not arranged according to proximity, friendships or cliques.

2.5 Allocating sufficient time

The time allocated to the discussion must be communicated to the members of the group at the beginning. The teacher should ensure pupils have sufficient time to learn targeted information and that groups stay together until the designated subject matter is learnt. The teacher should also have time to observe a group, and invite pupils to share what they have learnt in a group to the whole class. In support, Brophy (1986), stated that pupils achieve more when their teachers emphasize academic objectives in establishing expectations and allocating time and using effective management strategies to ensure that academic learning time is maximized. Furthermore, grouping pupils in small groups that allow high rates of success, and adaptation to curriculum materials based on their knowledge of pupils' characteristics and doing work within a given time frame is a requirement for the success of group learning method.

2.6 Clear instructions

The first aspect proposed by the proponents of group learning method is to make the instructions very clear as well as precise and that in the second aspect the teacher should demand from the groups a production of specific outcomes (Gillies et al, 2008). Besides giving clear instructions that are pertinent to the task at hand, the teacher should state the direction the lesson will take in clear, precise terms and share this direction with pupils before they engage in group learning activities and the teacher should describe exactly what pupils are expected to learn. Additionally, Fisher and Ellis (1990), asserts that having the instructor define problems, specify procedures and assign roles to group members would result in superior interactions characterized by high-level discussions that lead to greater conceptual understanding.

2.7 Monitoring of activities in the group setting

In a research that explored the role of the teacher in promoting group learning method and focused on how pupils learn from their peers during group work as well as how teachers prepared pupils for group work, it was found that the teachers needed to monitor what goes on in the groups (Webb, 2009). Additionally, Gillies et al, (2008) adds that teachers have an opportunity to assess pupils' learning and make concise conclusions to each lesson by clarifying certain issues raised and emphasizing on the important points. A teacher ensures that group members discuss how well they are achieving their goals or how they are maintaining effective working relationships during the lesson. Group activities may be structured to provide some rich information for teachers to use in assessing the nature of pupil learning. While walking around the class and observing pupils as they work in groups, the teacher is able to hear pupils express their understanding of what they have learnt, which provides teachers with an on-going, informal assessment of how well pupils are learning and understanding. In addition, checking on what pupils are doing in groups provide the teacher with an opportunity to offer support to pupils where necessary.

Finally, although the basic principles of group learning method are not exhaustive here, there are several additions and modifications that can be done to the models highlighted above.

2.8 Theories in Support of Group Learning Method

2.8.1 Cognitive Development Theory

Cognitive Development Theorists argue that, cognitive growth springs from the alignment of various perspectives as individuals work to attain common goals. Proponents of a cognitive perspective generally contend that interactions among pupils increase achievement because of more intense information processing. Developmental cognitive theories are generally grounded in the pioneering work of Piaget and Vygotsky. Both Piaget and Vygotsky saw that working together with more able peers and instructors resulted in cognitive development and intellectual growth (Johnson, Johnson and Smith, 1998). This theory generally holds that face-to-face work on open-ended tasks with several possible paths leading to multiple acceptable solutions facilitate cognitive growth.

2.8.2 Constructivist Theory

Constructivism is a theory of learning, which states that pupils construct their own knowledge of the world around them through experiencing things (Mathews, 2000). According to the proponents of this theory, learning requires invention and self-organization on the part of the pupil. The constructivist theory of learning, on which much of the current reform in mathematics and science education regarding the use of group learning method is based, describes learning as actively constructing one's own knowledge. Constructivists view pupils as bringing to the classroom their own ideas, experiences, beliefs that affect how they understand and learn new material. This is opposed to pupils receiving material in class as it is delivered but pupils restructure the new information to fit into their own cognitive frameworks. In this manner, pupils actively construct their own knowledge than copying knowledge transmitted to them from the teacher.

2.8.3 Social Interdependence Theory

Social interdependence theory view cooperation as resulting from positive links of individuals to accomplish a common goal. The Gestalt psychologist, Kurt (1948), proposed that although groups are dynamic wholes, the interdependence among members is varied. Kurt (1948), stated that interdependence developed from common goals provides the essential essence of a group. This interdependence creates groups that are dynamic wholes. The power of the group is such that a change in any member or subgroup directly changes any other member or subgroup.

3. METHODOLOGY

The study was carried out in Mazabuka District. Data was gathered about the practice and perception of group learning method by teachers of mathematics in selected Secondary Schools of Mazabuka District. The research design used in this study was the mixed model. According to Tashakkori and Teddlie (2003), mixed model is research design in which mixing of qualitative and quantitative approaches occur in all the stages of a study. The most appropriate mixed design used in this study was concurrent. The concurrent mixed design is selected when a researcher uses two different methods in an attempt to confirm, cross-validate, or corroborate findings within a single study (Steckler et al., 1992). In this circumstance, both the quantitative and qualitative data collection was happening concurrently during one phase of the research study. A sample of 4 secondary schools out of the total 8 secondary schools in the district was captured. A total of 21 teachers of mathematics were purposively selected to take part in the study. The teachers were selected purposively with the intention to yield a greater understanding of the phenomenon under investigation (Creswell, 2003) because they were teachers of mathematics with relevant experience. Classroom observations were done to establish the amount of time spent on various teaching strategies and learning activities that took place in mathematics lessons (Fisher, Berliner, Filby, Marliave, Cahen and Dishaw, 1981). The researcher observed each teacher of mathematics four times during the study. This was done through video recording of lessons and four (4) videos were recorded from each teacher. The videos were watched and the frequencies of the interactions observed in intervals of 30 seconds for at least a period of 60 minutes were recorded on the observation schedule designed by the researcher and 84 videos of lessons in total were captured. The researcher administered a questionnaire to establish the teachers of mathematics' perception of group learning method in the teaching and learning of mathematics, the challenges and opportunities if any that this method provided. The questionnaire used in this study was semi-structured because the sample of the teachers was relatively large and they were able to read and write (Cohen, Manion and Morrison, 2007). The questionnaire was divided into three sections. Section one (1) had closed-ended questions where the respondents were required to tick the selected response. Section two (2) had open-ended questions with some asking the respondent to indicate "Yes" or "No" before giving an explanation or description. Section three (3) had Likert scale statements which enquired about the teachers of mathematics' perception on the practice of group learning method in the teaching and learning of mathematics under the following categories: conceptual understanding, attitude, implementation and significance.

In this study, quantitative data was managed by using the Statistical Package for Social Sciences (SPSS, 23.0 version) to generate tables and figures which were used to present, analyse, describe and compare data (Durrheim, 1999). Qualitative data gathered through the questionnaire was analysed by the researcher and significant statements pertaining to the practice and perceptions that teachers of mathematics had on group learning method were extracted through

grounded theory procedures, that is, notes and memos were read and re-read and transcribed into categories (Strauss and Corbin, 1998). This enabled the researcher to establish a clear relationship between the practice and perception of the group learning method by the teachers of mathematics (Cooper and Schindler, 2003), as the researcher worked with the data, describing, creating explanations and linking the collected data to what others have collected on the similar study (Glesne, 1999).

4. DISCUSSIONS OF THE FINDINGS AND RESULTS

This section discusses the findings which sought to address the three objectives.

4.1 The Practice of Group Learning Method

The first objective of the study endeavoured to determine the practice of group learning method by teachers of mathematics in the teaching and learning of mathematics at selected secondary schools.

Findings of the study as regards to the teachers of mathematics' practice of group learning method are that 15 respondents indicated that they did not practice this method so often, 2 practiced the method once per week, 1 had never practiced this method and 3 practiced this method daily as shown in table 4.1.

Table 4.1: Teachers' responses on the frequency of using group learning method

Number of Teachers	Response
15	Did not use often
2	Used once per week
1	Never used
3	Used daily
Total	21

Source: Research data

Table 4.1 shows that most of the respondents did not practice the group learning method so often in the teaching and learning of mathematics.

This lack of practice of group learning method was also established by the researchers' observations made by the researcher in the classrooms during the study where 84 videos of lessons were captured and total time of the recordings translated into 4260 minutes. The various teaching strategies and learning activities carried out in mathematics lessons and time spent in minutes is presented in Figure 1.

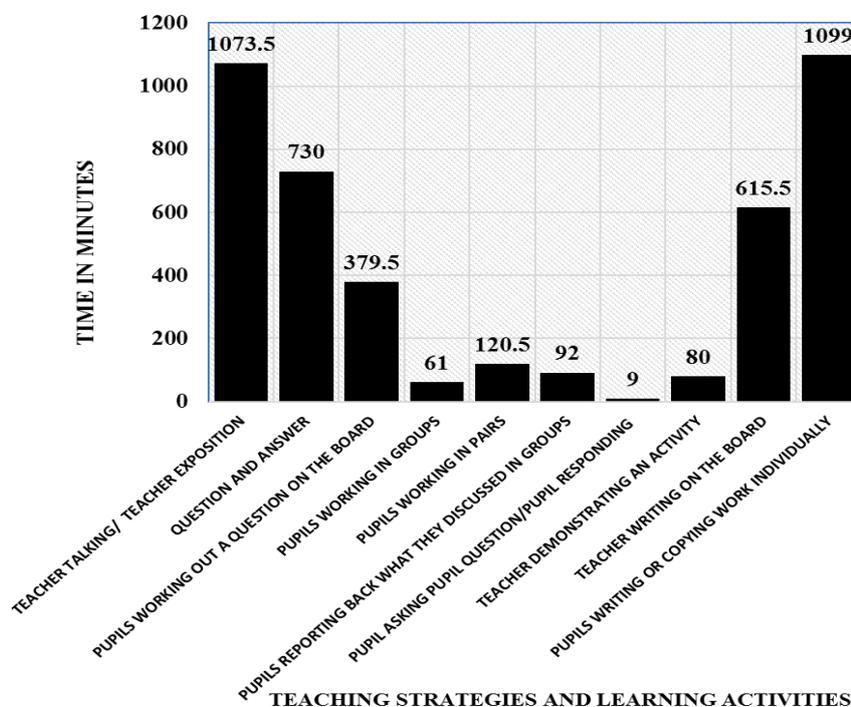


Figure 1: Teaching strategies and learning activities carried out in mathematics lessons and time spent in minutes

The findings as highlighted in Figure 1 are that only 61 minutes of the total time was spent on pupils working in groups against 1099 and 1073.5 minutes which was spent on pupils writing in their exercise books and teacher

exposition, respectively. Additionally, 120.5 minutes of the total time was spent on pupils working in pairs, 730 minutes was spent on using question and answer method, 615.5 minutes was spent on the teacher writing on the board and 379.5 minutes was spent on the teacher inviting individual pupils to write their responses on the board. Whereas 80 minutes was spent on the teachers demonstrating an activity, 92 minutes of the time was spent on pupils reporting back what they discussed in groups as well as in pairs and 9 minutes was spent on pupils asking a fellow pupil a question and responding. This implies that most of the time in mathematics lessons teachers did not practice the group learning method in the teaching and learning of mathematics.

With reference to the information highlighted in Figure 1 this study has exposed that teachers of mathematics spent a lot of time on other teaching strategies and learning activities at the expense of group learning method. Some of the activities teachers engaged in has the potential of making pupils passive and just recipients of knowledge from the teachers. The study has shown that teachers spent a lot of time asking questions, teacher talk (lecture method), inviting pupils to write on the board as well as pupils consuming a lot of time writing in their books at the expense of sharing and combining knowledge in groups. Nevertheless, the researcher is not in any way suggesting that these teaching strategies and learning activities are not best practices but that there should be integrated with methods that provides opportunities for pupils to take up a prominent role in the learning of mathematics. This is simply because no single method or learning activity can guarantee an effective learning when practiced independently of the other methods. For instance, question and answer method cannot be used to teach the whole content matter independently, unless it is supplemented by lecture and demonstration method among other methods (Parke, Terry and Minker, 1992). In the same vein, over reliance on question and answer, subject pupils to listening out for correct answers rather than fully engaging with the dialogue between the teacher and the class or among pupils themselves (Pratt, 2006), as pupils often see listening to be more important than talking even though it is through talk that a lot of understanding develops. Research has shown that what less confident pupils do during question and answer sessions is to avoid being asked questions, wait until the right answer is given and then memorise that answer.

4.2 Teachers of Mathematics' Perception of Group Learning Method

The second objective of the study endeavoured to determine the teachers of mathematics' perception of group learning method in the teaching and learning of mathematics at the selected secondary schools. However, to establish the teacher's perception of group learning method data was collected under the following categories; teachers of mathematics' conceptual understanding of group learning method, the teachers of mathematics' attitude towards the practice of group learning method, implementation of group learning method and teacher's views on the significance of group learning method.

4.2.1 Teachers of mathematics' conceptual understanding of group learning method

The study has established that teachers of mathematics who took part in the study have conceptual knowledge about group learning method as they were able to give their understanding of group learning method. Some of the teachers indicated that group learning method was a collaborative kind of learning where pupils share ideas and solve questions in groups while others stated that group learning was a teaching method where small groups of pupils work together on a common task with the teacher's guidance. The majority of the teachers described group learning as putting pupils in groups and allowing them to discuss and share ideas amongst themselves.

4.2.1.1 Procedures they applied when using group learning method

Furthermore, the study revealed that teachers of mathematics know what is involved in practicing group learning method as they presented the procedures to be applied when using group learning method such as introducing the topic, followed by giving clear instructions and then putting pupils in groups to discuss; putting pupils in groups for a specified time, discussing and then presenting findings; identifying pupils' abilities, grouping them, giving a task, monitoring and then rewarding them. Others indicated that they put pupils in groups of 5-7, assigned tasks, ensured everyone participated and then pupils gave feedback while some identified pupils' abilities, grouped them, gave them a task, monitored and rewarded them. Others indicated that they divided pupils into small groups, introduced the topic, gave examples, allowed pupils to discuss and then one presented the ideas of the group to the whole class.

4.2.1.2 The number of teachers of mathematics' responses to statements regarding conceptual understanding of group learning method arising from the Likert Scale responses.

The study has established that on 6 of the teachers of mathematics strongly agreed, 11 agreed, 3 uncertain, 1 disagreed, and no teacher strongly disagreed with the statements that were seeking to establish their conceptual understanding of group learning method as shown in Figure 2 below.

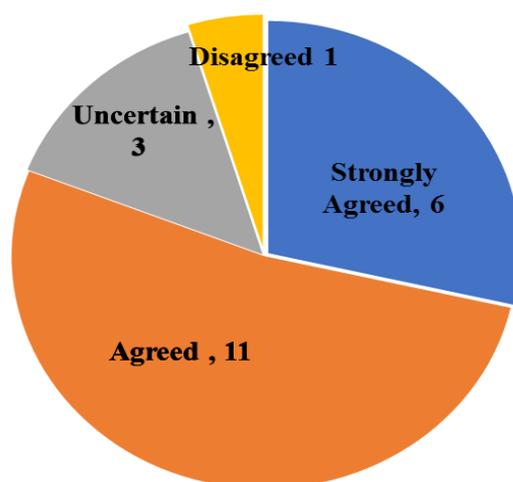


Figure 2: Number of teachers of mathematics and their responses on conceptual understanding of group learning method

The results shown in Figure 2, implies that the majority of the teachers of mathematics had the conceptual understanding of group learning method.

4.2.1.3 Analysis of an independent sample t Test done on teachers of mathematics' conceptual understanding of group learning method

The study has established that an independent sample t Test indicates that there was no statistically significant difference between male and female teachers of mathematics on the conceptual understanding of group learning method, ($p = .463$). This implies that gender was not a factor in determining the conceptual understanding that teachers of mathematics possessed.

4.2.1.4 Findings based on One – Way ANOVA test conducted on teachers of mathematics' conceptual understanding of group learning method.

The findings in this study are that a statistically significant difference was not found among the four variables on the teachers of mathematics' conceptual understanding of group learning method namely, schools where teachers were teaching, range of years teachers have been teaching, professional qualification of teachers and the institutions where teachers were trained. The results show that on schools where teachers were teaching, $F(3,17) = 1.77, p = .192$, range of years teachers have been teaching, $F(4,16) = 1.38, p = .285$, professional qualification of teachers, $F(2,18) = .06, p = .942$ and on the institutions where teachers were trained, $F(7,13) = .74, p = .644$. However, a statistically significant difference was found on the age of Teachers, $F(2,18) = 5.22, p = .016$.

These results show that the Schools where teachers were teaching, range of years teachers have been teaching, professional qualification of teachers and the institutions where teachers were trained had no effect on determining the conceptual understanding of group learning method.

Based on the information highlighted in this section, it can be concluded that teachers of mathematics who took part in the study possessed the required conceptual understanding of group learning method.

4.2.2 The teachers of mathematics' attitude toward group learning method

Here the findings are that all the respondents gave the same response that practicing group learning method was time consuming. The other additional responses were that the method was difficult to measure individual level of understanding and that some pupils do not participate. Others indicated that the group learning method was too demanding on the part of the teacher, demotivates pupils when they fail to find the solutions and lead to lack of interest in the subject. Some indicated that some pupils do not participate, it is time wasting and was difficult to use when introducing new concepts. The implication of these sentiments points to the fact that teachers of mathematics had negative attitude towards group learning method.

4.2.2.1 The number of teachers of mathematics regarding their attitude toward group learning method arising from the Likert Scale responses

The data obtained during the study indicates that on 6 of the teachers of mathematics strongly agreed, 7 agreed, 2 were uncertain, 5 disagreed and 2 strongly disagreed with the statements that point towards the negative perception of group learning method as shown in Figure 3.

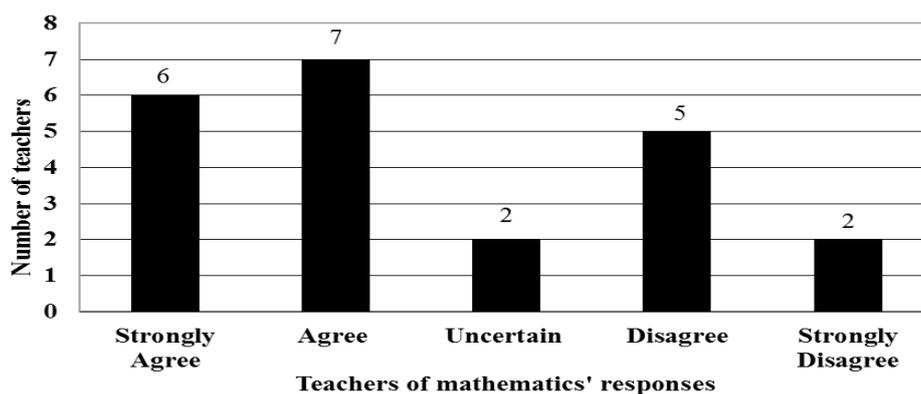


Figure 3: Number of teachers of mathematics and their responses on the attitude toward the group learning method

The results shown in Figure 3, suggests that the majority of the teachers of mathematics had a negative attitude towards group learning method.

4.2.2.2 Analysis of an independent sample t Test done on teachers of mathematics' attitude towards group learning method

The finding indicate that male teachers did not significantly differ from female teachers on their attitude towards group learning method ($p = .705$). On average the female teachers' mean score was ($M = 20.10$) and male teachers of mathematics the score was ($M = 20.64$). The implication of these outcome is that gender did not influence the attitude teachers of mathematics had towards group learning method.

4.2.2.3 Findings based on One – Way ANOVA test conducted on teachers of mathematics' attitude towards group learning method

The study has further established that a statistically significant difference was found on one level of the teachers of mathematics' attitude toward group learning method and that is on Professional qualification of teachers, $F(2,18) = 4.19$, $p = .032$, while a statistically significant difference was not found among four levels ; schools where teachers were teaching, $F(3,17) = 1.84$, $p = .178$, age of teachers , $F(2,18) = .68$, $p = .522$, range of years teachers have being teaching, $F(4,16) = 2.61$, $p = .075$, and on the institutions where teachers were trained, $F(7,13) = 1.70$, $p = .195$. This implies that professional qualification was statistically a factor in determining the teachers of mathematics' attitude towards group learning while schools where teachers were teaching, range of years teachers have been teaching, age of the teachers and institutions where teachers were trained were not factors with regards to how teachers of mathematics perceived group learning method.

From the data analysed from this section on attitude it is safe therefore, to say that the findings of this study show that teachers of mathematics who took part in the study had undesirable attitude toward group learning method. In the first place, the teachers' outlook on the group learning method was that it is time consuming and difficult to measure individual level of understanding. The negative attitude of teachers of mathematics towards group learning method emanates from the view that the method is time consuming.

4.2.3 Teachers of mathematics implementation of group learning method

The study has established that teachers of mathematics were able to indicate the procedures that are required in the implementation of group learning method. Some of the responses were; introduction of the topic followed by giving clear instructions and then putting pupils in groups to discuss; putting pupils in groups for a specified time, discuss and present findings; identify pupils' abilities, group them, give a task, monitor and then reward them. Others put pupils in groups of 5-7, assigned tasks to groups, ensured everyone participated and then pupils gave feedback while some identified pupils' abilities, grouped them in 6, gave them a task, monitored and rewarded them. Others indicated that they divided pupils into small groups, introduced the topic, gave examples, allowed pupils to discuss and then one presented the ideas of the group. This point toward the fact that the majority of the teachers of mathematics had ideas on how to implement group learning method.

4.2.3.1 The number of teachers of mathematics' responses regarding the implementation of group learning method arising from the Likert Scale responses

The study has revealed that 3 of the teachers strongly agreed, 9 agreed, 2 uncertain, 6 disagreed, and 2 strongly disagreed with the statements imploring teachers' perception on the implementation of group learning method as Figure 4 shows.

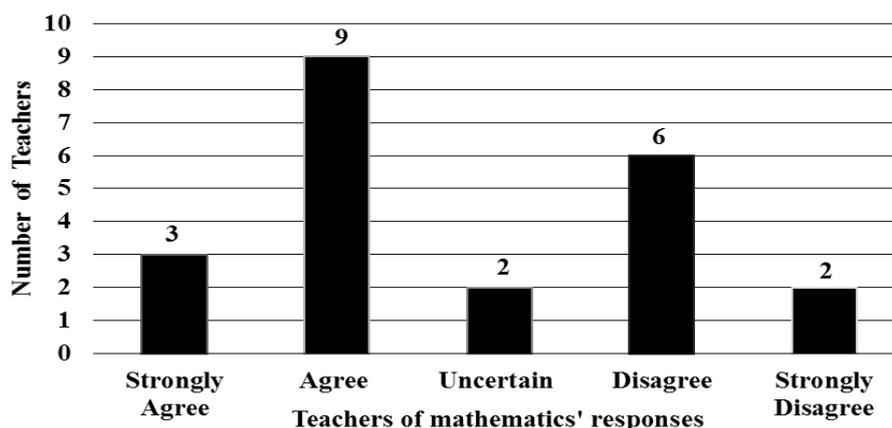


Figure 4: Number of teachers of mathematics and their responses regarding implementation of the group learning method

The results in Figure 4 is an indication that the majority of the teachers of mathematics did not implement the group learning method in their classes.

4.2.3.2 Results of an independent sample t Test done on teachers of mathematics' implementation of group learning method

The study has established that an independent sample t Test indicates that male and female teachers of mathematics did not differ significantly on the implementation of group learning method, ($p = .378$). This implies that being male or female did not influence the implementation of group learning method.

4.2.3.3 Findings based on One – Way ANOVA test conducted on teachers of mathematics' implementation of group learning method

The findings in this study are that a statistically significant difference was not found among the five levels, on schools where teachers were Teaching, $F(3,17) = 1.50, p = .251$, age of teachers, $F(2,18) = .04, p = .966$, range of years teachers have been teaching, $F(4,16) = 1.08, p = .400$, professional qualification of Teachers, $F(2,18) = .39, p = .681$ and on the institutions where teachers were trained, $F(7,13) = 1.13, p = .405$. From these statistics, it can be deduced that the schools where teachers were teaching, the age, range of years they have being teaching, their professional qualification and institutions where they were trained had no influence on the implementation of group learning method.

4.2.4 Significance of group learning as expressed by teachers of mathematics

The findings of this study suggest that most respondents were able to state some of the benefits of group learning method. The teachers indicated that the motivation to using group learning method arose from the fact that pupils understand concepts better from peers, the level of participation is high, both gifted and less gifted pupils are catered for and pupils are able to learn from each other when teachers practice the method.

All the respondents acknowledged that there were overwhelming benefits from using group learning method. Some of the benefits indicated by the respondents were that, group learning method subject's pupils to practicing, experimenting and solving mathematical problems confidently as well as understanding the language and symbols of mathematics. Additionally, teachers stated that group learning method removes the fear pupils have of teachers and improves performance, as they are free to ask their peers within the small group, things they do not understand. Others indicated that group learning method provides an atmosphere which enables shy pupils to express themselves in small groups as opposed to asking the teacher in the whole class discussion. It lessens the work of the teacher, develops problem solving skills among pupils and improves communication. Group learning method helps pupils devise their own methods of solving problems, improves the retention of learnt materials; is motivating and creates positive competition. This is a clear evidence that teachers of mathematics who took part in the study understood the significance of group learning method.

4.2.4.1 The number of teachers of mathematics with regards to their understanding of the significance of group learning method in the teaching and learning of Mathematics arising from the Likert Scale responses

One other issue of great importance that this study has revealed is that teachers of mathematics acknowledged the fact that group learning method was significant as Figure 5 indicates.

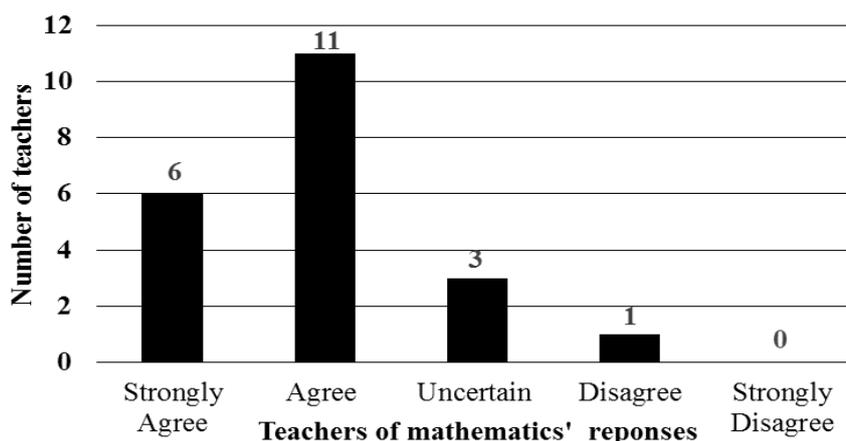


Figure 5: Number teachers of mathematics and their responses on the significance of the group learning method

Figure 5 shows that on average 6 of the respondents strongly agreed, 11 agreed, 3 were uncertain, 1 disagreed, and non-strongly disagreed with the statements seeking for the teachers of mathematics' insight with regards to the significance of the group learning method. The implication of these results is that the majority of the teachers who participated in this study acknowledged that group learning method was significant.

4.2.4.2 Results of an independent sample t Test done on teachers of mathematics' understanding of the significance of group learning method

The finding is that male teachers did not significantly differ from female teachers on their attitude towards group learning method ($p = .988$). The inference drawn from these results was that gender did not influence in any way the teachers of mathematics' understanding of the significance of group learning method.

4.2.4.3 Findings based on a One – Way ANOVA test conducted on teachers of mathematics' understanding of the significance of group learning method

The study has further established that a statistically significant difference was not found among the five levels of the teachers of mathematics' understanding of the significance of the group learning method on schools where teachers were teaching, $F(3,17) = 2.38, p = .106$, age of teachers, $F(2,18) = 3.36, p = .058$, range of years teachers have being teaching, $F(4,16) = 2.10, p = .128$, professional qualification of teachers, $F(2,18) = .37, p = .696$ and on the institutions where teachers were trained, $F(7,13) = .20, p = .980$. This implies that the teachers of mathematics' knowledge on the significance of group learning method was not influenced by the differences in the schools where teachers were teaching, the age of teachers, range of years teachers have been teaching, their professional qualification and institutions where they were trained.

It is therefore, undisputable fact that teachers of mathematics comprehend that group learning method has far reaching importance in the teaching and learning of mathematics.

4.3 Interpretations of the intercorrelations for the four perception variables

A correlation test was carried out to establish linkages among teachers' conceptual understanding of group learning method, teachers' attitude towards group learning method, teachers' implementation of group learning method and the teachers' understanding of the significance of group learning method. The data is tabulated in Table 4.2

Table 4.2: Intercorrelations for four perception variables (N=21)

Variable	1	2	3	4
1 Teachers' conceptual understanding of group learning method	-	-.016	-.079	.621
2 Teachers' attitude towards group learning method	-	-	.093	.050
3 Teachers' implementation of group learning method	-	-	-	.120
4 Teachers' understanding of the significance of group learning method	-	-	-	-

Source: Research data

Table 5.2 shows the results of a correlation test conducted, indicate a very strong correlation between teachers' conceptual understanding of group learning and teachers' understanding of the significance of group learning method

with a correlation coefficient $r = +0.621$. This implies that the conceptual knowledge teachers of mathematics had correspond favorably with their understanding of the significance of group learning method.

4.4 The relationship between the practice and perception of Group Learning Method

The third objective was to ascertain the relationship between the practice and perception of group learning method by teachers of mathematics at secondary school.

From the findings of this study, it can be concluded that there is a discrepancy in the relationship between the practice and perception of group learning method in the teaching and learning of mathematics. The knowledge teachers possessed on group learning method and the practice of this particular method was not consistent. The teachers of mathematics rarely practiced the group learning method despite having the required knowledge and acknowledging the significance of the group learning method as evidenced by the correlation test conducted on the data collected.

5. CONCLUSION

In line with the objectives of the study, it can be concluded that group learning method was not often practiced by the teachers of mathematics in secondary schools where the research was conducted. This assertion arises firstly from the teachers of mathematics responses from a question in the questionnaire where they were asked to state whether they practiced group learning method in the teaching and learning of mathematics and how often they practiced. Certainly, out of the 21 teachers of mathematics who took part in the study, 15 did not use this method so often, 2 used the method once per week, 1 had never used this method and 3 indicated that they had used this method daily. Secondly it has been established from the observation that out of 84 lessons observed group learning method was practiced in 5 lessons. Additionally, in the classes where it was applied the practice lacked the basic principles that are essential for successful implementation of group learning method such as planning, holding every pupil accountable, allocating sufficient time, clear instructions as well as monitoring the activities in the group setting when implementing the method and that teachers of mathematics did not consider mixing of abilities when forming groups.

The study has also revealed that the teachers of mathematics possessed the conceptual understanding about group learning method and perceived that the method had overwhelming benefits once correctly implemented. Furthermore, the teachers of mathematics understood that group learning method has far reaching importance in the teaching and learning of mathematics. The teachers of mathematics perceived that group learning method enhances pupil's retention of learnt materials, improves pupils' self-esteem and develops supportive relationships among pupils.

On the contrary, the study has established that the teachers' attitude towards group learning method was negative and their outlook on the group learning method was that it consumes a lot of time, too demanding and difficult to measure individual level of understanding.

This research has further established that there is a mismatch on the knowledge teachers possess, their perception and the way they practiced group learning method. The knowledge teachers of mathematics possessed on group learning method and the practice was not consistent. The study established that teachers of mathematics knew very well what is required to implement the group learning method but they did not practice it probably because they felt it was time consuming. Basically, time consuming is related to the amount of content teachers can cover using pupil-centred learning approaches like group learning method as opposed to the content that can be covered with traditional lecture based approaches. Teachers are still worried about the content they should cover instead of the benefits that arise from using the methods that focus the attention on the pupil.

These results were not influenced by any factors like gender, the schools where teachers were teaching, the age of teachers, range of years they have being teaching, their professional qualification and institutions where they were trained as evidenced by the independent t Test and One- Way ANOVA test conducted.

6. RECOMMENDATIONS

The teachers of mathematics should be encouraged to consider group learning method as one of the pupil centred methods that create opportunities for pupils to actively participate in the learning process as well as consider integrating group learning method with other methods to enable pupils actively participate in the lessons. The Zambia Association of Mathematics Education (ZAME), Mathematics, Science and Technology Education in Africa (CEMASTEA), policy makers and other stake holders should on purpose engage teachers on the practice of group learning method in mathematics lessons through regular professional meetings.

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