EFFECT OF HIGH PUPIL-TEACHER RATIO ON THE QUALITY OF THE TEACHING/LEARNING PROCESS OF MATHEMATICS IN SELECTED PUBLIC SECONDARY SCHOOLS OF LUSAKA DISTRICT

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CERTIFICATION

The undersigned certifies that she has read and hereby recommends for acceptance by the senate of the University of Zambia a dissertation titled: *"effect of high pupil-teacher ratio on the quality of the teaching/learning process of mathematics in selected public secondary schools of Lusaka district"* in partial fulfillment of the requirements for the degree of Master of Education in Educational Management of the University of Zambia and Zimbabwe Open University.

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Mrs Felisia Mulauzi Zulu

(Supervisor)

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Date

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DECLARATION

I, Christabel M. Kalemba, declare that this dissertation is my own original work and all sources of the materials used for this dissertation have been dully acknowledged. Submission of this work was part of the fulfillment of the requirements for the award of Master of Education in Educational Management of the University of Zambia and Zimbabwe Open University.

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Date

DEDICATION

This dissertation is dedicated to my Father Mr Terry M. Kalemba and my late Mother Mrs Mary N.W. Kalemba.

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I am so grateful to the creator of heaven and earth for giving me life, strength and courage toward the accomplishment of this work. I would also like to show my sincere thanks to Mrs Felisia Mulauzi Zulu, my supervisor for her intellectual contribution, professional guidance, interests and commitment throughout my study.

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Kalemba, C.M

ABSTRACT

The purpose of the study was to assess the effect of pupil-teacher ratio on the quality of teaching and learning process of mathematics in selected public secondary schools of Lusaka district. Four specific research objectives which guided the study were; to determine the proportion of pupils in an average class in public secondary schools of Lusaka district; to establish the average pupil-teacher ratio in public secondary schools of Lusaka district; to determine the effects of class size on the teaching/learning process in public secondary schools of Lusaka district; and ascertain the strategies to improve or promote the quality of teaching/learning Mathematics in selected Public Secondary Schools of Lusaka District.

The study employed descriptive survey design, and both qualitative and quantitative approaches were used to carry out the study. The methods employed during data collection were survey, interviews, focus group and document review. Interview guides and questionnaires were used as tools for data collection. Random and purposive sampling procedures were used to sample data from the respondents.

The study revealed that pupil-teacher ratio is high in most public secondary schools and has a negative effect on pupil academic performance in public secondary schools. From the findings, it is recommended that the government should employ competent teachers in order to increase the teaching force and encourage people with academic qualifications to join the teaching profession.

LIST OF ABBREVIATIONS

MFNP – Ministry of Finance and National Planning

MOE – Ministry of Education

PTR – Pupil-Teacher Ratio

SPSS – Statistical Package for Social Science

USA – United States of America

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CHAPTER 1

INTRODUCTION

1.0 Overview

This dissertation is divided into six chapters. The first chapter is the introduction and presents background to the study, statement of the problem, purpose of study, research objectives, research questions, and significance of the study, delimitation of the study, limitations and operational definitions. The second chapter reviews related literature on class size and its effects on the teaching-learning process. This chapter has attempted to analyze some of the existing literature on the subject of pupil-teacher ratio and its effects on the teaching-learning process in public secondary schools. Chapter three discusses the methods of data collection used in the study. The purpose of this chapter is to show how the research was conducted in terms of its design, target population, sample size, research instruments, data collection as well as data analysis. Chapter four presents the findings of the study, while chapter five discusses the findings. The sixth chapter deals with the conclusion and recommendations. The subsequent pages consist of references and appendices.

1.1 Background

Education is a process in which knowledge, skills and set of values are passed or imparted from one person to another. In the formal setting, wherein learning is done in schools, the success of education depends on the number of factors among which classroom environment is. According to Moyles (1980), one factor that affects classroom environment is class size. Class size refers to the number of pupils in any given class. The influence of class size on pupil outcomes is an aspect of the learning environment which has been a subject of much debate among parents, politicians, teachers, teacher unions and educationists in many countries.

In Florida United States of America (U.S.A) for example, a debate on class size and its effects on the teaching-learning process in schools led to the constitutional amendment of class size. Class size reduction was approved by Florida voters in November, 2002 election. Voters voted for a reduction in the maximum number of students assigned to each teacher teaching in public classrooms to 18 students in the first to third grade levels; 22 students in grades 4-8; and 25 students in grades 9-12. Beginning with 2003-2004 fiscal years, the amendment called for the legislature to provide sufficient funds to reduce the average number of students in each classroom by at least 2 students per year until the limits were reached, because research done has proved that smaller classes benefited students and improved upon classroom management. This proposed reduction in the classroom size meant a significant number of personnel, resources and new facilities were needed to satisfy the limits. This new policy required a significant funding of about $27,500, 000 as well as an increased demand on finding qualified teachers to fill the additional job vacancies. According to Florida's Revenue Estimating Conference, an estimated 31 800 additional teachers and 30, 200 additional classrooms were needed to accommodate the class size limits expressed in the amendment over the implementation period.

While developed countries like U.S.A were effecting class size reduction, most developing countries were enlarging their classes. In the case of Tanzania, for example, it has made it compulsory for every child who has reached the age of seven years to be enrolled for primary education. This policy was reinforced by the introduction of free education in 2002.The introduction of free education, led to a massive increase in the number of children enrolled in primary schools from 4,889,361 in 2001 to 7,959,884 in 2006 and to 8,410 000 in 2008 (Tanzania Ministry of Education and Vocation Training, 2010). Unfortunately, this increase in enrolment levels was not accompanied by a proportional increase in resources such as teachers, classrooms and books; consequently, the ratio of pupils to qualified teachers nationwide in 2010 was 54:1, which was 35% above the goal of 40:1. Every region in Tanzania exceeded the goal except in Kilimanjaro and Dar es Salaam. Therefore, because of this increased enrolment levels, only 3% of students in standard vi nationwide had sole use of a Mathematics textbook in 2007 as compared to 7% in 2000 (Tanzania Ministry of Education and Vocational Training,

2010).

Coming to Zambia, the picture is very similar with what is obtaining in Tanzania. Large classes in Zambia emerged immediately upon the introduction of Free Basic Education Policy in 2002. This policy made it easier for families that could not afford to pay school fees for their children to start sending their children to school, since basic education had been declared free by the Zambian Government (Ministry of Finance and National Planning, 2006).

With the Free Basic Education Policy in place, enrolment levels in Basic and Secondary Schools tremendously went up while expansion and construction of the school infrastructure as well as deployment of teachers did not increase with the same proportion. As a result of this mismatch between enrolment levels and expansion of schools as well as staffing levels, the available number of classrooms and teachers fell far below the increased enrolment levels, and this in turn made the average class size to keep on rising over the years (Ministry of Education: 2006). According to the survey conducted by the Ministry of Education (MOE) at the end of 2002, the following were the average class sizes per province: Central Province: 71.8, Copper-belt: 46.6, Eastern: 66.5, Luapula: 67.4, Lusaka: 40, Northern: 69.1, North Western: 64.6 and Western Province: 64.2 (MOE: 2006).

In terms of the National PTR (Pupil-Teacher Ratio) for grades 1-7, it was at 61.9:1; implying that for every teacher, there was a class size of 61.9 pupils to be taught (Ministry of Finance and National Planning (MFNP), 2005). Since the class sizes given above were averages, there could have been many very large classes in certain schools. This, therefore, resulted in most classrooms being over crowded since many of them were designed to seat a recommended class size of not more than 45 pupils per class (MFNP, 2005).

The effects that this increased PTR had on the teaching-learning process raised debate among parents, teachers, teachers' unions, politicians and school administrators. Results from these debates were inconclusive. It is for this reason that this study was instituted so as to try and establish the effects that high pupil-teacher ratio had on the teaching-learning process in Public Secondary Schools of Lusaka District.

1.2 Statement of the problem

Since the introduction of the Free Primary Education Policy in 2002, pupil-teacher ratios in most public schools have gone up while expansion and construction of school infrastructure has not increased proportionately, resulting in large classes in most public schools. This increase in classes raised a country-wide debate about its effects on the teaching-learning process. It is against this background that this study sought to investigate the effects of Pupil-Teacher Ratio (PTR) on the teaching/ learning process of Mathematics in Public Secondary Schools of Lusaka District.

1.3 Purpose of the study

The purpose of this study was to investigate the effects of high PTR on the teaching/learning process in Public Secondary Schools, so as to come up with ways and means of improving teaching and learning of Mathematics in Public Secondary Schools of Lusaka District.

1.4 Research objectives

The research objectives for this study were;

1.4.1 To determine the proportion of pupils in an average class in Public Secondary Schools of Lusaka District.

1.4.2 To establish the average pupil-teacher ratio in public secondary schools of Lusaka District.

1.4.3 To determine the effects of high pupil-teacher ratio on the teaching/learning process of mathematics in public secondary schools of Lusaka district.

1.4.4 Ascertain the strategies to improve or promote the quality of teaching/learning mathematics in selected Public Secondary Schools of Lusaka District.

1.5 Research questions

1.5.1 What is the proportion of pupils in an average class in public secondary schools of Lusaka district?

1.5.2 What is the average pupil-teacher ratio in public secondary schools of Lusaka district?

1.5.3 How does high pupil-teacher ratio affect the teaching/learning process of mathematics in public secondary schools of Lusaka district?

1.5.4 What strategies can schools use to improve or promote the quality of teaching and learning mathematics in the Selected Public Secondary Schools of Lusaka District?

1.6 Significance of the study

The findings of this study could be useful to policy makers, educational officials and researchers in education. On the part of policy makers, the data generated from this study may help them assess and evaluate the effects of high pupil-teacher ratio on the teaching-learning process of mathematics in public secondary schools of Lusaka district school. The findings and recommendations arising from this study could also hopefully attract the attention and possible action of both policy makers and educational officials through analysis and addressing of the issues raised. Researchers may also find the study a useful addition to existing knowledge on the effects of high pupil-teacher ratio on the teaching and learning process in general. Additionally, the findings of this study could raise new areas for further research.

1.7 Delimitation

This study was confined to Public Secondary Schools of Lusaka district only. Public Secondary schools were targeted because they were the ones affected by Overcrowding in classrooms.

1.8 Limitation of the study

The findings of this study may be limited to Lusaka district only, and therefore cannot be generalized. Secondly, distribution of schools and population in Lusaka, which is an urban district, may differ with demographic data in other districts, especially those in rural areas. Therefore, it is recommended that in future, other studies on pupil-teacher ratio should be extended to all other districts and provinces in the country in order for the findings to be generalized.

1.9 Operational definitions

For the purpose of this study, the terms below mean:

Classroom Management: the way in which the teachers organize pupils, resources, establish and maintain a classroom environment that facilitates teaching-learning activities.

Classroom Overcrowding: it is a situation in which a class accommodated in the classroom results in congestion thereby limiting or impending free movement of both the teacher and the pupils.

Class size: the number of pupils in any given class

Large class size a class with 46 and more pupils.

Small class size: a class size of 45 pupils and below.

Average class size: a class size of 45 pupils.

Teacher-Centered teaching style: a style of teaching in which the teacher allows only minimal or no active participation from pupils as he/she teaches.

Pupil-Centred teaching style: a teaching style in which pupils actively and fully participate with minimum guidance from the teacher. Pupil-centered teaching styles include discussion, project, discovery, field trips, debate, role play and many such styles of teaching.

Pupil-Teacher interaction: attention given by the teacher to each individual pupil or group of pupils.

Pupil-Teacher Ratio: the total number of pupils enrolled at school divided by the total number of teaching staff at that school.

1.10 Theoretical Framework:

Vygotsky's Socio-cultural approach to Cognitive Development

The theoretical framework that guided this study is Vygotsky's socio-cultural approach to cognitive development. This theory states that children learn better with the help of others around them before they can do things on their own. It has been observed that higher thinking in children develops better in social contexts. Vygostsky encouraged learning environments in which teachers and more capable peers interact directly with students who are at lower levels of thinking. The significant people in students' learning environment can help guide their thinking by providing hints as to how they should proceed when they cannot manage on their own. The experts can describe what needs to be done, taking the learner through the problem, while demonstrating appropriate strategies. Also the experts can reduce some of the demands of the task by taking responsibility for some parts while allowing the learner to concentrate on other parts. In this way, learners can learn even though they cannot solve the whole problem on their own. Ross (1976) describes this tutoring process in terms of providing a scaffold that helps a learner solve a problem or perform a task that he/she could not do alone. The scaffolding allows the expert to control elements of a task that are beyond the learners'

ability, thus allowing the learner to concentrate upon and complete these elements of the task that are within his/her ability level. Vygotsky's theory would do well in small classes in which teachers have direct personal contacts with each and every pupil in class. However, as classes become large, expert-learner interaction becomes less and less, thus negatively affecting the scaffolding process.

CHAPTER 2

LITERATURE REVIEW

2.0 Overview

This chapter presents a review of literature related to high pupil-teacher ratio and its effects on the teaching learning process.

There are many factors that affect the teaching-learning process. However, Kyricou (1997) considers class size as one of the most important factors that affects the teaching-learning process. According to Galton (1994), classroom size cannot just be a matter of the number of pupils in a class but how that number of pupils affects other classroom processes and activities which themselves bear more directly on teaching and learning.

Blatchford and Mortimore (1994) mention the following as some of the classroom processes and activities that may be affected by class size; teaching methods, time management, motivation of learners, assessment, behaviour management, teaching-learning materials, teacher-pupil interactions and teacher outreach programmes, among others.

2.1 Class size and the choice of the teaching styles

A study done by Lemmer (1999), found that a large class size has an effect when it comes to the choice and use of a variety of teaching styles, in particular group work. This is so because in an over-crowded classroom the working space for group activities is limited, and mobility of the teachers to monitor group activities is also quite challenging.

However, it is important to note that group work is one of the most important methods of teaching. According to (Kutnick, 1994), group work is one pedagogical strategy that promotes participation and interaction among learners in class. It fosters a deeper and more active learning process, and it also provides instructors with valuable

demonstrations of the degree to which pupils understand particular topics or concepts easily.

Learner tutelage in a group formation is more preferable as compared to being guided in the whole class formation. Kutnick (1994) states that traditionally a teacher has always been treated as an indemnified personality who leads the whole class, dictating his/her notes and lectures to the pupils trying to put everything into the minds of the pupils. This one-way mode of communication has not been that effective and efficient as compared to the new trend of forming different small study groups among the pupils. It has been ascertained that the existence of the group in the classroom is not so new a phenomenon.

According to Kutnick (1994), "from earliest recorded writings about education (from Plato to Socrates), learning used to take place in a group context. Hence, the importance of social interactions in learning cannot be overlooked". The idea of group work carries with it a vision of pupils talking to each other, sharing, reshaping and refining their ideologies and concepts. It means those learners' enthusiasm and consequently learning opportunities increase with in-group situations, both cooperative and collaborative. Moyles (1980) also cites learners' preference for working with someone else as being the most important, not because they just enjoy working with a friend but because they can receive help, give help and exchange ideas.

Wells (1985) states that group work, provides pupils with an opportunity to assimilate their knowledge through discussion with their peers, hence supporting each other's learning. It has also been observed that young pupils very often in the classroom do not have the opportunity to develop their listening and speaking skills in a whole class approach. The amount of time any individual pupil can speak in a whole class situation is limited, so group discussions can increase the opportunities for talk and encourage pupils to organize their own discussions. Thus, it is through discussion in a group that pupils develop a better ability to listen and accept others' opinions and develop confidence in expressing their own views by speaking with clarity. Wells (1985) states that all children learn most activities when there are frequent opportunities of collaborative talk with teachers and fellow pupils. Therefore, this proved that while engaging in group work, students in a way take charge of their own learning.

While group work methodology is important in the teaching-learning process, more attention must be given to the following group aspects: firstly, the size of the group and how groups are formed; secondly the nature of group task; thirdly monitoring of group tasks by the teacher and finally time management.

The role of the teacher during group tasks is that of directing the pupils, facilitating and monitoring their learning process. It is also commonly seen that the pupils in a class have different attitudes and strengths. Therefore, the teacher is a person who shows acceptance of learners praises each child's strengths and recognizes each child's uniqueness by planning purposeful tasks, having clarity of goals and ways. In this regard, Cordon (2000) has outlined the duties of the teacher during group tasks. He states that during group tasks the teacher should introduce the activity and establish a collaborative working climate; by clarifying expected outcomes. The teacher should ensure that pupils have a clear understanding of the ground rules for the group work, respect rules and interdependency.

This proves that although group work is a learner-centered approach, the teacher still has to play a leading role in that he/she has to act as a beacon for his/her pupils. In fact, a teacher has a central role in the whole process of group work. It is his/her responsibility to plan activities in such a way that children could work effectively in groups under the guidance of their teacher. Cordon (2000) points to the importance of teachers encouraging pupils to see themselves as responsible learners by designing the activities which ensure pupils pose questions, make observations and contribute opinions. Group work increases pupils' ability to cooperate and learn from others, thus enables them to take responsibility of their own learning and reducing reliance on the teacher.

The Ministry of Education (MOE: 2008), also acknowledges that large classes have an impact on the choice of the teaching methods since teachers have to adjust their teaching methods according to the number of pupils in the class. Furthermore the MOE (2008) also states that large classes necessitate placing excessive reliance on teacher-centered methods, with learner participation being reduced to listening, taking down notes and absorbing what is received from the teacher. According to MOE (2008), the consequent widespread absence of learner activity and hands on experience might contribute to the

superficiality of learning and poor performance being experienced both in the examinations and subsequently, in the real-life situation.

Meanwhile, Mbozi (2008) observes that large classes may be a limiting factor in the choice of teaching methods. Thus, some styles may not be employed at all thereby depriving some pupils who would have benefited from the employment of such styles. For example, the teacher may fail to employ project method due to the pressure of work on the part of the teacher when it comes to monitoring and maintaining the pupils' project manuscripts. But the use of the project method may assist the teacher to identify not only slow learners but also weaker ones who may need specific assistance.

2.2 High pupil-teacher ratio and teacher-pupil interaction

Teacher-pupil interaction is yet another important teaching-learning factor that is affected by pupil-teacher ratio, in that, the larger the class size, the less the occurrence of teacher-pupil interactions. In an over-crowded classroom, teacher-pupil interaction may be challenging as reflected in the studies done by Kaulule (2006). Kaulule found that teachers may not fully interact with all the individual pupils, and as a result, the teacher may not come to understand each pupil's ability and disability, which may result in the teacher's failure to structure the teaching-learning materials for meaningful learning of each pupil. Obanya (1980) also found that substantive teacher-pupil interaction in a classroom is affected by high pupil-teacher ratio. He stated that the smaller the class, the greater the opportunity for substantive teacher-pupil interaction, especially through monitoring and feedback.

Furthermore, the study on the challenges of free education in Zambia, done by Kaulule (2006), suggested that there were variations in teacher-pupil interaction in large classes, in that the teacher finds it more difficult to provide attention to all needy pupils during the teaching-learning process. Thus, many pupils cannot be noticed by the teacher in a crowded classroom. Kaulule also pointed out that in large classes, a situation may arise in which the teacher may fail to call upon some pupils to participate in the lesson and thus, leading to such pupils losing enthusiasm and involvement in learning thinking that the

teacher does not care about them. Thus, as Kaulule pointed out, if these interactions were indeed beneficial, many pupils in large classes would be deprived of such benefits.

Other studies have also found some relationship between pupil-teacher ratio and teacher-pupil interactions. These interactions are carried out in two ways, namely, teacher-initiated and pupil initiated (Brophy and Good, 1970). Whatever, the direction of these communication channels, a vital role is played by the teacher, and all learners should have their fair share of access to that resource. Garner and Bing (1973) did a study on classroom practices and found that there was uneven in teacher-pupil interactions, in that the teachers found it more difficult to provide attention to all needy learners during the teaching-learning process in large classes. In the study done by Dunkin and Doevan (1982) it was reported that teacher-pupil interactions decreased with increased pupil-teacher ratio. They stated that teacher-pupil interactions were at the core of the educational process and as such vital in 'judging the quality of educational opportunity'.

It was noticed that in large classes a number of pupils were denied this essential interaction with the teacher. Cotton (1990) also reports several studies, which included studies by Corno and Snow (1986) as well as Cotton and Savard (1981), which focused on teacher-pupil interactions within the realm of the classroom, school or district. These studies pointed out that these interactions were to be positive to improve learner performance. In order to achieve this, for instance, teachers were urged to do the following: firstly, teachers were to pay attention to learner interests, problems and accomplishments in social interactions both in and out of the classroom. Secondly, teachers were to communicate interest and caring to learners both verbally and through such non-verbal means as giving individual attention, maintaining eye contact, smiling and positive head nodding, and finally, teachers were to foster positive teacher-learner and learner-learner relationships through the use of cooperative learning strategies.

Meanwhile, teachers in the United States of America (USA) study reported that most parents preferred small classes for their children because of the individual attention afforded to the children. Even teachers themselves preferred teaching in small classes than large ones because in small classes, it was easier to meet each child's individual attention. Teachers felt that it was their privilege to develop to the fullest extent all the

talents and abilities pupils possessed as well as helping them to make the best use of their ability whether great or small. The study also found that as classes increased, the percentage of students who passed the course went down due to limited individualized attention to pupils with various learning difficulties. Large classes meant less individual attention for pupils, both in class and after class because of the higher preparation and marking load for teachers with large classes resulting into pupils becoming frustrated and having more behavioural problems in class which made it harder for all the pupils to learn. Thus, there is a need to have classes of a size which would enable the teacher to focus on each individual pupil to enhance learning and subsequently improve learner achievement.

2.3 High pupil-teacher ratio and the teaching-learning resources

Moyles, (1980) describes teaching-learning resources as materials teachers use to deliver instructions effectively. MOE (2003:21) acknowledges the inadequacies of teaching-learning resources in large classes, stating that, "overcrowded classrooms naturally lead to inadequate teaching-learning resources to match the number of pupils in classes, meaning that the pupil textbook ratio becomes high".

However, it is important to note that teaching-learning resources play a vital role in the improvement of the quality of the teaching-learning process in that they support pupils' learning and increases their retention of lessons learnt. In addition, teaching-learning resources significantly increase pupils' achievement by supporting their learning. For example, a worksheet may provide pupils with important opportunities to practice a new skill gained in class. This process aids in the learning process by allowing the pupils to explore the knowledge independently. Learning materials can also add important structure to lesson planning and the delivery of instruction.

Particularly in lower grades, learning materials act as a guide for both the teacher and pupils. They can provide a valuable routine. For instance, if a teacher of mathematics wants to teach a new concept, having a chart which learners can constantly refer to provide them with practice regarding the new concept taking pressure off the teacher and

provide important practice for pupils. Furthermore, apart from supporting learning more generally, teaching-learning materials can assist teachers in an important profession duty; the differentiation of instruction. Differentiation of instructions is the tailoring of lessons and instructions to the different learning styles and capacities within the classroom. Teaching-learning resources also allow teachers to modify work to best activate each individual pupil's learning style. Teaching-learning materials may come in many shapes and sizes, and may include such things as maps, wall charts, flip charts, flash cards and real objects. All these have in common the ability to support pupils' learning activities at school.

According to Moyles, (1980), it is essential for quality materials to be made available to the teachers and pupils in adequate quantities to support the teaching-learning process. Ideally, every pupil in every class should possess his/her own copy of the textbooks required by the school for each subject.

2.4 High PTR and availability of time for individual attention

Pail (1980), points out that time is an important resource in the teaching-learning process and teachers need to manage it effectively in order to implement their strategy. According to the study conducted by Galton and Hargreaves (1996), it was found that smaller classes provided teachers with the opportunity to devote more time to each pupil with regard to individual attention. Furthermore, Lemmer (1999) argues that smaller classes allow teachers to increase the time devoted to each pupil, either individually or in smaller groups, and thereby improving the quality of learning. However, in large classes it was found that teachers had limited time to attend to the needs of all the pupils in class and this resulted in pupils performing poorly.

2.5 High pupil-teacher ratio and assessment of learners

According to the findings of the study conducted by Shapson, Wright, Eason and Fingerland (1980), it was revealed that assessment is different in small and large classes. According to the teachers in that study, marking of pupils' work took little time and

corrections were immediate in smaller classes whereas in larger classes, marking became more time-consuming and most often feedback to pupils delayed. Hence, a good number of teachers of large classes rarely gave assessment to their learners.

However, it is important to note that assessment is a very necessary tool in a classroom that all teachers must master. Assessment is defined as a process and procedure used to gather data, utilizing a variety of factors, about pupil performance. Therefore, every educational professional must be able to effectively assess and evaluate the pupils' progress and knowledge of the subjects being taught. A teacher should also be able to assess how a pupil learns and if the methods the teacher is using are effective. As teachers, it is important to be aware of a pupil's performance in the classroom for many reasons. If a teacher is accurately able to assess pupils' progress, the teacher will know if the teaching methods are working, and where the pupils need help. Assessment is a necessary factor in the educational system and all teachers should be aware of the means and methods of assessing.

2.6 High pupil-teacher ratio and motivation

Motivation has been perceived differently by different people. According to Edwards (2002) motivation is the internal and external factors that stimulate desire and energy in people to be continually interested in and committed to a job, role, or subject, and to exert persistent effort in attaining a goal. As for Maehr (1997), motivation is the energizer of behaviour and 'mother' of all actions. It results from the interactions among conscious and unconscious factors such as the intensity of desire or need, incentive or reward value of the goal, and expectations of the individual and of his or her significant others. Biehler and Snowman (2001) also defines motivation as the forces that account for the arousal, selection, direction, and continuation of behaviour. Finally Ormond (2003) sees motivation as the energy that gives a person the strength to get up and keep going even when things are not going how you expected.

The study conducted by Don (2010) found that pupil-teacher ratio has an effect on the motivation of pupils. The study discovered that motivating learners in a smaller class was

easier than motivating them in a larger one because each learner in class is motivated differently according to his/her needs and characteristics.

Nelson (2009) adds that motivation of pupils requires knowing individual differences and characteristics of each pupil. In the case of less crowded classes, pupils' needs are more easily recognized and easier for teachers to motivate them. According to Cheryl and Spaulding (1992) pupil motivation in the classroom is extremely important for their success because it plays a crucial role in the development of human cognition. Motivation also influences pupil behaviour.

Theorists and researchers of human motivation point out two types of motivation as extrinsic and intrinsic motivation (Deci and Ryan, 1991). Extrinsic motivation exists when individuals are motivated by an outcome that is external or functionally unrelated to the activity in which they are engaged (Spaulding, 1992). When individuals are extrinsically motivated, they hold some desired outcomes as a goal. They recognize that a certain way of behaving is expedient means to that goal, and they make plans to modify their behaviour in such a manner that they are likely to experience the desired outcome (Lepper and Haddel, 1989).

Furthermore, Paul and Burden (2000) also define extrinsic motivation as motivation from outside the learner and has to do with external rewards for completing a task. But if we take this into account, we have to know that, "the reinforcement practices of extrinsic motivation can be effective, but the excessive use of rewards may be decreasingly successful in new situations, may foster dependence on the teacher, and may undermine intrinsic motivation (Paul and Burden, 2000). Therefore, it is good to use extrinsic motivation taking into account the rewards, when this is really necessary.

Within extrinsic motivation, we find, according to Deci and Ryan (1991) four sub-types of extrinsic motivation, and these are:

(i) External regulation: this is when the behaviour is performed to satisfy an external demand or reward. The behaviour is influenced by rewards or punishments, for example, a child may work hard to pass passing an examination so that parents would buy him a cell phone as per promise.

(ii) Introjected regulation: this is when the individual understands the reasons for carrying out these actions, but yet is influenced by rewards or punishments. For example, a pupil tries to pass a test after failing the previous one. This is regulated by self-control, ego involvement, internal rewards and punishment.

(iii) Identified regulation: this is when the individuals are able to control their behaviour, once they understand the reason for their actions. For example, an individual decides to study for the importance that the knowledge has in his life. This is regulated by personal importance and conscious valuing.

(iv) Integrated regulation: this is when pupils treat and evaluate the objectives of the action. The individual is fully conscious, and regulates his or her behaviour although it is considered extrinsic because their behaviour is carried out to achieve results. The integrated regulation is closely related to intrinsic motivation. This is regulated by congruence, awareness and synthesis with self.

In contrast to extrinsic motivation, intrinsic motivation appears to be a by-product of two self -perceptions. People tend to be intrinsically motivated in situations in which they feel both competent and self-determining (Deci and Ryan, 1991). The simplest example of such motivation would be curiosity or interest. Furthermore, various theories of human motivation have revealed that pupil's perceptions of competence and control influence their motivated behaviour and task-related management in an impressive way. Thus teachers who want to enhance their pupils' intrinsic motivation in the classroom must consider two things: they must create academic environments that provide their pupils with control opportunities and they must be certain that their pupils are competent of performing successfully in those environments (Spaulding, 1992). This competence motive can be activated in any situation that provides opportunities for developing new competencies, a variety of tasks, materials, activities and a suitable learning environment. Even though pupils usually do not attempt school tasks unless there is some extrinsic reason for attempting them, if certain conditions are met, they may become intrinsically motivated to continue works (Spike, 1988).

In order for the teacher to encourage pupils' intrinsic motivation in the classroom, there are a number of principles they need to follow. To start with, the first principle involves a

predictable classroom environment. The principle shows one way to enhance pupils' self-perceptions of competence and control. In this principle, teachers can help pupils to feel better in school by creating predictable environments in their classrooms. Pupils most often prefer to know what the upcoming plans for their classes are, so that they can deal effectively with the academic challenges (Spaulding, 1992).

To put this principle into practice, teachers could for instance organize their classes in such a way that days of a week become associated with certain recurring activities or they could begin and end each class period with predictable routines (Spaulding, 1992). Nevertheless, it is important to mention that these kinds of activities do not imply that teachers do not have a responsibility to bring novel and interesting ideas into their lessons (Spaulding, 1992). At the contrary, to provide pupils with interesting lessons and activities is another important principle of intrinsic motivation. It suggests that teachers should make their lessons novel or unusual with discrepant or unexpected outcome. If they do so pupils will probably be more interested in the content of their lessons (Spaulding, 1992).

Another principle to maximize intrinsic motivation in the classroom is to find a balance between easy and moderately challenging tasks. Pupils must have the opportunity to demonstrate their existing competences by managing easier tasks and according to this develop new competences by successfully competing moderately challenging tasks (Spaulding, 1992). Tasks that are difficulty are not intrinsically motivated for pupils. In that case they do not experience any development of competence, and therefore will not be motivated to continue to engage the task (Stipek, 1988). According to Stipek, each child must be given tasks that are hard enough to require some effort and to result in increased competence but easy enough to be completed with no more than a modest amount of assistance (Stipek, 1988).

Another variable that encourages intrinsic motivation is individual choice. Several recent studies have shown that interest in school-related activities is enhanced by less teacher control and more pupil choice in tasks (Cherly, 1992). There are many ways to provide some pupil choice without creating chaos in a classroom. One approach could be to give pupils some directions when they complete particular tasks so they can order tasks

according to their personal preferences. Altogether many possibilities exist to improve intrinsic motivation in the classroom. Pupils are intrinsically motivated to manage tasks that are moderately challenging, novel and relevant to their own lives. Tasks which are too hard or too easy, repetitive, or perceived to be irrelevant do not encourage intrinsic motivation. Pupils will also feel more competent and proud, and thus more intrinsically motivated in tasks, when they can take responsibility for their success (Stipek, 1988). However, it is not always easy to put all these principles into practice, especially in classes with many pupils. It could be a problem to respect individual needs.

2.7 Conclusion

This review of the literature has shown that pupil-teacher ratio is an important dimension in the planning and realizing of effective teaching and learning in schools. However, most countries, especially developing countries which include Zambia, do not pay much attention to the issue of high pupil-teacher ratio when it comes to planning of education provisions in their countries. Literature review has shown that the teaching-learning process in secondary schools can be made more effective by taking into account the issue of class size when it comes to the planning of education provisions in public secondary schools.

CHAPTER 3

METHODOLOGY

3.1 Overview

This chapter presents information on the research design, target population, sample size, sampling procedure, data collection techniques, data collection procedures, data analysis and interpretation as well as ethical considerations of the study.

3.2 Research design

A research design is defined as, "the planning of any scientific research from the first to the last step; a specification of the most adequate operations to be performed in order to test specific hypothesis under given conditions" (Bless and Achola, 1998). This study employed both qualitative and quantitative paradigms. The two methodological approaches were used to give the study an in-depth understanding that a single approach cannot attain. Silverman (2000) explains triangulation research design as an approach in which two or more paradigms are utilized in order to circumvent the biases associated with a single design. In this study therefore, both qualitative and quantitative designs were used. The study employed triangulation in data collection using unstructured interview schedules, observation checklist to elicit qualitative data and questionnaires for quantitative data. It was hoped that the methodological triangulation could enhance the quality of data. However, although both designs were used, the study was more of qualitative than quantitative.

3.3 Target population

White (2005) defines population as a collection of objects, events or individuals having some common characteristics that the researcher is interested in studying. This therefore, implies that population is the sum total of the cases that meet the definition of the researcher's unit of analysis. It need not be too small or too big. Use of a small population would be too limiting in terms of generalization while the later would make

the study too involving if not impossible to carry out (Bless and Achola, 1998). For this study, the target population therefore, included public secondary school head teachers, public secondary subject teachers and public secondary school pupils. It was hoped that these people had the necessary information on this study.

3.4 Sample size

Sampling refers to the way of selecting the subjects that make up a population while a sample refers to the elements in a population. According to White (2005), the key concept in sampling is representativeness. Unless the sample from which generalization had to be made was 'truthfully' representative of the target population from which it was drawn, there was no reason to believe that the population had the same properties as those of the sample. The sample size for this study comprises 70 respondents within Lusaka district. The breakdown of the sample size was as follows; five head teachers, 3 subject teachers from each sampled school totaling 15 and 50 learners.

3.5 Sampling procedures

There are two main procedures of sampling, and these are random and non-random sampling procedures. Random sampling is the procedure in which each member of the population has an equal chance of being selected while non-random sampling procedure is a procedure in which subjects or elements do not have an equal chance of being included in the sample (White, 2005). In many educational studies, random samples are not required or appropriate. Instead non-random sampling procedures are used. In this study, a non-random sampling procedure known as purposive sampling was appropriate. Purposive sampling was based entirely on the judgment of the researcher, in that a sample composed of elements that contain the most characteristic, representative or typical attributes of the population. Based on the researcher's knowledge of the population, a judgment was made about which subjects could be selected to provide the best information to address the purpose of the research. In this study, purposive sampling procedure was appropriate in that the researcher hand-picked the cases that were included

in the sample to determine specific needs. The logic behind purposive sampling was that a few cases could yield an in depth insight about the topic.

3.6 Data collection techniques

A multi-method approach was used to collect data. A multi-method approach is the use of many methods to collect data. According to Cohen and Manion (2007), the advantage of using a multi-method approach in data collection is that, it eliminates bias or distortion of the researcher's picture of the particular reality he/she is investigating.

For this study therefore, the following techniques were used in the collection of the required data: questionnaire for head teachers, semi-structured interviews for the subject teachers, focus group discussion with learners, classroom observation checklist and class registers. The rationale for the use of each of the following techniques was as follows: questionnaires were used to elicit data from head teachers on the number of learners in their classes. Semi-structured interviews were used to elicit data from the subject teachers with regard to pupil-teacher ratio and its effects on the quality of the teaching and learning process of mathematics. The semi-structured interviews had the advantage of being reasonably objective while still permitting a more thorough understanding of the respondents' opinions. They were seen to provide a desirable combination of objectivity and depth, and permitted the gathering of valuable data. Furthermore, the other advantages were that there was much higher response rate, and clarifications on the questions. Focus group discussions were used to elicit data from learners. The advantage of this technique was that participants were able to bring to the fore issues in relation to the topic and challenge each other's views. Through the correction of each other's views, reliable data was collected. The researcher used classroom observation checklists to observe classroom practices. The advantage was that the researcher got first-hand information from the classroom practices. The study of class registers was done in order to establish the number of learners per class in every sampled school.

3.7 Data analysis

Data analysis refers to the systematic way of organizing information collected in order to make sense out of it. In the field of research, data collected must be analyzed in order for it to be meaningful and useful when answering the research questions. According to White (2005), there are two broad ways or approaches to data analysis, and these are qualitative data analysis and quantitative analysis. In this study, quantifiable data was analyzed using Statistical Package for the Social Sciences (SPSS) while qualitative data was analyzed using themes and descriptions.

3.8 Ethical Considerations

Firstly, informed consent was sought from the respondents and participants after informing them about the importance of the study. Furthermore, respondents and participants were assured that data collected from them would be kept strictly confidential and would not be used for any other purpose other than the intended one which is academic. The researcher also assured the participants that names of respondents would be concealed unless permission was sought from the owners to have their identity disclosed as a showcase for certain achievements made in their schools.

Participants were treated with respect and consent was obtained from all participants before they could participate in this study. They were also accorded the chance to understand what the researcher was doing and the researcher promised to share the findings with them for their reactions among others. Furthermore, the researcher obtained clearance from the University of Zambia Ethics Committee.

Summary

This chapter has discussed the methodology used in the study in terms of research design, target population, sample size, sampling procedure, data collection techniques, and data collection procedures and data analysis. The next chapter presents the research findings.

CHAPTER 4

PRESENTATION OF THE FINDINGS

4.1 Overview

This chapter presents the research findings in two ways. Quantitative data has been presented in table form and figures while qualitative data have been presented descriptively according to common themes as reflected by the research objectives and key questions of the study.

(A) Presentation of the findings from the subject teachers

4.1 Gender of the interviewees (teachers)

Figure 1 shows the gender of teachers that took part in the study;

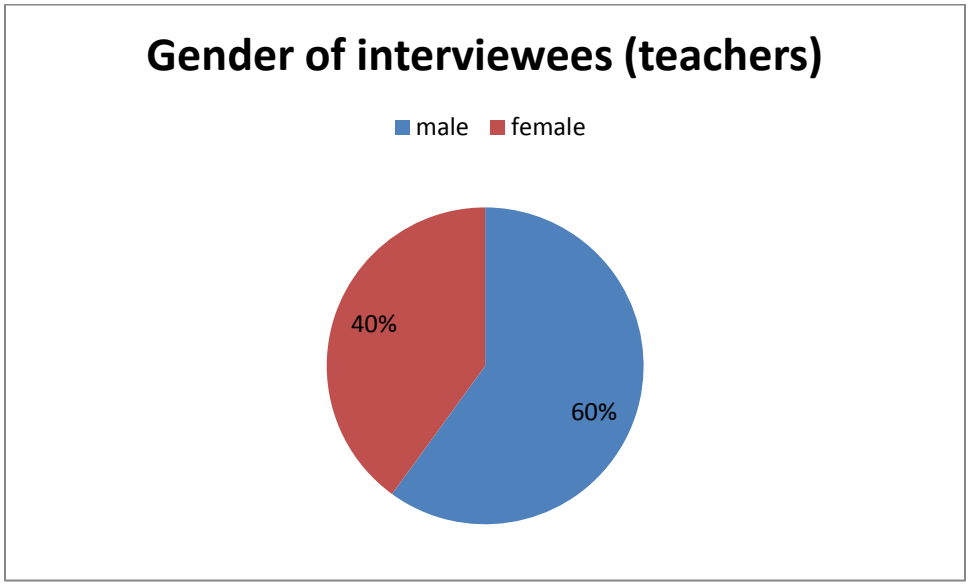

Figure 1- Gender of interviewees (teachers)

Figure 1 show that out of 15 teachers interviewed 9 (60%) were males while 6 (40%) were females.

4.2 Length of service for the teachers that took part in the study.

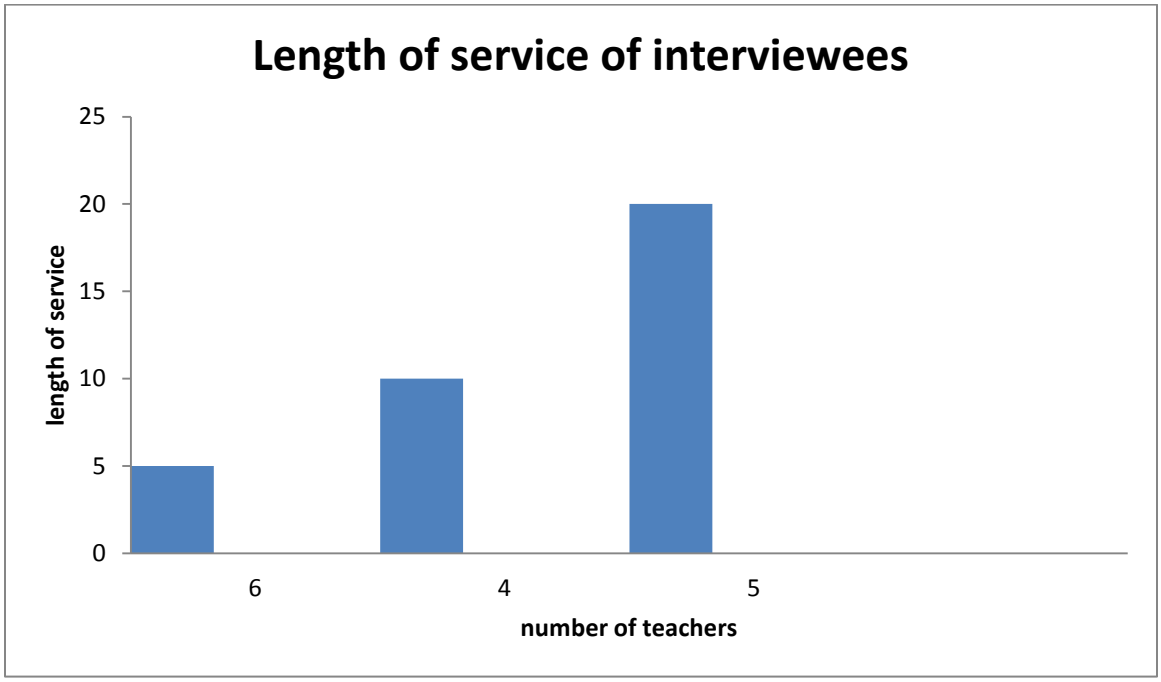

Figure 2-Length of teaching service for interviewees (teachers)

Figure 2 shows the duration of teachers. As shown in the figure, out of 15 teachers who participated in the study, 6 had been teaching for 1 to 5 years, 4 for 6-10 years and 5 for 16-20 years respectively. All the teachers in the sample taught at the secondary school level, that is grades 8-12.

4.3 Proportion of children per class

When asked on the number of pupils they had in their classes, teachers gave out the following responses as shown in figure 3;

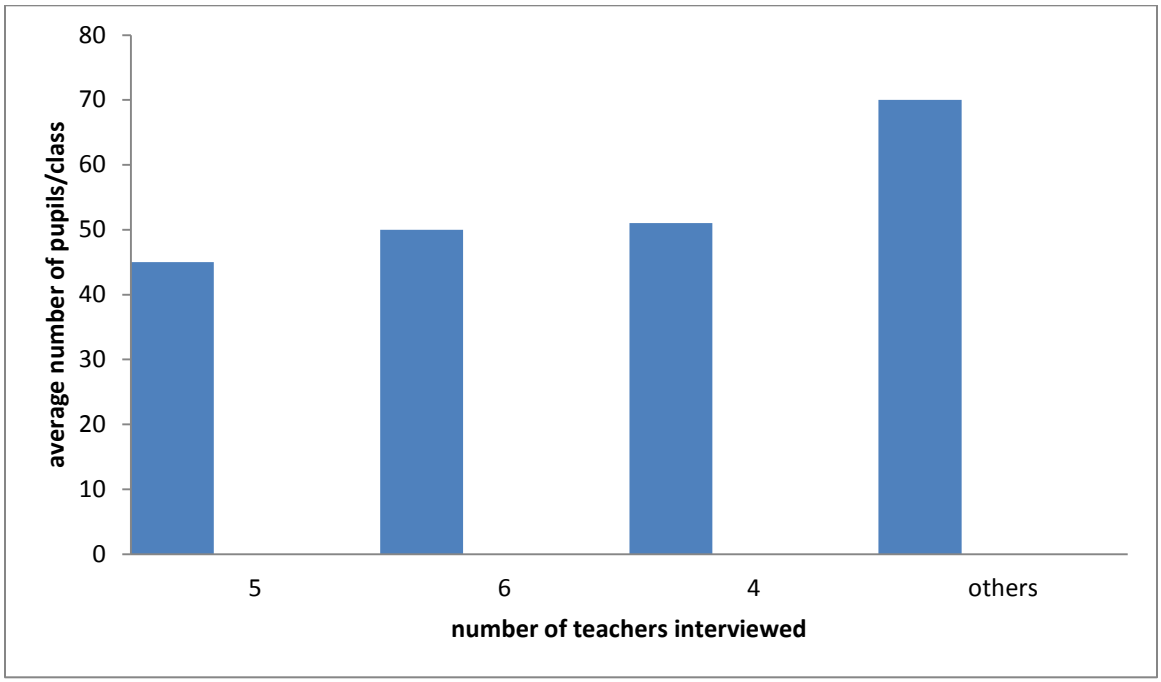

Figure 3: Proportion of children in class

Figure 3 shows the average number of pupils per class as given out by class teachers during interviews. Out of 15 teachers interviewed, 5(33%) teachers had class sizes of 45 pupils and below each, 6(40%) teachers had class sizes of between 46-50 pupils each, while 4(26%) teachers had a class sizes of 51 and above pupils each. Most of the teachers who participated in the study described their classes as being large. Some classes were as large as more than 70 pupils.

4.4 Effects of PTR on the teaching-learning process

The study sought to establish the effects of PTR on the teaching and learning process. Thus, when asked if PTR had an effect on the teaching-learning process, all the teachers observed that class size had an effect on the teaching-learning process. The following were highlighted as the effects of PTR on the teaching-learning process.

4.4.1 PTR and individualized attention

One of the effects of a high pupil-teacher ratio is failure by the teacher to provide individualized attention to pupils in class.

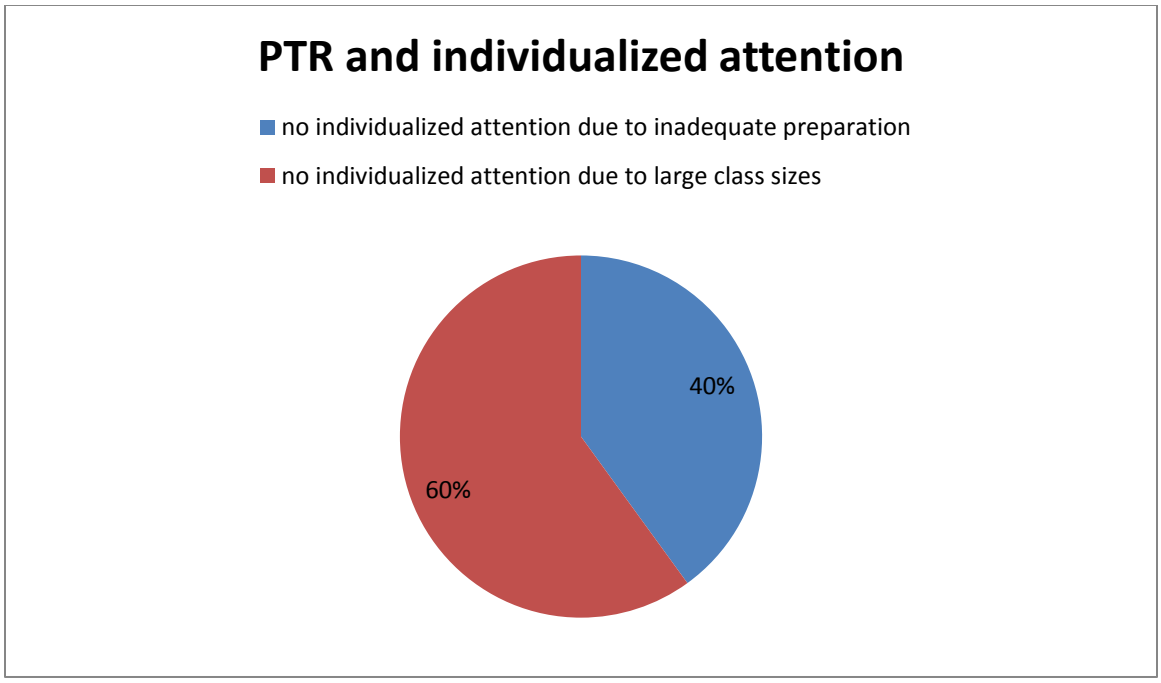

Figure 4: Reasons why teachers fail to provide individualized attention

Figure 4 shows that out of teachers who participated in the study, 9 said that they were unable to provide individualized attention to the learners due to large classes while the other 6 teachers attributed the teacher's failure to provide individualized attention in their classes to a number of factors that ranged from lack of proper preparation on the part of the teacher to in competence and laziness. As for the teachers who failed to provide individualized attention to pupils due to large numbers of pupils in their classes stated the following; one teacher observed that it was difficult to meet the needs of all the learners when the class size became large. He also pointed out that,

"No matter how well a class was organized, the number of learners in class was the most important factor in that it affected how much time a teacher spent with individuals and groups".

Another teacher said,

"Having a large class size could make one feel that they were not always meeting the needs of all the learners in class adequately". "It was also hard to find time to focus on individual learners so often".

Yet another teacher at the same school said that,

"It was very difficult to get around and see on a one-to-one basis each learner when one had a large class size. Children with learning difficulties and slow learners could not get a fair deal, especially if they received little or no additional support".

In addition, teachers pointed out that in small classes they had more opportunities to monitor individual pupils closely, thereby providing the opportunity for more individualized instructions and help during practice. Furthermore, teachers stated that learners received more assistance from them because they had more time to get to know them on a more personal basis.

Commenting on the benefits of small classes, one teacher said,

"The smaller number of learners in her class, allowed her to give more individual attention to the learners on a personal level because she was not rushed in trying to cope with large numbers".

4.4.2 PTR and marking pupils' work

Another effect of a high pupil-teacher ratio is failure by the teacher to mark pupils' work.

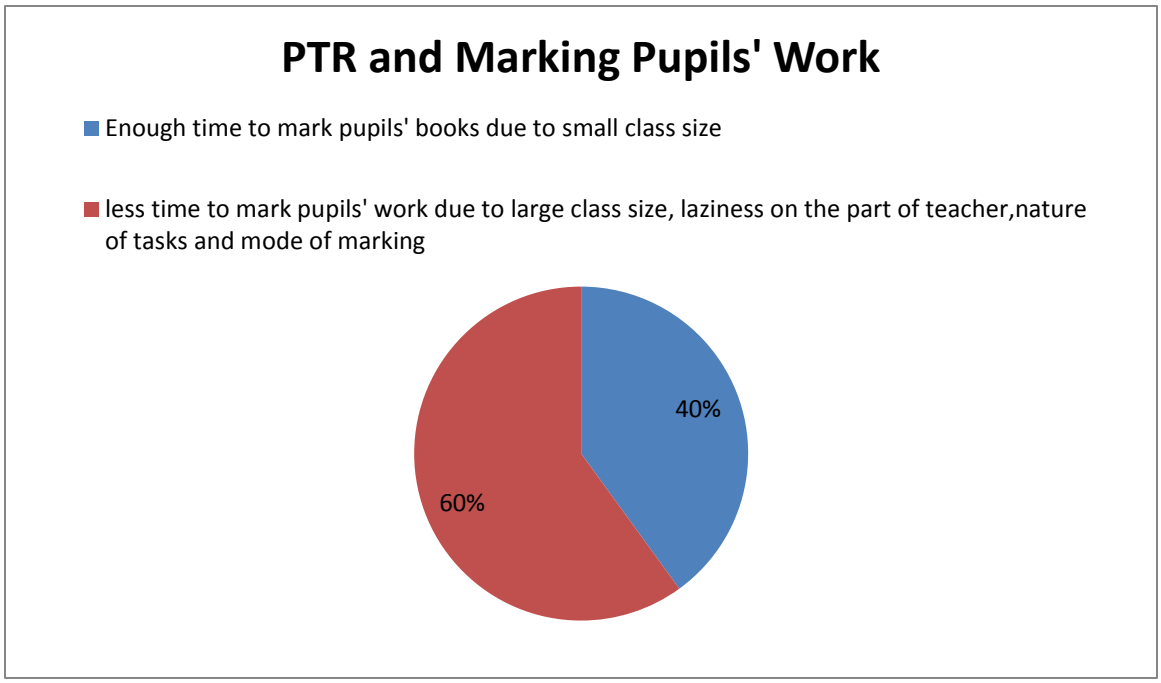

Figure 5: Reasons why teachers fail to mark pupils' work

Figure 5 shows that in terms of marking pupils' work, 6(40%) teachers out of 15 reported that in small classes, there was enough time for teachers to mark pupils' work because the number of books to mark was small, and such a situation of having less books to mark helped them to provide some feedback to the pupils soon after each piece of work or test while the other 9(60%) teachers attributed the teachers' failure to mark pupils' work not only to large classes but also to a range of other reasons which included laziness on the part of the teacher, nature of tasks to mark and the mode of marking among others. Teachers who found it challenging to mark pupils' books due to large classes reported that marking pupils' work took up more and more time as the size of the class increased. For instance, one teacher said,

"There was great stress when it came to marking of more than 70 exercise books within a period".

Another teacher reported that,

"Having 80 pupils in class made him think twice about the work he had to plan for the pupils such as practical activities. He also had to consider the quantity of work the pupils were given as the marking became unreasonable if activities were too many".

4.4.3 Class size and discipline

With regard to class size and discipline, teachers gave out the following responses as shown in table 1.

Table 1: class size and discipline

Class size	Discipline	Percentage
Large	7	47%
Extremely large	8	53%
Total	15	100%

Table 1 shows that in terms of class discipline, 7(47%) teachers out of 15 reported that, discipline in large classes was difficult to maintain and was more of an intrusion into the teaching-learning process while 8(53%) other teachers gave different views. Among the reasons given on why large classes caused indiscipline were that when pupils were too many in class, individualized attention became minimal as such pupils felt forgotten, hence engaged in off-task activities such as noise making, fighting and many such off-task activities that would keep them occupied.

Commenting on discipline during focus group discussion, Pupils reported that there was too much noise making in large classes during the learning process, and because of too much noise, concentration on what teachers were teaching was difficult. One pupil said,

"In their class were 70 pupils and because of being too many, there was too much noise and fighting, and their teacher at times failed to

identify those who were making noise, as a result she could resort to punishing the entire class".

Another pupil said,

"In their class there was also a lot of noise making and hearing what the teacher was saying proved futile".

In addition, other teachers also observed that classroom control was easier in smaller classes because each pupil became aware of the teacher's attention on him or her, and such awareness inhibited disruptive classroom behavior.

On the other hand, the other teachers did not believe that large classes caused indiscipline. The teachers attributed indiscipline in classes to other factors among which included the type of leadership the teacher exhibited in class, how well prepared a teacher was, age of learners, firmness and consistence of the teacher when dealing with pupils.

4.4.4 PTR and classroom space for mobility

With regard to pupil-teacher ratio and classroom space for mobility, teachers gave out the following responses as shown in table 2.

Table 2: pupil-teacher ratio and classroom space for mobility

Pupil-teacher ratio	Classroom space	Percentage
High	12	80%
Low	3	20%
Total	15	100%

Table 2 shows that another classroom factor affected by a large class size, as observed by 12(80%) teachers out of 15 was the inadequate classroom space for mobility of teachers

and pupils for the purpose of group activities. However, the other 3(20%) teachers gave contrary views.

Teachers who attributed lack of inadequate space for group work in class to large classes based their reports on the following: one teacher noted that space for teacher's mobility to monitor pupils' activities during group work was limited, and as such supervision became poor and consequently group activities were equally poor.

The other teacher stated that,

"Her room was very small and over-crowded such that she could not arrange furniture well and working area was not suitable for maximum learning potential".

Furthermore, another teacher reported that in large classes groups were made large in order to reduce the number of groups in class since space was limited. In some cases, groups were as large as 20 pupils per group.

On the contrary, other teachers attributed poor group work not only to lack of space for the teacher's mobility during group work but also to inadequate furniture in the classroom as well as poor sitting arrangement in class. Teachers reported that, it was quite difficulty to organize for group work because it was quite difficulty to leave passages for the teacher's mobility.

4.5.5 PTR and the availability of the teaching-learning resources

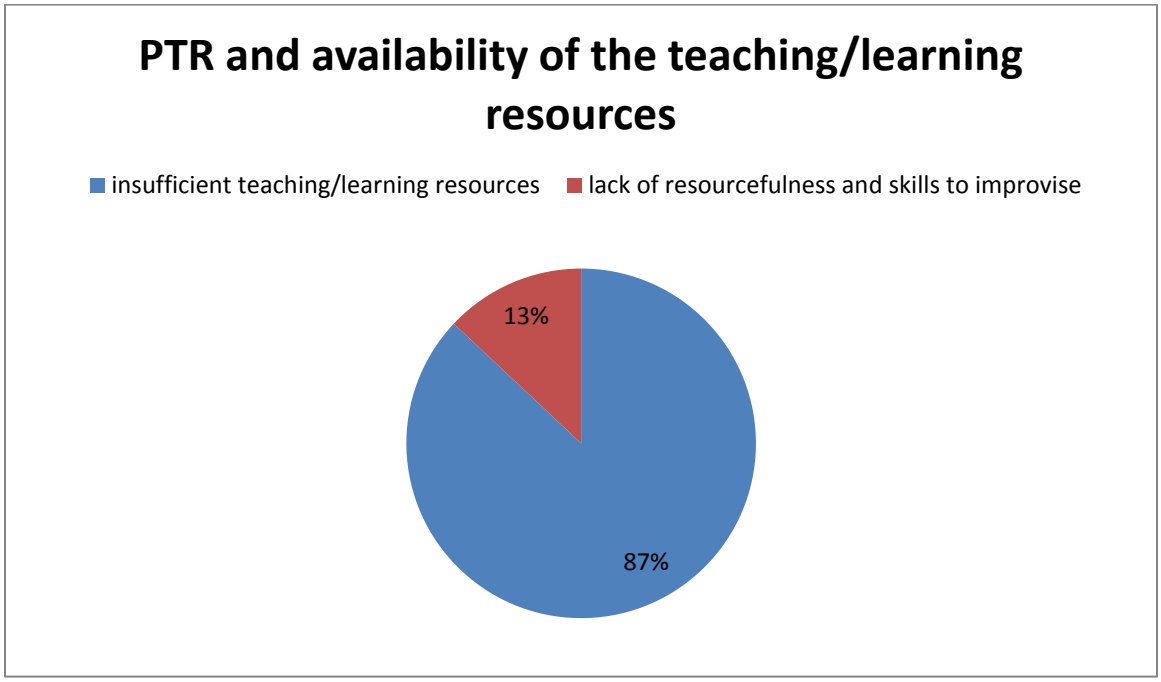

Figure 6: PTR and the availability of the teaching-learning resources

Figure 6 above shows that 13(87%) of the 15 subject teachers attributed insufficient teaching-learning resources as one critical factor that is influenced by large class size while the other 2(13%) teachers gave a contrary view. The two teachers who gave out contrary views reported that inadequate teaching-learning resources is not affected by a large class size only but also by teachers' lack of resourcefulness and improvisation skills. Some of the 13 teachers who attributed insufficient resources to large classes stated the following:

One teacher said,

"It was difficult to supply adequate expensive materials such as text books to match the rise in class sizes and that affected learning greatly".

Another teacher said,

"There were very few relevant books at their school to match the large numbers of pupils in the classes".

She mentioned Mathematics as one subject area in which 60 pupils in her class share 5 Mathematics text books. She called this situation pathetic and de-motivating to both teachers and pupils.

Furthermore, some teachers said that, due to inadequate teaching-learning resources, they were forced to write down all the class activities on the chalkboard, including drawing graphs. This situation consumed much of their teaching time.

Pupils also reported that there was a critical shortage of books and other learning materials, especially in core subjects like Science, Mathematics, English and Computer studies. One pupil complained that at her school, they had only 10 Mathematics books for grade 12, against 65 pupils in class.

4.6.5 Class size and teacher exhaustion

With regard to class size and teacher exhaustion, teachers gave out the following responses as shown in table 3.

Table 3: class size and teacher exhaustion

Class size	Teacher exhaustion	Percentage
Large	11	73%
Average	4	27%
Total	15	100%

Table 3 shows class size and teacher exhaustion. 11(73%) teachers out of 15 mentioned exhaustion as one of the effects of teaching large classes while the remaining 4(27%) reported contrary views. For example, one of the 11 teachers had observed that teaching large classes was exhausting because one was forced to speak loudly in order for all pupils to hear him or her, and as a result of this, one would be very tired by the end of the day. On the other hand, the other 4(27%) teachers reported contrary views.

Exhaustion was not only due to large classes but to a range of other factors which among others included high number of periods against one teacher as well as the type of

teaching strategies employed when teaching. For example, one teacher reported that the use of teacher-centered methods was found to be more exhausting than learner-centered strategies.

4.6.6 Class size preference for teachers

With regard to class size preference, teachers gave out the following responses as shown in table 4.

Table 4: class size preference for teachers

Class size	Preference	Percentage
Small	12	80%
Average	3	20%
Total	15	100%

Table 4 shows class size preference for teachers. Out of the 15 teachers who took part in this study, 12 (80%) teachers preferred teaching small classes, and 3 (20%) teachers preferred teaching average class size.

4.7 Teachers' views on small classes

All the teachers interviewed preferred teaching small classes, and the following were among the major reasons given for their preference:

4.7.1 Class size and pupil participation

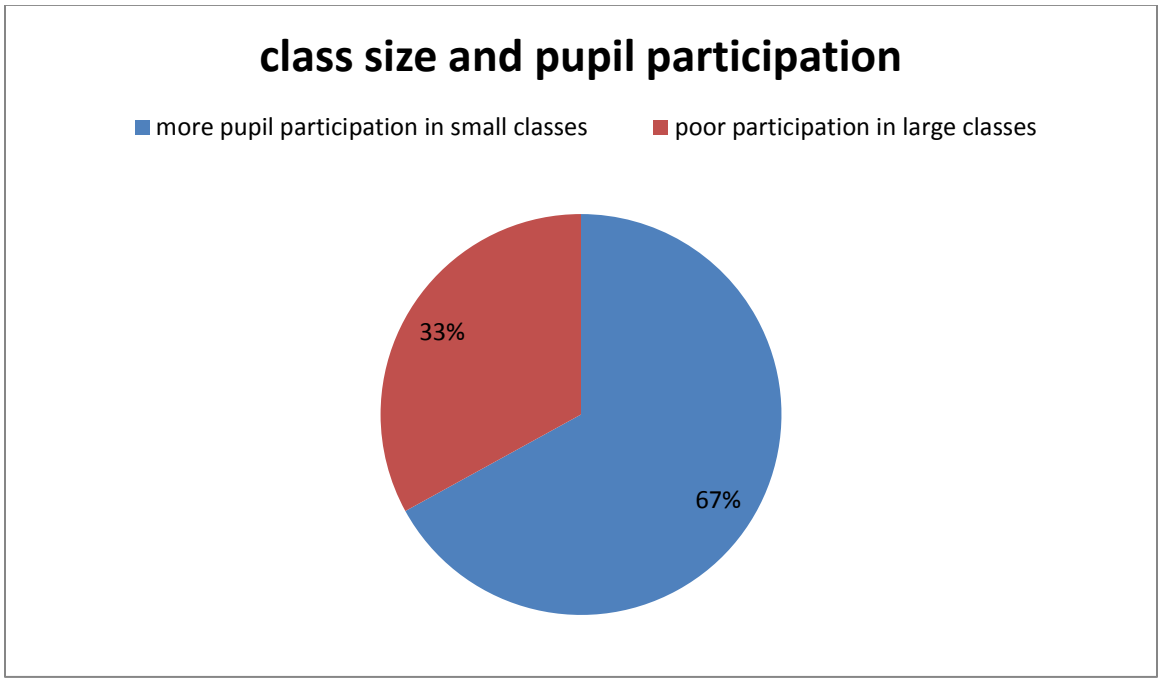

Figure 7: Class size and pupil participation

Figure 7 shows that 10(67%) out of 15 teachers who participated in the study observed that, there was more pupil participation in class activities in small classes because most of the pupils were given enough time to ask questions and teachers took time to answer pupils' questions as well as making clarifications where necessary. On the contrary, the other 5(33%) teachers attributed pupils' lack of participation in lessons to a range of factors that included among others, poor teaching strategies used, nature of subject matter taught, type of tasks prepared, nature of questions formulated and age of the learners.

4.7.2 Class size and learning of pupils' names

Learning of pupils' names was mentioned by 8 teachers out of 15 as another factor affected by class size while the other 7 teachers never mentioned it as an effect of large classes. Teachers reported that as classes increased, it became a challenge to learn pupils'

names and to get to know them personally. Teachers observed that learning of pupils' names was a primary method of developing contact with them but as classes increased, it became difficult to learn pupils' names. However, in a small class, it was reported that it was quite easy to master pupils' names.

Commenting on the learning of pupils' names in small classes, one teacher said,

"Small classes allow him to learn his pupils' names relatively quickly".

4.7.3 Class size and teacher productivity

6 teachers out of 15 reported that in small classes, teachers would be less tired, more productive and develop more positive interactions as well as effective communications with learners. On the other hand, teachers reported that in large classes, teachers spent much of their time managing the classroom (keeping order and discipline) instead of providing teaching. The other 9 teachers were mute with regard to class size and teacher productivity.

4.8 Challenges associated with teaching large classes

The following are some of the challenges associated with teaching large classes as reported by subject teachers:

4.8.1 Class size and teacher-pupil interaction

Teacher-pupil interaction was mentioned by 13 teachers out of 15 as yet another factor influenced by class size while the other 2 teachers were silent on class size and teacher-pupil interactions. Teachers stated that, as the class increased, the number of interactions with individual pupils decreased, and this adversely affected pupils' progress. Commenting on how teacher-pupil interaction is affected, one teacher said that,

"It was very difficult to get around and see on a one-to-one basis each learner when one had a large class because time could not allow seeing each and every individual learner in a class of 70 pupils".

Another teacher noted that,

"Pupils with learning difficulties and slow learners did not get a fair deal in a large class because they were not given the desired attention".

Teacher-pupil interaction was observed to be less in large classes as compared to small classes. In large classes teachers concentrated more on teaching and completing their topics than attending to pupils' individual needs. In one large class, it was observed that one pupil was fast asleep without the teacher noticing and caring, instead, the teacher continued teaching.

4.8.2 Class size and classroom furniture

Non availability of adequate furniture to match the rising numbers of pupils in the classes was mentioned by 13 out of 15 teachers as another factor affecting class size while the other 2 teachers never reported on it. Teachers reported that due to inadequate desks in the classrooms, pupils were forced to squeeze on the few available desks and some to sit on the floor. The situation was worse in large classes because in some cases there were classrooms with as few as five desks to be shared amongst a class of 70 pupils. This therefore, meant that more than half the pupils had to sit on the bare floor. In one classroom it was observed that 5 pupils squeezed themselves on one desk meant for 3 pupils.

During focus group discussion with Pupils, they complained of inadequate furniture to match the numbers of pupils in their classes. One pupil reported that in his class, due to inadequate furniture, they were made to squeeze on the few available desks. Desks meant for three pupils were being shared by 4-5 pupils per desk in order to accommodate all of them.

4.8.3 Class size and class management

10 teachers out of 15 teachers mentioned class management as one problematic area in large classes while the other 5 gave contrary views Those who gave the contrary views attributed failure of the teachers to motivate pupils not only to the number of pupils in class but also due to a wide range of factors which among others included poor

knowledge in the subject matter, poor lesson preparation and use of more teacher-centred methods than learner-centred approaches. On the other hand, those who attributed difficulties in class management to large classes stated the following:

One teacher said that,

"Managing a large class was always more difficult than small ones because if the class was small, the possibility of encountering classroom management difficulties decreased".

He furthermore said that,

"It was easier to deal with pupils in small classes than in large ones because pupils in small classes could easily be known".

Another teacher said that,

"In a large class, teachers spend more time managing the classroom (i.e. attending to undisciplined learners) instead of providing teaching, which might affect learner achievement".

Yet again, the third teacher said,

"As numbers rose and space decreases, the level of misbehaviour equally went up, due to proximity of learners. More arguments and less opportunity to physically separate disruptive individuals contributed to the problems of managing and controlling large classes".

The teachers who gave out contrary views reported that poor class management was not only caused by a large number of pupils in class but by the teacher's personality, poor preparation of lessons and poor leadership style exhibited in the classroom. For example, authoritative leadership style could result into pupils dislike for the teacher and failure of the pupils to respect and cooperate with the teacher in class.

4.8.4 High pupil-teacher ratio and motivation

9 teachers out of 15 observed that motivation is an important factor in the teaching/learning process which unfortunately may be affected by high pupil-teacher ratio. They argued that the most difficult part of teaching large classes was motivation.

One teacher said,

"Motivation of a smaller number of pupils is easier than motivating a bigger number because each learner had different needs".

On the contrary, the other 6 teachers attributed failure of the teacher to motivate pupils not to the number of pupils in class but due to a range of factors which among others included poor knowledge in the subject matter, poor lesson preparation and use of more teacher-centred methods than learner-centred approaches.

4.8.5 High pupil-teacher ratio and homework

9 teachers out of 15 admitted failing giving pupils home work because they had no time to mark all the books for pupils. One teacher reported that if he gave home work to a class of 80 pupils, it would take him a long time to finish marking and at the end of it all that home work would serve no purpose. On the contrary, the other 6 teachers attributed the teachers' failure to give homework to a number of reasons that included laziness, lack of professionalism and poor preparation of lessons on the part of the teacher.

4.9 Measures to mitigate the impact of high pupil-teacher ratio

When asked on the measures that should be taken to mitigate the impact of large classes on the teaching-learning process in public secondary schools, teachers gave out the following responses;

Firstly, teachers observed that employing all trained teachers immediately upon graduation would go a long way towards solving the problem of having large classes. Teachers were also of the view that there should be timely replacement of teachers who were being transferred, retired, resigning, promoted to administrative posts and those who were dying.

Another measure recommended by teachers was that there must be continuous construction of more schools, especially in densely populated areas of the district. In terms of existing schools, teachers proposed that more classrooms be constructed in existing schools which had large classes. When it comes to the teaching-learning

materials, teachers recommended that the Ministry of Education should ensure continuous supply of both teaching-learning resources as well as furniture in all schools. The last comment was that the Government should work towards improving conditions of service for teachers in order to retain the existing staff as well as attract back those who had left the teaching service for green pastures.

(B) Presentation of the findings from pupils with regard to class size and learning

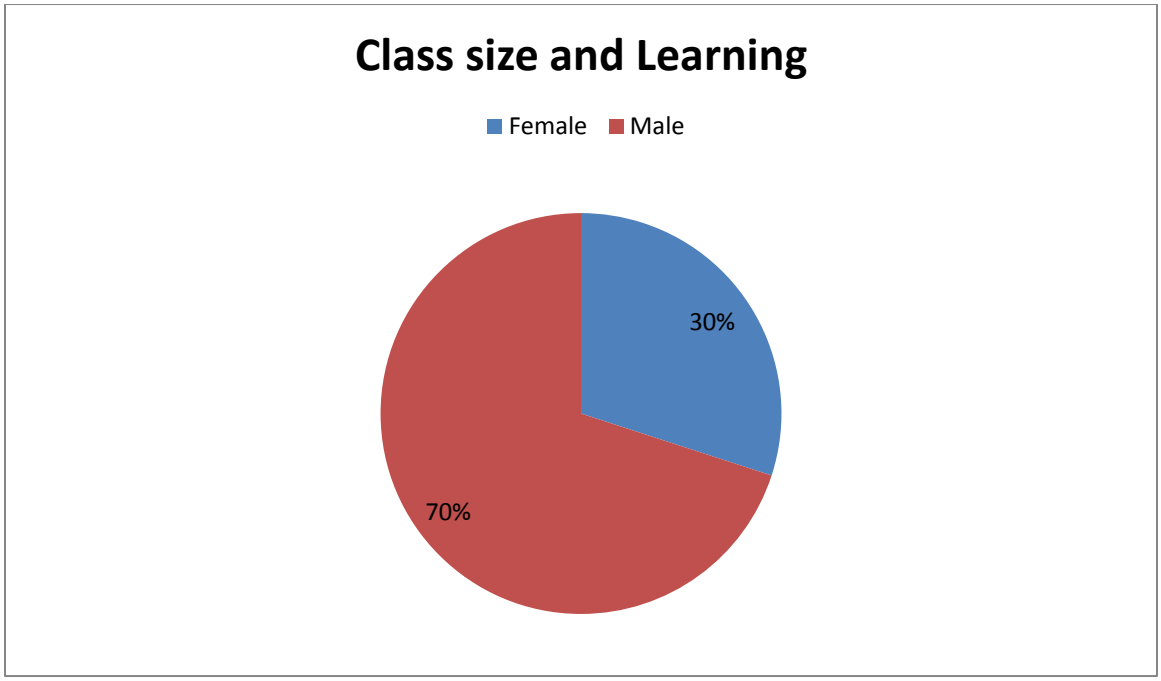

Figure 8: Class size and learning

Figure 8 above shows that out of 50 pupils that took part in the focus group discussion, 35(70%) were males while the other 15 (30%) were females. These 50 pupils were drawn from all grade levels thus grades 8-12. Each grade level was represented by 10 pupils who were selected randomly. The following were the common comments obtained from pupils during the focus group discussion held with them:

When asked to classify their classes as small or large, 12 pupils classified their classes as being small while 38 pupils classified their classes as being large. With regard to class preference, all the pupils said that they preferred learning in small classes.

(C) Presentation of the findings on the challenges of teaching large classes as obtained by the researcher through class observations

In order to obtain a true picture on the challenges associated with teaching large classes, the researcher conducted class observations at all the schools sampled, using a designed checklist shown under appendix iii and the following were the findings: Of the 50 classes observed, 12 classes had a class size of 45 pupils and below each, 15 classes had between 46-50 pupils each while 23 classes had more than 50 pupils each. In almost all the classes observed, it was noticed that teachers paid less attention to identifying and helping pupils' with learning difficulties.

However, the situation was worse in schools with large classes. When asked on the presence of pupils with learning difficulties in their classes, most teachers said they had none. But a closer look at the performance of some pupils in some classes revealed that there were learners with learning difficulties in most of the classes. As for trouble makers, they could not easily be identified in large classes. For example, in one large class, it was observed that due to the teachers' failure to identify trouble makers, the whole class was punished. All the pupils in the class were made to kneel down for about 20 minutes while the teacher continued teaching.

(D) Presentations of the findings from school head teachers

The following were the responses from school head teachers with regard to high pupil-teacher ratio and its effects on the teaching-learning process

Out of 5 head teachers that participated in the study, 2 were males while 3 were female. The length of service head teachers served ranged from 5years and above. When asked on the grade levels of their schools, head teachers classified 3 schools as being grade ones and 2 schools as grade two. With regard to the total number of teachers at each school, head teachers gave out the following responses shown in table 2

Table 2: Total number of teachers at each school

School	Grade of the school	Expected number of teachers	Available teachers	Shortfall in number of teachers
A	1	50	44	6
B	1	50	46	4
C	2	40	32	8
D	1	50	43	7
E	2	40	35	5
Total		230	200	30

Table 2 shows that each of the 5 schools sampled had a shortfall in the teaching staff. This shortfall ranged from 4 to 8 teachers per school.

4.10 Total number of classrooms per school

When asked on the number of classrooms at their schools, head teachers gave out the responses shown on table 3.

Table 3- Total number of classrooms per school

School	Grade of the school	Expected number of rooms	Available rooms	Shortfall in number of rooms
A	1	15	12	3
B	1	15	13	2
C	2	12	10	2
D	1	15	10	5
E	2	12	12	0
Total		69		12

Table 3 shows that there was a short fall in the number of required classrooms in four of the schools sampled. The range of the short fall per school was between 2 to 5.

4.11 Total enrolment level per school (grades 8-12)

Table 4 gives the total enrolment of pupils per school as obtained from school head teachers.

Table 4: Total enrolment of pupils per school

School	Grade	Total Number of Pupils
A	1	1800
B	1	2200
C	2	850
D	1	1897
E	2	997

Table 4 shows the total enrolment levels of pupils per school. When requested to state whether these enrolment levels of pupils in their schools were small or large, all head teachers said that they were large because the number of classrooms, teachers, teaching-learning resources and furniture could not correspond with the number of pupils.

4.12 Average number of pupils in class

On the question of the total number of pupils in each class, head teachers reported that there were 12 classes with an average class size of 45 pupils and below each, 15 classes with 46-50 pupils each, and 23 classes with more than 50 pupils each. When requested to state whether these class sizes were large or small, head teachers said there were more large classes than small ones in their schools.

4.13 Class size and classroom environment

Finally, head teachers noted that due to large classes, the circulation of fresh air in the classroom was limited and this was a health hazard to both pupils and teachers.

4.14 The average teacher-pupil ratio per school

Table 5 shows the average pupil-teacher ratio per school.

Table 5: Average PTR per school

School	Number of teachers	Number of pupils	Pupil-Teacher Ratio
A	44	1800	40:1
B	46	2200	47:1
C	32	850	26:1
D	43	1897	44:1
E	35	997	28:1

Table 5 shows that the PTR ranged from 26:1 to 47:1. This therefore means that the average class in sample schools was 45-54 implying that one teacher has to teacher between 26-47 pupils per class.

Summary

This chapter has presented data collected from both respondents and participants with regard to high pupil-teacher ratio and its effect on the teaching-learning process in public secondary schools. Quantitative data have been presented in table form and figures while qualitative data have been presented descriptively according to common themes as reflected by the research objectives and key questions of the study.

The next chapter discusses the findings collected during research.

CHAPTER 5

DISCUSSION OF THE FINDINGS

5.0 Overview

This chapter discusses the findings based on the following objectives that it sought to achieve:

- To determine the proportion of pupils in an average class
- To establish the average teacher-pupil ratio in Public Secondary Schools
- To determine the effects of high pupil-teacher ratio on the teaching-learning process in Public Secondary Schools

5.1 The proportion of pupils in an average class size

To assess the effects of high pupil-teacher ratio on teaching and learning process, it was prudent to begin by establishing the proportion of pupils per class. The study has revealed that the average class size in the sampled schools was 46-50 pupils. These findings clearly show that most public secondary schools in urban areas have large classes. This finding seems to agree with the findings of the study done by Kaulule (2006), who suggested that because of free basic education most schools were overcrowded resulting in difficulties of class management. These figures are also in line with the statistics that MOE (2002) obtained in its survey of pupil-teacher ratio in 1992 when it came up with a national average class size of 61.9 pupils per class.

5.2 The teacher-pupil ratio

The study further sought to establish the teacher-pupil ratio in the sampled schools. Research findings revealed that the pupil-teacher ratio ranged from 45:1 to 54:1. The range of pupil-teacher ratio revealed in this study is very similar with the findings reflected in the MOE Statistical Report (1985) which showed a pupil-teacher ratio of

about 52:1. This ratio is quite high for effective classroom delivery of the teaching-learning process. This ratio implies that in a period of 40 minutes, the teacher will on average have to spend less than a minute on each pupil if he or she has to attend to each and every pupil individually. This therefore, implies that in a large class, some pupils with problems that may need the teacher's attention may miss out due to limited time that the teacher may have.

In other studies done on the effects of the teacher-pupil ratio, Ruopp et al., (1979), had established that lower staff-child ratios were associated with better outcomes in early childhood education programmes.

Subsequent studies in a variety of countries around the world have demonstrated that staff-child ratio is a critical determinant of high quality in early childhood education (Neugebauer, 1995). In order to establish the extent to which staff-child ratio affects quality in early childhood education, McGurk et al. (1995) conducted a thorough review of a variety of international studies which attempted to investigate the staff-child ratios in early childhood education centres in various countries. The research findings showed variations in teacher-child ratios ranging from 1:2 to 1:9 for infants and from 1:7 to 1:30 for children aged between three and four years. The findings seemed to indicate that culture had a critical part to play in determining the ratio. For instance, the United Kingdom and New Zealand were found to have similar ratios at 1:11 and 1:15 respectively. Japan on the other hand, which had a collectivistic cultural system, as opposed to the individualistic system found in the United Kingdom and New Zealand, had a higher teacher-child ratio of 1:30.

Other studies have taken a more experimental approach to try and establish what effects the variations in teacher-child ratio might have on the quality of early childhood education outcomes. In one study, Russell (1985) studied the effects that changes in teacher-child ratio might have in 27 kindergartens in Southern Australia. In one study, the ratio was at 1:8, in another, it was kept at 1:10, in the third group it was at 1:12. The results from this experimental study showed that there was a close relationship between the size of the teacher-child ratio and the quality of outcomes. Where the ratios were bigger, Russell reports that the quality of interaction between teachers and children

declined significantly, meaning that children did not get optimal opportunities to get their personal challenges addressed by their teachers.

Further, the study revealed that the larger the ratios, the more children engaged in disruptive behaviours. Smith et al. (1989) yielded similar findings in studies conducted in New Zealand. Notwithstanding these statistics, however, one cannot unequivocally state what the optimal ratios are in yielding quality outcomes in early childhood education; one need to remain cognizant of the fact that quality is determined by a multiplicity of interconnected factors. Further, cultural variations have also a role to play (Wylie, 1989).

5.3. Effects of high pupil-teacher ratio on the teaching-learning process

The following are some of the effects that high pupil-teacher ratio has on the teaching-learning process as revealed by the study:

5.3.1 Class size and pupil participation

From the observation made as well as from the responses made by 11 teachers out of 15 the study revealed that there was more pupil participation in class activities in small classes than in large ones. In-fact, the researcher observed that in large classes, pupils hardly asked questions. The only activity that pupils were involved in was listening and copying down of notes. Teachers were also in a hurry to teach topics instead of teaching pupils. This means that teachers were more concerned with completing their syllabi instead of getting concerned with whether pupils understood their lessons or not.

Pascarella and Terenzini (1991) state: “Perhaps the strongest conclusion that can be made is the least surprising. Simply put, the greater the student’s involvement or engagement in academic work or academic experience in the classroom, the greater his or her level of knowledge acquisition and general cognitive development”. Pascarella and Terenzini’s (1991) support for active involvement (engagement) is so formidable that it has been referred to as the “grand-meta principle” of pupil teaching (Cross, 1998). This means that pupil participation in the classroom is viewed as important for learning. However, large classes have been found to reduce the likelihood of classroom participation. Meanwhile,

Stone (1970), surveyed over 1000 pupils in different schools, and found that 60% of them reported that the presence of a large number of people in class deterred them from asking questions, even if the teacher encouraged them to do so. Using direct classroom observation as their methodological tool, Karp and Yoels (1976) discovered that in classes of less than 40 pupils, 4-5 pupils accounted for 75% of all classroom interactions; and in classes with more than 40 pupils, 2-3 pupils accounted for over half the exchanges.

The importance of classroom involvement for pupil learning is strongly supported by the results of a longitudinal study of pupils' intellectual skill development conducted by Terenzini, Theophilides and Loran (1984), who found classroom participation to be the only course experience variable that consistently correlated with pupils' cognitive growth. McKeachie (1981) also notes that it is "because active thinking is so important to learning and retention of learning, constraints upon oral participation are likely not only to induce passivity but also to be educationally harmful" A relationship between pupils' active involvement in the classroom experience in general and their enrollment in small-sized classes is suggested by the work of Light (2001). He conducted in-depth interviews with more than 1600 pupils, and one of his principal findings was that pupils enrolled in small classes were noticeably more engaged in the classroom experience. Since active involvement in the classroom experience is strongly correlated with pupil retention (Astin, 1993; Tinto, 1993), the findings of reduced levels of active class involvement in large-sized classes may have disturbing implications for pupil retention in schools. The implications may be particularly disturbing for lower grades.

The researcher therefore feels that it is very important for teachers to understand that participation of the learners in the lesson is very vital because when learners participate in the lesson it enables them to understand the lesson better than when they are passive. In fact, Fontana (1988) also notes that participation of learners in the lesson increases their level of retention of the knowledge learnt.

5.3.2 Class size and pupil discipline

When it comes to class size and discipline, the study revealed that the larger the class, the more undisciplined it became. Discipline was mentioned 11 times by 15 teachers as a factor which is influenced by class size. The researcher also observed that in small classes, there were less discipline cases than in a large classes because pupils were aware that the teacher was observing whatever they were doing and so they refrained from misbehaving.

From the observation made at one school, the researcher noticed that trouble makers could not easily be identified in large classes. For instance, in one grade 11 large class, it was observed that due to the teacher's failure to identify noise makers, the whole class was punished. All the pupils were made to kneel down for about 20 minutes while the teacher continued teaching. The researcher feels that this kind of reinforcing class discipline was ineffective because even the innocent pupils were affected. Furthermore it was noticed that in large classes there was too much noise making during the teaching-learning process, and because of too much noise, concentration on what teachers were teaching was difficult. It was found that indiscipline was more of an intrusion into the teaching-learning process in large classes. It was also noticeable that in some large classes, teachers resorted to the use of traditional styles of maintaining class control which included threats and reprimands throughout the period as a way of maintaining class control. However, in smaller classes, pupils' behaviour was under control because learners were aware that teachers were able to see everything that they were doing since there were very few in class.

The findings of the present study are in line with previous research by Carrington (1980) which found that a small class enabled teachers to know their learners better and could easily recognize their problems and special needs early. As for the learners, they were more likely to be on-task and less likely to talk amongst themselves. In addition learners in small classes were more likely to create fewer discipline problems and engage in more pro-social behaviour, thereby allowing teachers to devote more time to teaching and less time to controlling the class.

Commenting on the issue of discipline in class, Fontana (1985) notes that, classroom discipline is important because it creates a safe learning environment for both learners and teachers. Teachers can deliver effective lesson presentation without classroom disruption and learners can receive a quality education without constant distractions. According to Fontana (1985) classroom discipline is important because it aims at producing well-mannered learners with proper personal, social and ethical abilities. These abilities may eventually give them the opportunity to make significant contributions to their communities. A school classroom is designed for learners to learn, but when a learner acts out as the case is in large classes, it can affect every learner in the class. Classroom discipline is necessary to ensure that, learners stay on topic; behave within the rules set by the school; and contributes to a positive learning environment for their peers. An in-disciplined class wastes the teacher's time, energy, and robs learners of quality education. However, in a large class, discipline was quite elusive as such the teaching-learning process was compromised in many ways.

5.3.3 Class size and teaching styles

With regard to class size and teaching styles, the study revealed that class size affected the choice of the teaching styles. The researcher observed that in small classes it was easier to effectively use learner-centered methods such as field trip; project method and group work because managing a small number of pupils when using learner-centered methods such as a field trip was easier than managing a large number. For example, it was easier to give individual projects and monitor them in a small class than when pupils were too many because monitoring was too demanding and time consuming on the part of the teacher. The researcher also observed that teachers teaching large classes neither took pupils out on field trips nor gave them project work. Most of the times, pupils were in the classroom listening to the teacher's voice and instructions. This findings seem to be suggesting that class size is one of the factors that determines the teaching methods used in the classrooms by teachers. The findings of the study also tally with the views of Turner (1995) who in his study found that smaller classes provided the opportunity for more individualized instructions and help during the teaching-learning process.

Furthermore, Turner observed that while class size may not be significant in subjects best suited for lecture style learning, subjects that encouraged the pupils to think critically while developing their problem-solving skills were more suitable for a smaller atmosphere. Mortimore (1998), also points out those teachers might alter their style of teaching, and tend to use a whole class teaching method instead of the one- to- one approach when faced with a large class.

The study done by Lemmer (1999), found that small classes had an advantage over large classes when it comes to the employment of a variety of learner-centered teaching styles such as discussion, project, role-play and many such teaching styles. The Ministry of Education (2008) is also in agreement with the above views when it comes to the choice of teaching styles. The Ministry of Education acknowledges that a large class has an impact on the choice of the teaching methods since teachers have to adjust their teaching methods according to the number of pupils in their classes. Furthermore the MOE (2008) also states that a large class necessitates placing excessive reliance on teacher-centered methods with much student participation being reduced to listening, taking down notes and absorbing what is received from the teacher. The consequent widespread absence of student activity and hands on experience may have contributed to the superficiality of learning and to poor performance, both in the examinations and subsequently in the real life situations. Mbozi (2008) also argues that a large class may be a limiting factor in the choice of teaching methods. Thus, some styles may not be employed at all thereby depriving some pupils who would have benefited from the employment of such styles. For example, the teacher may fail to employ project style due to the pressure of work on the part of the teacher in maintaining the pupils' project manuscripts. But the use of the project styles may assist the teacher to identify not only slow learners but also weaker ones who may need specific assistance. This clearly points to the fact that teaching was more effective when the class was small as opposed to a large one.

Commenting the effects of class size, Smith (1983) notes that large classes increase faculty reliance on the lecture method of instruction. "Class size and method are almost inextricably intertwined. Thus, the research on class size and that on lecture vs. discussion overlap. Large classes are most likely to use lecture methods and less likely to

use discussion than small classes". This naturally leads to the question of how learning outcomes achieved by subjects taught with the lecture method which is the dominant mode of instruction in large-class settings compare with outcomes achieved in smaller-sized classes, where the discussion method is more likely to be employed. Research on the lecture method strongly suggests that pupil attention and concentration tend to drop off dramatically after 10-20 minutes of continuous instructor discourse (Penner, 1984; Verner and Dickinson, 1967). This attention "drift" occurs even among highly motivated upper basic school pupils (Stuart and Rutheford, 1978) and learning-oriented (versus grade-oriented) pupils (Milton, Pollio and Eison, 1986). In general, it has been found that about half of the time during lectures, pupils are thinking about things unrelated to the lecture content, with up to 15% of their class time spent fantasizing (Milton, Polio, and Eison, 1986). In his review of close to 100 higher education studies over a 50-year period, Bligh (1972) reports that pupils who become involved in active discussion of their ideas with other pupils are more likely to stay "on task" in class (i.e., experience fewer irrelevant or distracting thoughts) and spend more time synthesizing and integrating concepts, relative to pupils who listen to lectures.

Bligh also found that pupils, who had the opportunity to interact in class with the class teacher, and with other pupils, reported significantly higher levels of satisfaction with their learning experience than pupils in classes that were taught exclusively by the lecture method. Reinforcing this finding is Costin's (1972) review of close to 60 studies, spanning a 40-year period, which revealed that pupils better like (thus, report more positive attitudes toward) the subject and its subject matter when they had small-group learning experiences in class. Kulik and Kulik (1979) reached a similar conclusion in their comprehensive literature review, reporting that pupils involved in classes which made use of discussion groups were more likely to develop positive attitudes toward the subject matter. These results are consistent with those generated by the Policy Center on the lower basic pupils, based on survey data collected from more than 60 learning institutions and over 30,000 pupils. This national survey revealed that use of "engaging pedagogy" (for example, class discussions and group work) was positively associated with pupil satisfaction and self-reported learning outcomes in basic schools (Swing, 2002). Similar findings emerge from research conducted by the Middle

Education Research Institute on basic school subjects in general. Based on data gathered from almost 25,000 pupils at 110 institutions, it was found that the pedagogical practices most strongly associated with pupil satisfaction with the overall quality of instruction were those that emphasized involvement with peers, faculty, and the course itself (Keup and Sax, 2002). Research also indicates that, relative to traditional lecture classes, pupils are more likely to take additional subjects in an academic discipline when their prior subjects in that discipline had either one of the following characteristics: (a) small-group discussions with other pupils (Bruxton and Crull, 1982), or (b) teachers who adopted the role of "facilitator" rather than "expert" or "authority" (McKeachie, Lin, Moffet and Daugherty, 1978).

These results suggest that greater use of pupil centered methods of instruction (such as, class discussions and small-group work) may promote greater pupil interest in the subject matter of introductory courses and, perhaps, increase the likelihood they will pursue the subject as a potential major. Smaller class size and less lecturing in introductory subjects may also increase pupil appreciation of general education curriculum, for which they typically report less subject satisfaction (as evidenced by lower pupil ratings) than 4 elective subjects (Braskamp, Bradenburg and Ory, 1984; Cashin, 1988). A fitting summary of the outcomes associated with the lecture method is provided by Bligh (1972), based on his extensive review of the research literature: "The balance of evidence favors this conclusion: Use lectures to teach information. Do not rely on them to promote thought, change attitudes, or behavioral skills if you can help it". Since the amount of class time that teachers spend lecturing tends to increase with increasing class size (Smith, 1983), the foregoing shortcomings of the lecture method may be ascribed to large class size as well.

5.3.4 Class size and assessment

In terms of class size and assessment, the study revealed that assessment was another teaching-learning process that was affected by high pupil-teacher. It was noticed that in small classes, marking of pupils' books took up less time, and immediate feedback was given to pupils on their performance, and this enabled pupils to work on their weaknesses

immediately but in a large class, marking pupils' work took too long and the feedback to pupils was often delayed. This in the end frustrated pupils' performance. Furthermore, this research revealed that teachers developed great stress each time they had to mark a huge number of exercise books for their classes in each of the 8 subjects that they taught. It was noted that owing to large classes, the option that most teachers had was to reduce the amount of activities and frequency for assessment, although this compromised the quality of work. On the other hand the study revealed that marking time in small classes had been much reduced leaving teachers with more energy to actually teach. When it comes to marking of class work and tests, responses from pupils also revealed that marking was a big problem in large classes because their teachers took too long to finish marking their test papers, and sometimes did not give them back their test papers but just told them the results they had got. In line with the above responses from teachers, the findings of the study conducted by Sharpson et al (1980) indicate that teachers believed that the evaluation process was different in large and small classes.

According to the findings in the Sharpson study, teachers working in small classes were more satisfied because marking took little time, corrections were immediate and details were provided to guide the child whereas in large classes, marking was time consuming, and sometimes delayed. The findings of the study conducted by Korostoff (1998) also support this view. In this study, teachers expressed the ease of keeping track of pupils' achievement, suggesting that the assessment and evaluation process of pupils was easier in small classes than large ones. The researcher noted that teachers of large classes avoided giving pupils activities for marking because it was time consuming. However, it is important to note that assessment is an integral part of the teaching-learning process because it is essential for maximization of pupils' learning. Large classes however, threaten this process. Certain types of work given to learners need to be assessed in process as well as in product but large classes make this very problematic, because having more children in class entails taking long to finish marking their work.

In the study by Kaulule (2006), teachers of large classes admitted attempting limiting the amount of work and activities they had to asses. For example, Kaulule observed that at one school teachers who had as many as 80 pupils and more in their classes reduced the

number of items for assessment to just one or two due to lack of time. Furthermore he had also observed that no practical activities such as projects were given to pupils in large classes. Most of the activities for assessment were theories.

From what was observed and heard, it is apparent that assessment in large classes was not effectively being carried out. It is however, important to note that assessment in the teaching-learning process serves many purposes. It can grade the attainment of learners, help to select candidates for jobs or future courses, contribute to evidence on the effectiveness of courses and teachers, and provide a long term goal for learners. For assessment in the classroom to be effective it must be on-going so that it provides judgment on whether, and to what extent, learning has been successful, and to pinpoint difficulties for remedial action to be taken.

5.3.5 Class size and identification of pupils with learning problems

Coming to class size and identification of pupils with learning problems the study findings revealed that a small number of pupils in class allowed teachers to easily identify and provide children with learning difficulties with the much needed individualized help on curriculum areas where they were finding problems. This in turn helped slow learners to catch up with their peers in the same classroom.

This is in line with previous research findings that showed that small classes promoted the interactions between teachers and pupils. These interactions helped the teacher to understand individual pupils' capabilities and weaknesses (Ansubel 1963). Thus, each pupil is likely to be given some attention by the teacher thereby encouraging each one of them to participate fully during the teaching-learning session. In addition, the teachers' understanding of pupils was likely to lead to a structuring of teaching materials for meaningful learning. In contrast, large classes were likely to put less able pupils at a greater disadvantage as theirs teacher might fail to identify and assist them. This may therefore, lead to the failure of such pupils in the examinations.

5.3.6 Pupil-teacher ratio and motivation of learners

In terms of pupil-teacher ratio and motivation, the study revealed that learner motivation is captivated in a smaller class than in a large one because different pupils have different needs. This finding was in line with the findings of the study conducted by Don (2010), which revealed that class size has an effect on the motivation of pupils. The study discovered that motivating children in small classes was easier than motivating them in large classes because each child in class is motivated differently according to his/her needs and characteristics.

Furthermore, Nelson (2009) also states that, motivation of pupils requires knowing individual differences and characteristics of each pupil. In the case of less crowded classes, pupils' needs are more easily recognized and thus easier for teachers to motivate them. This therefore, implies that there is a relationship between class size and motivation of learners. It is important to note that motivation is an integral aspect in the teaching-learning process.

Pantrick and Schunk (1996) found that the level of motivation a person has, affects how much he or she achieves. They stated that in learning or teaching situations, a learner who is motivated will try to complete a task and work hard to achieve success. On the other hand, a learner who is not motivated will not try, will not work hard, or will bring in some other behaviour that sabotages the outcome of the teaching-learning process. In a large class, however, most learners are not motivated by teachers due to teachers' failure to identify each and every learner's needs and characteristics, thereby missing out on the benefits of motivation.

In the studies conducted by McKeachie (1980) it was revealed that students reported less satisfaction in large-sized classes. Furthermore McKeachie (1980) found that, in almost all published studies, both pupils and teachers expressed a strong preference for small-sized classes. Similarly, Carbone and Greenberg (1998) surveyed pupils in large classes, and discovered that these pupils reported higher levels of dissatisfaction than they did for smaller-sized classes. Anecdotal reports also suggest that higher levels of pupil

dissatisfaction with large-sized classes contribute to lower rates of class attendance. As Cooper and Robinson (2000) report, "We often hear that large-lecture attendance dwindles throughout the term and is often down to 30 to 40 percent by the end. And in many larger classes, note-taking services have sprung up as lively businesses through which pupils buy lecture notes in lieu of attending class. Other anecdotal reports suggest that higher levels of pupil dissatisfaction (and anonymity) in large classes are associated with a higher incidence of classroom incivility such as talking in class, and more frequent violations of academic integrity such as cheating on exams (Carbone, 1999; Sorcinelli, 1994, 2002; Weimer, 1987).

In contrast, Light (2001) reports a "strong relationship" between the number of small classes that pupil take and their satisfaction with the overall academic experience. He reports that, "Nearly without exception, pupils who are dissatisfied with their academic performance, are those attending large classes. These findings are particularly significant when juxtaposed with Astin's (1991) finding of a strong relationship between pupil enrollment in small classes and overall school satisfaction. This finding gains further significance when it is viewed in conjunction with the well-established relationship between pupils' level of satisfaction with the school they are attending and their rate of retention at that institution (Noel, Levitz and Saluri, 1985) thus, school satisfaction is a "primary predictor" of student persistence (Noel and Levitz, 1995). Indeed in one study of pupil retention in 25 schools, it was found that learners were more likely to persist to course completion is smaller-sized classes (Ashar and Skeenes in Grayson and Grayson, 2003). The positive relationship between small-class experience and (a) pupil satisfaction and (b) pupil persistence to school completion would clearly suggest that increasing the opportunities for pupils to experience small-sized classes will serve to elevate their retention rate. This would be especially true if the increased opportunities for small-class learning take place during the lower basic classes, which is the stage of the school experience when class sizes tend to be largest and pupil attrition tends to be highest.

5.4 Challenges associated with high pupil-teacher ratio

In terms of challenges associated with teaching and learning in large classes, the major areas of concern that came out prominently were as follows;

5.4.1 Pupil-teacher ratio and meeting the needs of all the pupils

The study found that with more pupils in the class, it became more challenging to meet the needs of all the pupils as one would like. The responses from teachers revealed that no matter how well organized a class was, the number of pupils in class was the most important factor to the quality of teaching and learning because it affected how much time a teacher spent with individuals and groups. Furthermore the study revealed that teaching large classes would make one feel that he or she was not always meeting the needs of all the pupils in class adequately. It was also hard to find time to focus on individuals as often as one wanted. Identifying pupils' needs is very vital for structuring of teaching materials for meaningful learning. But large classes are likely to put less able pupils at a greater disadvantage as the teacher may fail to identify and assist their personal needs.

5.4.2 High pupil-teacher ratio and teacher-pupil interaction

In terms of class size and pupil-teacher relationship, the study revealed that as the class increased, the number of interactions with individual pupils decreased, and this adversely affected pupils' progress. Responses from teachers revealed that it was very difficult to get around and see on a one-to-one basis each child in a large class, because time might not allow you to see each individual in a class of about 70 or more pupils. What teachers observed on the relationship between class size and teacher-pupil interactions were in harmony with other findings done by researchers elsewhere. For example, the study by Kaulule (2006) on the challenges of free education in Zambia found that the teacher would not fully interact with all the individual pupils in a large class, and consequently the teacher might not come to understand each and every pupil's ability and disability.

Ultimately, this might result in the teacher's failure in structuring the teaching-learning materials for meaningful learning of each and every pupil. Furthermore, Kaulule observed that there were variations in the teacher-pupil interactions in large classes. He found that in large classes, teachers found it difficult to provide attention to needy pupils during the teaching-learning process. Thus, many pupils had the problem of not being noticed by the teacher in a crowded classroom. Kaulule also pointed out that in large classes, a situation would arise which the teacher may fail to call upon some pupils to participate in the lesson and thus, this would lead such pupils to lose enthusiasm and involvement in learning thinking that teachers were not interested in them. Thus, as Kaulule pointed out if these interactions were indeed beneficial, and then many pupils in large classes were being deprived of such benefits.

The study done by Obanya (1980) also found that substantive teacher-pupil interaction in a classroom was affected by a large class. He stated that the smaller the class, the greater the opportunity for substantive teacher-pupil interactions especially through monitoring and feedback.

Commenting on the effects of pupil-teacher ratio, Carbone and Greenberg (1998) found that large classes reduce the frequency and quality of teacher-pupil interaction with and feedback to pupils. Carbone and Greenberg (1998) also found that one specific aspect of large-class interaction which pupils report the least satisfaction with is their interaction with their teachers both inside and outside the classroom. School teachers also see it the same way, as evidenced by the research of Ratcliff (1992) who conducted interviews with more than 300 teachers at five different schools, and concluded that "the sheer size of lecture classes often militated against direct interaction with most pupils". Based on multi-campus visitation and on-site observations, Kuh, Schuh, Whitt and Associates (1991) report that in large-class settings, a "compact of disengagement" exists between teachers and pupils, who seem to convey the mutual message: "You leave me alone and I will leave you alone". In very large classes, it is likely that the vast majority of pupils in class will go through the entire term without experiencing a single interactive episode with the teacher, whether it be person-to-person verbal exchange inside the classroom or a written exchange of ideas outside the classroom (e.g., receiving written feedback from

the teacher on returned exams). This is particularly disturbing, given that pupil-teacher interaction is a school experience variable which is strongly associated with a host of positive pupil outcomes, such as: pupil retention, academic achievement, critical thinking, and educational aspiration (Astin, 1993; Pascarella and Terenzini, 1991; Tinto, 1993).

Another aspect of the large-class learning experience that pupils report particularly high levels of dissatisfaction is the frequency of assessment (Carbone and Greenberg, 1998). Frequent assessment and feedback is an almost axiomatic principle of effective learning (American College Personnel Association, 1994; Guskey, 1988). Frequent assessment is also more likely to result in early assessment and early feedback to pupils during the term, which pupils can use proactively to improve their subsequent performance and eventual subject grade. In addition, frequent assessment encourages pupils to study and practice more consistently, thus increasing the likelihood that they will distribute their study time more evenly throughout the term, rather than cramming the bulk of their work. This advantage of frequent assessment for pupils, in particular, is underscored by Erickson and Strommer (1991): "Frequent evaluations provide the structure many lower grade pupils need learning and academic performance, it is reasonable to conclude that pupil reports of insufficiently frequent assessment and feedback in large classes serve not only to decrease learning satisfaction, but may serve to decrease the quality of pupil learning as well to keep up with work [and are] more likely to get pupils to attend class and do their homework". Lastly, pupils in a variety of schools report lower levels of test anxiety when tests are given frequently.

5.4.3 Pupil-teacher ratio and learning pupils' names

In terms of learning pupils' names, the researcher heard that it was difficult for most teachers teaching large classes to learn pupils' names quickly because of the numbers involved. It was noted that as a class increased in numbers it became difficult for most teachers to learn pupils' names and to get to know them personally.

Commenting on the relationship between class size and learning pupils' names, Stone (1980) stated that, as classes increased, it became impossible to learn all the pupils' names and to get to know them personally and quickly. Thus, pupil anonymity was a problem in many contexts. When pupils felt that their teacher did not know them, it was easier for them to be disruptive, argue about trivia things, arrive late or leave early, miss class and disengage from the lesson, thus, missing on what the teacher was teaching.

5.4.4 PTR and the availability of the teaching-learning resources

The study revealed that there were very few relevant books in schools to match the large numbers of pupils in the classes. For example, the researcher observed that in one class of 62 pupils, 5 mathematics text books were shared among the 62 pupils, meaning that one book was shared among 12 pupils on average. The researcher feels that this situation was pathetic and demotivating to both teachers and pupils.

It was also observed that, due to inadequate teaching-learning resources, teachers were forced to write down all the class activities on the chalkboard, including drawing maps and graphs. This situation consumed much of their teaching time.

It is important to note that teaching-learning materials play a vital role in the improvement of the quality of the teaching-learning process. According to Mbozi (2008), learning is severely hampered by an undersupply of basic textbooks and other teaching learning materials. This is so because pupils, who do not have their textbooks to study and take home, do not perform as well as those who have them.

5.4.5 Pupil-teacher ratio and classroom furniture

The study revealed that inadequate supply of furniture to match the rising numbers of pupils was another factor affecting large classes. The researcher observed that due to inadequate desks in the classrooms, pupils were forced to squeeze on the few available desks, and some to sit on the floor when learning. Sitting on the floor demoralized pupils and had a negative effect on their handwriting as well.

Commenting on the importance of suitable classroom environment, David (1997) states that furniture makes classroom environment conducive for effective teaching learning process. On the other hand if the learners are having a hard time taking down notes because of not being comfortable when seated, it may hinder them from effective learning, and at the same time sitting on the floor may be detrimental to their health, particularly posture.

5.4.6 Pupil-teacher ratio and class management

The study revealed that managing large classes was more difficult than managing small ones because if a class was small, the possibility of encountering classroom management difficulties decreased. Furthermore, it was observed that it was easier to deal with pupils in small classes than in large ones because pupils in small classes were easily known.

The study revealed that teachers in large classes spent more time on managing the classroom than on actual teaching which negatively affected students' achievements. It was observed that crowd control became more of an issue in large classes because as numbers of pupils increased and space for pupils decreased, the level of misbehavior went up, caused in part by the pupils' closer proximity. More arguments and less opportunity to physically separate disruptive individuals contributed to the problems of managing and controlling large classes. It is important to note that when teachers spend more time on maintaining discipline in class, the time that is left for teaching becomes less thereby affecting completing the topics that are supposed to be covered within a given period.

David and David (1994) noted that classroom management involves such activities as marking of class registers, distribution of teaching-learning resources and splitting the class into small groups for the purpose of group activities. Such activities tend to consume more of the teacher's time in a large classes than in small ones.

5.4.7 Pupil-teacher ratio and group work

Coming to the issue of class size and group work, the study revealed that group work was adversely affected by large classes. The study revealed that in large classes group work was ineffective due to lack of adequate space for dividing groups and monitoring group activities. Furthermore, it was observed that in large classes, groups themselves were made very big in order to reduce the number of groups in class since space was limited. In some cases groups were as big as 20 pupils per group.

However, from what was observed, it seemed learners in large classes were missing out on this important aspect of learning because if there was not enough space in the classroom, maneuverability of teachers as they tried to monitor pupils' work and provide guidance during group work was limited.

Commenting on the importance of group work, Little (1995) noted that group work was an active approach in the sense that it gave learners a chance to use methods, principles and vocabulary that were being taught. Shy learners who could not contribute to the full class could usually be coaxed into contributing to group work. What was more was that, there was a built-in-self checking and peer-tutoring aspect to most group work, where errors in understanding were ironed out, usually in a very supportive atmosphere. Learners could usually do together what they could not achieve alone, with each member of the group providing part of the 'jigsaw' of understanding. Guttance (1993) states that group work give learners a universally welcomed opportunity to get to know each other well. It can also arouse group loyalty, especially if there was an element of competition. Furthermore, research has shown that smaller groups of children lead to optimal outcomes of early childhood education. According to Frede (1998), smaller groups may, "create a more comfortable environment for children". Smaller groups allow children to be less noisy and more orderly and as such benefit more from teachers' guidance. Larger groups, on the other hand, have been found to lead to chaotic classroom atmospheres where children do not get an opportunity to have meaningful interaction with teachers and with peers. Consequently, children who learn in overcrowded conditions have been

found to have lower social competences, decreased creativity, and poor language and play skills (Clarke-Stewart and Gruber, 1984; Frede, 1998).

Finally, group work improved rapport among learners and gave a class a more trusting and supportive atmosphere. Social activity was so universally enjoyed that group work promoted a positive attitude in class.

5.4.8 Pupil-teacher ratio and homework

With regard to pupil-teacher ratio and homework, the study revealed that most teachers did not give pupils home work because they had no time to mark all the books for pupils. Furthermore teachers feared giving home work to large classes because if they gave home to a class which was as large as 80 pupils and more, it would take them a long time to finish marking, and at the end of it all, that home work would serve no purpose. It is however important to realize that it is now a policy of the Ministry of Education, Science, Vocational Training and Early Education that teachers should give homework. Homework helps learners to continue learning even when they are away from school. At the same time, homework helps teachers to cover all the topics including those that they might not have time at school to cover.

Home work as defined by Sydney and Golden (1999) as an out of class tasks assigned to learners as an extension or elaboration of classroom work. Homework usually comes in three types: practice homework, preparation homework and extension homework. Practice homework reinforces newly acquired skills. For example, learners who have just learned a new method of solving a mathematical problem should be given simple problems to complete on their own. This increases comprehension of a subject or topic while helping learners retain it for longer periods of time. Preparation homework helps learners get ready for activities that will occur in the classroom. Learners may, for example be required to do background research on a topic to be discussed later in class. Extension home work includes long term assignments such as projects or long papers. These projects or papers should correlate with subjects learners are learning in the classroom. In large classes, however, home work may not be given to learners because of

the teacher's fear to mark a large number of books or projects; hence pupils may miss out on the benefits of homework.

The other effects of pupil-teacher ratio as revealed by Renwick and McCauley (1995) who studied kindergartens in New Zealand which had 45 children in one class were that teachers working with children in these kindergartens, reported a number of challenges including individual children getting overwhelmed by the presence of many other children, teachers failing to have one-to-one interactions with children, children competing for space and learning materials, excessive noise and other disciplinary problems.

On the other hand studies, Smith (1999) studied 200 children under the age of two years. Smith (1999), like Renwick and McCauley (1995), found that smaller classes were the best predictors of positive child initiation into the school environment. Smith's (1999) study further clarifies the positive role played by smaller class sizes in yielding positive interactional outcomes between children and teachers and among themselves. He indicates that classes that had 14 children and below, had three times better chances of improving the interactional classroom atmosphere than those classrooms which had 26 children or more.

Summary

This chapter has discussed the effects that high pupil-teacher ratio has on the teaching learning process and it has established that high pupil-teacher ratio has an effect on the following classroom processes: teacher-pupil interaction, class discipline, teaching styles, assessment, and motivation of learners, teaching-learning resources, classroom furniture and identification of learners with learning difficulties.

The next chapter draws conclusion from the findings and makes recommendations on how best the effect of high pupil-teacher ratio on the teaching-learning process could be dealt with.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.0 Overview

6.1 Conclusion

This chapter draws conclusions from the findings and makes recommendations which are thought to be important for action by the Government and other stake holders. The study was conducted to investigate the effects of pupil-teacher ratio on the teaching-learning process of mathematics in selected Public Secondary Schools. The results discussed in chapter five have established that PTR has an effect on the teaching-learning process in the following ways:

The study showed that there was a close relationship between the size of the pupil-teacher ratio and the quality of outcomes. Where the ratios were bigger, results revealed that the quality of interaction between teachers and learners declined significantly, meaning that learners did not get optimal opportunities to get their personal challenges addressed by their teachers, and this adversely affected pupils' performance in class. This finding seems to be consisted with the results obtained from other similar studies. For example, the study conducted by Kaulule (2006) on the effects of Free Education Policy in Zambia revealed that in large classes, teachers failed to fully interact with each and every pupil that needed help due to limited time to be shared among so many pupils in class. The consequence of the teacher's failure to fully interact with all the learners was that teachers could not understand each and every pupil's ability and disability, and hence planning for them was difficult.

Secondly, the study revealed that as classes increased in size, teachers were challenged with the use of learner-centered teaching methods such as project method, field trips, demonstration, experimental, group work and many such methods that required monitoring of learners' participation by the teacher. Instead, teachers relied more on

whole class teaching methods which did not require individual attention but such methods reduced pupils' participation to listening only without any hands-on experience resulting in superficiality of learning and poor performance in both examinations and in the world of work. This finding seems to be in harmony with the results obtained in other similar studies. For instance, the survey conducted by MOE (2008), revealed that teachers adjusted their teaching methods basing on the number of pupils they had in their classes. In large classes, the study found that teachers were employing more whole class methods of teaching and less learner-centered methods of teaching.

In terms of marking pupils' work, the study found that in small classes, teachers finished marking pupils' books within a period and corrections were done immediately in class while in large classes teachers never finished marking pupils' work within a period. Usually, there was an overlap into the next period because there were too many books to mark. In terms of tests, there was a delay in giving pupils feedback on their performance. Research findings have also shown that smaller groups of children lead to optimal outcomes in education, create a more comfortable environment for children, allow children to be less noisy and more orderly and as such benefit more from teachers' guidance.

Large groups, on the other hand, have been found to lead to chaotic classroom atmospheres where learners do not get an opportunity to have meaningful interaction with teachers and with peers. Consequently, children who learn in overcrowded conditions have been found to have lower social competences, decreased creativity, and poor language development. Other challenges of large classes include individual children getting overwhelmed by the presence of many other children, teachers failing to have one-to-one interactions with children, children competing for space and learning materials, excessive noise and other disciplinary problem.

In short, the study found that large classes had generally adverse effects on the teaching-learning process, mediated primarily by lowering pupils' level of engagement (active involvement) with the teacher, with classmates and with the subject matter. In addition, large classes were found not to be as effective as small classes for retention of knowledge, critical thinking and attitude change. Going by this finding, one would be

hard-pressed to find any empirical evidence or reason to support high pupil-teacher ratio other than its obvious fiscal advantage (economical, in that it is cheaper to employ and pay few teachers) plus some speculation suggesting that teachers feel motivated teaching classes with large audiences. However, the evidence against large classes is so formidable that it borders on being incontrovertible.

6.2 Recommendations

The following are some of the recommendations that may help to mitigate the effects of large classes on the teaching-learning process in public secondary schools:

6.2.1 The Ministry of Education should come up with a limit with regard to the number of pupils that can effectively be handled by as single teacher in a single session. As at now schools have been instructed not to deny any child a place so that the Government can attain the Sustainable Development Goal on education which is about increasing access of education to all.

6.2.2 The Government should recruit all graduating student-teachers upon their graduation from colleges and universities of education in order to increase staffing levels in schools and reduce the pupil-teacher ratio.

6.2.3 The Government should replace all the teachers who are retiring, resigning, and being dismissed and dying in order to maintain the number of teachers required in schools. The Ministry of Education should increase its budgetary allocation for infrastructure development and procurement of desks and teaching-learning resources in public secondary schools in order to increase the number of classrooms, so as to reduce overcrowding in the few classrooms available.

6.2.4 School desks as well as the teaching-learning resources should continuously be supplied in schools by the Ministry of Education and Priority should be given to schools in densely populated areas around the country.

6.2.5 The Zambian Government should expand facilities in teacher-training colleges and construct more colleges for teachers so as to train more teachers for schools. If this is done, the pupil-teacher ratio will become low.

6.3 Suggestions for further research

While the advantages of small-sized classes may be well documented, what remains to be answered is the question: "How small is "small?" Most of the studies conducted on pupil-teacher ratio have collapsed individual classes of different sizes within a high range, for example, 50 and higher and compared them with class sizes within a lower range of 25 and lower to demonstrate that the average outcomes of smaller classes are more positive than those associated with larger classes. However, these results do not allow us to conclude that the relationship between the pupil-teacher ratios and positive outcomes are strictly linear, thus, gains in outcomes may not increase incrementally in equal intervals on a continuum from smaller to larger. Instead, it may be that there is a threshold number, below which the positive benefits of class size increase appreciably or "jump" dramatically. Similarly, there may also be threshold number, above which the liabilities of further increases in class size "level off" or become negligible.

Admittedly, additional research is needed to determine if there is a specific threshold point or absolute number below which the benefits of smaller pupil-teacher ratio become magnified. However, if one were to extrapolate from existing research and speculate what that magic number might be, it appears that our best current estimate would be a class size of 40 and less. Empirical support for this speculation comes from a variety of different responses got from both respondents and participants in this study. For instance, when both teachers and pupils were asked to on which class size is considered small, almost all of them said 40 pupils or less would be considered to be small for secondary school classes. This finding is consistent with previously cited research conducted by Fischer and Grant (1983), who found that class size significantly affected the level of cognitive skills used by pupils in the classroom. In small classes defined as 40 or fewer pupils the average level of thinking displayed by pupils in response to teacher-posed questions was significantly higher than it was in larger-sized classes. These findings are

notable in their own right, but become more significant when viewed in conjunction with other research indicating that high-level cognitive responses from pupils in class correlate significantly with positive changes (gains) in pupil scores on standardized critical thinking tests (Smith, 1983).

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APPENDIX I

FOCUS GROUP DISCUSSION INTERVIEW SCHEDULE FOR PUPILS ON THE EFFECTS OF CLASS SIZE ON THE TEACHING/LEARNING PROCESS

1. What is the total number of pupils in your class?

(a) Grade 8---------- (b) Grade 9----------

(c) Grade 10---------- (d) Grade 11----------

(e) Grade12----------

2 (a)Would you say the number that you have given for each of your classes is small or large?

(b) Give reasons for your answer.

3. (a) According to your experience as pupils, does class size affect your learning?

(b) If it does, state how.

4. (a) In which class size would you like to learn between small or large?

(b) Give reasons for your answer in (4a)

5. According to your experience as pupils, what are some of the major problems do you face when it comes to learning in large classes?

6. Considering the 'education for all policy' in Zambia, what should the Ministry of Education and schools do to solve problems associated with learning in large classes?

APPENDIX II

SEMI-STRUCTURED INTERVIEW SCHEDULE FOR TEACHERS OF MATHEMATICS ON CLASS SIZE AND ITS EFFECTS ON THE TEACHING/LEARNING PROCESS IN PUBLIC SECONDARY SCHOOLS

Part 1: Identification particulars

Part 2: Content: 1

District: …… School: .....

Class taught: ..... Gender: male / female

Date: ……

1. For how long have you been teaching at this school?

…… ……

2. How many pupils do you have in your class?

…… ……

3. How would you classify your class?

(i) Small

(ii) Average

(iii) Large

4. (a) In your own opinion, which class size would you say is small?

(i) 45 and below

(ii) 46 – 50 (iii) 51 and above

5. (a) Which class size would you say is large?

(i) 45 and less (ii) 46 – 50 (iii) 51 and above

6 (a) According to your experience, does class size affects the teaching-learning process?

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……

(b) If your answer in (6a), above is yes, give reasons.

……

……

……

7 (a) Which class size would you prefer to teach between small, standard or large?

.....

(b) State reasons for your answer.

……

8. According to your own experience as teacher, what are some of the major challenges associated with teaching large classes?

……

……

……

……

……

9. Please, recommend measures that the government and schools should put in place to mitigate the impact of large class size on the teaching - learning process.

……

……

……

THANK YOU FOR YOUR PARTICIPATION

APPENDIX III

CLASSROOM OBSERVATION CHECK LIST ON CLASS SIZE AND ITS EFFECTS
ON THE TEACHING/LEARNING PROCESS

Part 1: Identification particulars

Part 2: Classroom observation check list

S/N Items Observation

"To be used in the classroom by the researcher".

(For official use only)

District: ..... School:.....

Class:..... No. of Pupils:.....

Date of observation:.....

Duration of teaching service:.....

Sex of the Teacher:.....

1. Adequate classroom furniture for all learners
2. Adequate textbooks for all learners
3. Adequate teaching-learning resources
4. Adequate space for group work and mobility for both teachers and learners
5. Teachers formed groups of less than 8 pupils
6. Teachers gave pupils an exercise and marked all books
7. Both teacher and learner Centered methods were
8. There were adequate Pupil interactions
9. Home work was given and marked
10. Slow learners were given special help
11. Teachers easily identified trouble makers and dealt with them

APPENDIX IV

QUESTIONNAIRE FOR HEAD TEACHERS ON CLASS SIZE AND ITS EFFECTS ON THE TEACHING/LEARNING PROCESS IN PUBLIC SECONDARY SCHOOLS

(Strictly confidential)

Part 1: Identification particulars

Part 2: Content

District: ..... School: .....

Position: ..... Date……..

Gender…… Period of service as head……..

1 What grade level is your school?

(i) Grade 1

(ii) Grade 2

(iii) Grade 3.

2. (a) What is the total number of teachers of Mathematics at this school?

.....

(b) Is this number adequate?

.....

(c) If your answer in (b) above is no, what number would you say is adequate

.....

3. (a) How many classrooms do you have at this School?

……

(b) Are these classrooms adequate?

..... .

(c) If not adequate, how many classrooms would you consider adequate?

.....

4. (a) What is the total enrolment of pupils for this school from Grades 8 to 12?

……

(b) Is this number of pupils large or small?

.....

(c) Give reasons for your answer in (b) above.

5. (a) What is the average number of pupils per class for each grade level?

Grade 8: ..... Grade 9: ..... Grade 10: ..... Grade 11: ..... Grade 12: ……

(b) Would you consider these numbers, small or large?

.....

6. (a) What class size would you prefer to have between small or large?

……

(b) Giver reasons for your answer in 7(a) above

……

……

……

7 (a) According to your experience, does class size affect the teaching-learning process

……

(b) If yes, state how large class size affects the teaching-learning process

……

8. In your own opinion, what should be done in the midst of high PTR to improve the teaching/learning process at your school?

THANK YOU FOR YOUR PARTICIPATION

APPENDIX V

THE UNIVERSITY OF ZAMBIA AND ZIMBABWE OPEN UNIVERSITY

Topic: Effects of PTR on the Quality of teaching and learning Mathematics in Selected Public Secondary Schools of Lusaka District.

Dear Respondent,

This study aims at investigating the Effects of PTR on the Quality of teaching and learning Mathematics in Selected Public Secondary Schools of Lusaka District. The findings of this study will be used for academic purposes only and no information will be made available to any third party.

Be informed that your participation in this study is voluntary but very important and will therefore be highly appreciated.