RESEARCH PROJECT
MANAGING LARGE CLASSES IN THE TEACHING -LEARNING OF MATHEMATICS:
A CASE STUDY OF NYAMANYORA SECONDARY SCHOOL.

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DEDICATION

I dedicated this dissertation to my late mother for her love, patience and endurance.
ACKNOWLEDGEMENTS

Firstly, I would want to thank the Almighty God for guiding and giving me strength throughout the time I was doing this research project. Was it not because of You where would I be? This project was never an individual effort but several people were helpful in making it a success. Firstly, I would like to extend my genuine appreciation to my family members Mr and Mrs Tapindwa who were always there to give me moral support. Further thanks go to my friend Joseph for his fervent prayers and support that this programme may be a success. Lastly, I want to express gratitude to my parents; Baba naMai Norman Chikaura who never spared the rod whenever I crossed their pathways.

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ABSTRACT
This study sought to determine how teaching and learning of Mathematics is affected by large classes, especially in the case of students studying for Ordinary level at Nyamanyora Secondary School. In this study, the researcher used a multi-method approach, integrating qualitative information from teachers’ and data from case studies with quantitative information from systematic observations. In the study, 55 students and 7 teachers purposively selected were used as the research subjects. Questionnaires were used to provide information on the effects of large class size on the teaching and learning process. Observations were also used to observe different class behaviours. Results showed that large class sizes are more likely to use non-participative teaching methods. These large-class settings have been heavily teacher centred, requiring minimal student engagement and expecting little more than memorization of terms and concepts as evidence of student learning. The sheer size and anonymity of large classes seem to influence against the very elements that promote students’ involvement and intellectual development, learning, and success. Absence from class and mediocre student performance seem to be tolerated simply as unfortunate realities. The study also showed that there was less individual attention in larger classes, a more active role for pupils, and beneficial effects on the quality of teaching. It is suggested that teachers in both large and small classes need to develop strategies for more individual attention but also recognize the benefits of other forms of learning, for example, group work. Based on the findings, it was discovered that large class size negatively affects the students’ academic performance. The study recommends that more classrooms should be created with up-to-date facilities and improve on the use of information and communication technology (ICT) that would aid teaching-learning process of Mathematics at Nyamanyora Secondary School.
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CHAPTER ONE

1.0 Introduction
In this chapter, background to the study, statement of the problem, research objectives, and purpose of the study was highlighted. Assumptions, delimitations, limitations and definition of terms were also discussed on this chapter. On background of the study, the researcher discussed on what really stimulates the desire to carry out the research. The research questions were stated in this chapter and were answered at the end of the research. Finally, on limitations and delimitations, the researcher highlighted some of the cases which might reduce the correct outcome of the research and give some ways to limit the cases.

1.1 Background of the study.
The researcher sought to study the effects of large class size to the teaching-learning of Mathematics. Mathematics is a subject done in all schools in Zimbabwe. The Ministry of Education has made the subject an entry point into Tertiary Education and employment. One without Mathematics is not accepted into any formal employment. Recently the government of Zimbabwe has embarked on a program STEM, to encourage students to do science subjects for which Mathematics is one of the components of STEM. Hence for one to be enrolled in STEM there is need for Mathematics.

However, despite that students shun Mathematics lessons or drop it at Ordinary Level, some learners of Mathematics do not write given work and teachers may not notice in large classes which has resulted in low pass rate in Mathematics. The success at Mathematics depends on a number of factors which classroom environment is among the factors. According to Goodman (1997), one factor that affects classroom environment is class size.

Class size refers to the number of students in any given class. Malamah-Thomas (1991:56) defines a class size as the number of pupils for whom (one) teacher is responsible in a self-contained classroom. Goodman (1997) observed that class size has an effect on students’ achievement, attitude and teaching methods employed by teachers.

The effects of class size on the teaching-learning process have been a concern for educators. In the United States of America (USA), debate on class size and its effects on the teaching-learning process in schools led to the constitutional amendment of class size (www.florida.gov/n). While developed countries like the USA were effecting class size reduction, most developing countries were enlarging their classes. In the case of Zambia,
example, large classes emerged immediately upon the introduction of Free Basic Education Policy in 2002 (Ministry of Finance and National Planning, Zambia 2006). Unfortunately, this increase in enrolment levels was not accompanied by a proportional increase in resources such as teachers, classrooms and books consequently affecting the quality of education.

Looking at Zimbabwe, the image is very similar with the Zambian situation. Zimbabwe, having achieved its political liberation through struggle, moved swiftly to give its people the educational opportunities long denied them (Chikombah, Johnson, Schneller and Schurle 1998:x). This has seen Zimbabwe achieving higher adult literacy rate and higher school enrolment than average for developing countries. With the deliberate effort to educate the mass, the enrolment levels in schools tremendously went up while expansion and construction of infrastructure as well as deployment of teachers did not increase with the same proportion.

More so, the situation was further worsened by the increase in skills flight in the early 2000s as professionals and qualified science teachers left for greener pastures to Australia, South Africa and United Kingdom. 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.

The problem is so much that it has hassled to the decline of the once revered education system. Overcrowded classrooms have increased the possibilities for mass failure and students to lose interest in Mathematics and it led pupils to choose the arts subjects. The effects that this increased class size had on the teaching-learning of Mathematics raised debate among stakeholders (parents, teachers, government and students) in the education sector. Results from the debates were inconclusive. It is for this reason that this study was instituted so as to try and establish the effects that increased class size had on the teaching-learning of Mathematics at Nyamanyora secondary as a case study.

1.2 Statement of the Problem

Large class size results in learners limited opportunities in participating in class leading to negative attitude towards the subject. Teachers lack of new teaching methods also hinder the learner participation in large class sizes. Lack of qualified teachers to teach Mathematics also lead to failure in the subject.
1.3 Objectives of the Study

By the end of the study the research must be able to:

- explain the effects of class size to students’ performance.
- discuss the effects of large class size on student-teacher interaction.
- explore on the effects of large class size on the instructional methods.
- examine the effects of large class size to both the teacher and learner’s attitude.

1.4 Research Questions

The study attempts to answer the following questions:

- How does large class size affect pupils’ participation and performance in Mathematics?
- What are the challenges faced in teaching large class size of Mathematics?
- Which methods of teaching Mathematics are suitable in large class sizes?
- How does large class size affect pupils’ attitude towards Mathematics?

1.5 Assumptions of the Study

The research will be based on the following underlining assumptions:

- All respondents will provide unbiased information and data, resulting in accurate results and findings.
- The available resources especially teaching materials will be sufficient enough to carry out the whole project.
- Students in smaller classes learn more than students in larger classes.
- The research findings reflect the general situation in schools in Zimbabwe.

1.6 Significance of the Study

This study is important for several reasons. The findings will help teachers to identify the effects of large classes and how they can address the problems. More so, findings from this research will improve the researcher’s skills on how class size affect students’ performance and participation in Mathematics. It is hoped that the study will help improve performance of learners through application of proper teaching methods to large classes. Heads of Departments
will also gain knowledge on how large class size affect overall results and attitude of students towards Mathematics.
This will also improve the pass rate of the subject at the school. It will also provide comprehensive information for educational planners, educators, and parents on how they can assist students to cope in large classes. Lastly, it will serve as a contribution to knowledge in the subject area. In this regard, it will be useful for other researchers who might want to carry out research in related areas.

1.7 Delimitations of the Study
The research was confined to one school in Mudzi district, Nyamanyora Secondary School because it happens to be where the researcher teaches. The study was conducted from August to March 2017. Poor teaching methods and lack of resources has been hindering learner’s performance. As a concerned party, the researcher sought to find out how large classes affect the teaching-learning of mathematics. This study was carried out using a sample of one class which consists both male and female students. The class was form three students who were doing mathematics and teachers at the same schools.

1.8 Limitations of the Study
In conducting the research project, the researcher is most likely to encounter constraints that will hinder the successful accomplishment of his research goals. These may be categorized as follows:

Finance
For the research to yield good results, adequate funds will be required to finance research costs such as purchase of stationary, typing and printing and other expenses. Consequently, some of the research costs had to be forgone at the expense of the research goal achievement.

Instruments
Questionnaires and observations which will be used as instruments for collecting data have some drawbacks. The disadvantage of interviews is that it takes time to interview pupils one
by one and in group interviews the ideas will reflect more the views of the subjects who are more verbal and thereby few comments for those who are reserved.

**Time:**

Time will also be a limiting factor in delivering questionnaires and collecting them for analysis.

**Confidential**

Some of the respondents will be reluctant to disclose required information due to confidentiality issues or that they lack full understanding of why the research is been done and in most cases the targeted experts who are able to respond fairly will have busy schedules to meet the researcher. The researcher expects to get hostile responses from some of the respondents.

1.9 Definition of Terms

**Class size** – refers to the number of students in a given course or classroom, specifically either the number of students being taught by teachers in a school, district or education system. Lewitt & Baker, (1997), argues that, class size is typically defined as the number of students for whom a teacher is primarily responsible during a school year. The teacher may teach in a self-contained classroom or provide instruction in one subject. Achilles (2003) gives the following example of class size: “Average class-size is the sum of all students regularly in each teacher's class divided by the actual number of regular teachers in those specific classes. If the four second grade rooms have 14, 16, 18, 18 (n=64) the average grade two-class size is 16” (p. 4). Regardless of the definition one uses, class size has been difficult to measure due to the dynamic nature of classroom, a variety of classroom models (pull outs, resource rooms, specialists), and a lack of precise measurements of what occurs in schools and classrooms (pupil-teacher ratios, class size based on the number of students assigned to a given teacher) (Reichardt, 2000). The lack of a common agreement as to what constitutes a small class or even an ideal class has made it difficult to compare research studies.
Operational definition of class size - For the purpose of this study class size was defined as the number of students for whom a teacher is primarily responsible during a school year. A small class was defined as a class having 25 or fewer students. A large class contained 30 or more pupils. The total number of students in the small schools’ English and Math classes was added together and divided by the number of classes to determine the average class size for small schools, 25. The total number of students in the large schools’ English and Math classes was added together and divided by the number of classes to determine the average class size for large schools, 30.

Teaching method – techniques, strategies that a teacher uses to construct his or her students

Teacher-centred approach – a method of teaching in which the teacher allows only minimal or no active participation from students as he/she teaches (lecture method).

Student-centred approach – a teaching method in which students actively and fully participate with minimum guidance from the teacher (discussion method, debate and project).

Academic achievement – accomplishing higher learning successfully

Learning environment - this is learning occurring in a number of places other than the classroom for example in personal interaction with teachers, other students and staff on campus outside.

Teaching environment - this is the sum of internal and external circumstances and influences surrounding and affecting a person’s ability to impart knowledge to the students.

1.10 Summary

This chapter has presented the background to the study and its significance to the learning and teaching process. The main focus of the study was on research problem. In the same chapter, the researcher outlined the limitations of the study and also its delimitations. Finally, major terms used in the study have been defined. The following chapter is a review of related literature put forward by other authorities regarding the topic under study.
CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

In this chapter, the researcher will provide a comprehensive review of related literature under the following subheadings: theoretical framework, conceptual framework and previous related research studies. The theoretical framework that guided this research is Vygotsky’s socio-cultural approach to cognitive development then the conceptual framework of the study which centred on class size and learning. Finally, the research present related studies which focused on the effects of class size on the teaching-learning process in schools.

2.1 Theoretical framework

The target of the study is premised on class size and its impact on the teaching-learning of Mathematics. Therefore, theories that has to do with the characteristics of these entities as they affect learning would be applicable. Vygotsky's socio-cultural approach to cognitive development would therefore provide theoretical basis for the study.

This theory states that children learn better with the help of others around them before they can do things on their own (Hillgard, 1971). It has been observed that higher thinking in children develops better in social contexts. Vygotsky 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 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 student in class. However, as classes become large, expert-learner interaction becomes less and less, thus negatively affecting the scaffolding process.
2.2 Conceptual framework

2.2.1 Class size

Class size refers to the number of students in any given class. A class is a group of students meeting regularly with one particular teacher (Goodman, 1997). Class size enables all students to reach their potential and the optimum class size for any class and level is directly related to composition of the class (Ehrenburg, Brewer, Gamuran and Willmus 2001:2). Class size is not the same as the pupil/teacher ratio. Student-teacher ratios are based on the total number of school instructional staff divided by the total enrolment of students. So, this number may include specialist teachers in the arts, literacy specialists, physical education and special education teachers, who may teach smaller groups of students. As a result, student-teacher ratios may show smaller numbers than the actual average class size.

Ehrenburg et al (ibid) argue that class size refers to the actual number of pupils taught by a teacher at a particular time. Class size has a direct influence on teacher morale; time spent by teachers on individual instruction, and classroom management, disruptions and discipline problems. Other factors include engagement by students in instruction, opportunities for better teaching to take place, grade retention, dropout rates and aspirations for students to attend college. The measurement of class size is not as straightforward as it might seem. It can vary considerably for a single child at different times during a school day and school year, because of student mobility, student absences, truancy, or the presence of pull-out special education classes. Thus, a class with fifty registered pupils will vary in its size from day to day, and may have fewer than fifty pupils at particular times. Mpofu (1997) suggest that in the middle and secondary school grades, class size tends to vary by subject area, and therefore can vary for each pupil during a school day. Ideally, one would like to have a measure of the actual class size experience by every pupil day every school day over the school year.

2.2.2 Learning

Learning entails permanent behaviour change as a result of reinforced practice. Therefore, learning is about behaviour change for a specific purpose. The Holmes Group (1990) cited by Bonstingl (2000) define learning as an active, social, highly participatory affair characterised by conversation, experience, interpretation, criticism, engagement, voice, participation and purpose. Here the Holmes Group was presenting learning as an encounter between persons. Peresuh & Mpofu (1997:29) view learning as a relatively permanent change in behaviour that
results from an individual’s interaction with the environment. From the above definitions, it is discernible that for learning to occur there must be a change in behaviour. The change of behaviour is a result with the interaction with the environment, be it at home or school. In school learning is often associated with the student’s response to the teacher’s instructional behaviour. Learning is also associated with behaviour that can be observed. Peresuh & Mpofu *(ibid)* suggest that private thoughts, feelings and emotions are part of learning in so far as they can be translated into directly observable behaviour.

Learning takes place in many ways; it can be intentional and unintentional. Intentional learning occurs when children acquire information presented in a classroom or when they look up something in the dictionary. Sometimes it is unintentional, as in the child’s reaction to the touching of a hot place stove. Thus, various forms of learning are going on all the time. The challenge faced by teachers is not how to get children to learn, children are already engaged in learning every waking moment. Rather it is to help them learn particular information, skills and concepts that will be useful for their interaction with the environment. Peresuh & Mpofu *(ibid)* argue that the central problem in teaching is how to present pupils with the right stimuli on which focus their attention and mental efforts so that they acquire important skills. It becomes imperative to respond to their statement with theoretical arguments. Several learning theories have been propounded in an attempt to help teachers understand how children should learn.

### 2.3 Previous Research Studies

This study will be reviewed under the following previous researches, the effects of class size on the teaching methods, the effects of class size to students’ performance, the effects of class size to students and teachers’ attitude and the effects of class size on classroom interaction.

#### 2.3.1 The effects of large class size on the instructional methods

McKeachie (2006:81) notes that: “Class size and instructional method are almost inextricably intertwined. Thus, the research on class size and that on lecture against discussion overlap. Large classes are most likely to use lecture methods and less likely to use discussion than small classes” Research on the lecture method strongly suggests that student attention and concentration tend to drop off dramatically after 10-20 minutes of continuous instructor discourse (Penner, Verner & Dickinson 2001). This attention “drift” occurs even among highly motivated post-graduate students (Stuart & Rutheford, 2008) and learning-oriented
undergraduate students (Milton, Pollio, & Eison, 2006). Among students in general, it has been found that about half of the time during lessons, they are thinking about things unrelated to the lesson content, with up to 15% of their class time is spent fantasizing. In his review of close to 100 higher education studies over a 50-year period, Bligh (2002) reports that students who become involved in active discussion of their ideas with other students are more likely to stay “on task” in class and spend more time synthesizing and integrating concepts, relative to students who listen to lectures. Bligh (ibid) also found that students, who had the opportunity to interact in class with the teacher, and with other students, reported significantly higher levels of satisfaction with their learning experience than students in classes that were taught exclusively by the lecture method.

Reinforcing this finding, Costin (2002) review of close to 60 studies, spanning a 40-year period, which revealed that students better like the subject and its subject matter when they had small-group learning experiences in class. Bruxton & Crull (1992) suggested that, relative to traditional lecture classes, students are more likely to take additional courses in an academic discipline when their prior course in that discipline had either one of the following characteristic small-group discussions with other students. Smaller class size and less lecturing may also increase student appreciation of general education curriculum, for which they typically report less course satisfaction than elective courses and courses in their academic major (Braskamp, Bradenburg, & Ory, 2004). These results suggest that greater use of student centred methods of instruction may promote greater student interest in the subject matter of the subject and, perhaps, increase the likelihood they will pursue the subject as a potential major.

A fitting summary of the outcomes associated with the lecture method is provided by Bligh (ibid), based on his extensive review of the research literature. He argued that teachers should not use the lecture method to teach information. He further went on to suggest that lecture method do not promote thought, change attitudes, or behavioural skills. Hoyt & Perera (2000) report results of a multi-institutional survey of schools, which revealed that teachers’ educational objectives in subjects taught exclusively by the lecture method were limited primarily to knowledge acquisition—for example, factual information about concepts, principles and theories. In contrast, teachers who taught classes with instructional methods that placed more emphasis on student involvement—for example, discussion-oriented and dramatization teaching were more likely to pursue lesson objectives that emphasized critical thinking, communication skills, and lifelong learning.
Furthermore, classes taught with student-involving methods were more effective in achieving lesson objectives than were lecture-method lessons in achieving their more limited, lower-level objectives. These findings fit together with results obtained in a previously cited study by Ratcliff (1992), who conducted interviews with over 300 teachers at five different schools, and reported that, “Class size is cited frequently as a major limitation on what could be accomplished in instruction and in what reasonably could be asked of students in class assignments” One major limitation in the nature of assignments given in courses with large class size is that they are less likely to involve student writing. Smith (2002:25) had a significant influence on how students prepared for exams. He reports that students were: “…more likely to employ surface [memorization] strategies and report surface motives when preparing for multiple-choice question examinations than when preparing for assignment essays. In contrast, when preparing their assignment essays, students were significantly more likely to employ deep comprehension strategies and report deep motives than when preparing for their multiple-choice question examinations”

Since essay assignments involve writing, they are less likely to be employed by instructors who are teaching large classes; thus, it may be expected that students in large classes will more likely adopt “surface” learning rather than “deep” learning strategies when preparing for examinations. This suggests that large class size not only reduces the quality of student learning inside the classroom, but may also diminish the quality of student studying outside the classroom.

As mentioned above there is a vast literature on the role of large class size on instructional methods. The bulk of this literature focuses on whether large class size is instrumental in negatively affecting learning and teaching environment at ordinary level. From the literature above it is discernible that large classes necessitate placing excessive reliance on teacher-centred methods in mathematics, whilst small classes focus on student-centred approaches to teaching.

2.3.2 The effects of class size to student’s performance

Most of us implicitly believe that students in smaller classes learn more and better than students in larger classes. Yet, a number of research studies at different times and places conclude that students in larger classes end up knowing as much about the subject matter as students in
smaller classes. However, literature is abounded with claims of the merits of small classes contributing to positive educational processes within the classroom, and increased pupil learning as an educational product. Among the specific advantages purported for small classes is greater pupil achievement. Raimondo, (1990) postulates that when it comes to the attainment of higher-order academic skills such as problem solving, written expression, and critical thinking, students in smaller classes do acquire more of these skills than do students in larger classes. Thus, while the literature demonstrates that large classes prove no obstacles to the acquisition of specific, factual knowledge, students in larger classes are at some disadvantage in developing an ability to think better by using skills beyond the basic acquisition of information.

Objective evidence for the effect of class size on students’ subject grades is supplied by a large-scale study conducted in the United Kingdom, where national budget cuts led to rapid increases in class size during the 1980s (Jenkins, 2002). In this major study of the impact of increased class size on students’ academic performance, it was discovered that the percentage of A and B+ grades awarded decreased steadily as module enrolments increased (Lindsay and Paton-Saltzberg, 2007). This finding is congruent with research in America conducted by Franklin and Theall (1991), who discovered significant negative correlations, i.e., inversely relationships between class size and course grades.

To add on, Hattie (2005) argued that reducing class size from 40 or more to 20 students led to almost no increase in achievement. Not until class sizes being dropped to 15 students or lower were there larger effects on achievement. Glass et al. (1982) looked for class size studies using document retrieval and abstracting resources. Previous reviews of the class size literature, and the bibliographies of studies found 77 empirical research studies of the relationship between class size and learning spanning for over 70 years, performed in more than a dozen countries. From the 77 studies, Glass and colleagues recorded 725 comparisons of smaller and larger classes (studies from 1900-1979) almost evenly divided between junior high and below and secondary school. They concluded that the relationship of class size to student achievement is quite strong (Glass et al, 1982).
Light (2001) reports a consistent correlation between the number of small classes taken by students and their overall grades. He concludes that this correlation “sends a clear message—that most of the time smaller is better, with strong[er] student engagement” Research on student ratings of subjects and subject teachers suggests that students’ overall evaluations of teaching effectiveness decrease with increasing class size. For instance, institutional research at Western Washington School, where the subject-evaluation system allows departments to utilize evaluation forms tailored to the size of class taught, reveals that subject ratings decline systematically with class size in the following manner: Seminars receive higher average ratings than small lecture classes, which in turn are rated higher than large lecture classes (Frye, 2002). This literature review concludes that reducing class size can have a positive effect on overall student achievement.

2.3.3 Class size and attitude

2.3.3.1 The effects of class size to student attitude

Attitude is a settled way of thinking or feeling about something. Goodman (1997) defines an attitude as a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude thus, influences an individual’s choice of action, and responses to challenges, incentives, and rewards. Class size affects the attitude of students in terms of attendance, pupil behaviour, interaction with other students. A number of studies revealed that higher level of student dissatisfaction with large-sized classes contribute to lower rates of class attendance. Cooper & Robinson (2000: 9) suggest that large-class attendance dwindles throughout the school term and is often down to 30 to 40 percent by the end. They further argued that in many larger classes, note-taking services have sprung up as lively businesses through which students prefer prepared notes in lieu of attending class. Their research clearly, shows that students were sending signals concerning their disaffection with large classes.

Student discipline tends to be more difficult in large classes and more of an intrusion into the teaching and learning process. Large classes may allow students to be more disruptive, allow them to “hide” from participation, engagement, or even attendance (Lazear 2001). In contrast, smaller classes tend to be quieter and more easily managed. Smaller classes do lead to a positive attitude toward the subject matter of the course. In the most extensive study of class size and student attitude McConnel & Sosin (1984) came up with the following conclusions: Students tend to be the most upset when confronted with larger classes in the majors. Students tolerate
large classes for general arts subjects where there is no need for high cognitive and critical thinking compared to science subjects. Students definitely expect smaller classes in their major and express dissatisfaction if they do not get them.

Larger classes appeal less to students who are more intelligent. Better students seem to desire the positive impacts of smaller classes on the development of higher order cognitive skills. The reason that students in general viewed larger classes less favourably than smaller classes was the perceived lack of teacher-student interaction in the larger classes and deleterious impact on student motivation inherent in large classes.

Other studies suggest that higher levels of student dissatisfaction 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). In contrast, Light (2001) reports a “strong relationship” (correlation of .52) between the number of small classes that students take and their satisfaction with the overall academic experience. He reports that, “nearly without exception, students who are dissatisfied with their academic performance, are taking nothing but large, introductory subjects.”

However, some contributors proposed that what students and teachers do in large and small classes made the most significant impact on student outcomes. Misbehaving students, student attention span, peer pressure, student engagement and teacher attention to students and content were all influenced by class size according to several authors.

Lazear (2001) offered a disruption model to explain the importance of class size. He claimed that optimal class size was larger for better-behaved students and this helped explain why it was difficult to find class size effects in the data. He proposed that age and attention span factored into the class size-student outcomes equation. He makes the assumption that one child’s disruption destroyed the ability of all students to learn at that moment. When a student was misbehaving, the teacher must attend to him and thus the learning of the student and his classmates was affected.

In addition to disobedient students, a student who asked a question to which all other students knew the answer disrupted the learning process. In order to demonstrate his theory, Lazear offered a model that uses $p$ as the probability that a student does not interfere with classroom learning. “It is expected that $p$ would be relatively high because even having $p=.98$ in a class of 25 students results in disruption 40 percent of the time (1-.9825=.40)” (Lazear, p. 780). The
better the behaviour of student, Lazear argued, the fewer the number of teachers, \( n \), needed. The relationship of \( n \) to \( p \) demonstrated why there were more students in a college lecture than in a kindergarten class. “If \( p \) were .97, learning would occur 40 percent of the time in a class of 30 but only 2.5 percent of the time in a class of 120” (Lazear, p. 783).

Resnick (2003) suggested that smaller classes benefited student achievement claiming that teachers in small classes paid greater attention to each pupil. Students in these classes experienced continuing pressure to participate in learning activities and became better, more involved students; attention to learning went up and disruptive and off-task behaviour went down. Pedder (2006) believed that class size might impact classroom processes and pupils’ learning. He stated that smaller class size allowed teachers to cover more curriculum and students to be more cognitively engaged. These two features led to improved student achievement and attitude towards learning.

Pedder asserted that in larger classes, more time is needed for non-academic activities related to administrative and organizational procedures and to the management and control of discipline. Reductions in the quantity of learning opportunities constrain teachers from achieving the necessary pace, depth and breadth of curriculum coverage as class size increases.

\[ \text{2.3.3.2 The effects of class size to teachers’ attitude} \]

The positive effects of small class size on teachers’ attitudes and feelings are not trivial. Teachers’ view of class size has always been clear. Teachers believe that smaller classes provide better quickly and a richer environment for pupils, while making teaching more enjoyable for the teacher. Teachers reported that in small classes they were more able to concentrate on teaching (Johnston, 1989). The teacher of smaller class sizes reported themselves as more productive and efficient. They spent less time in behaviour monitoring and control of disruptions because they were more able to deal with problems promptly as they arose and before they became serious. This resulted in a reduction in the amount of negative stress in the classroom environment (Zahorik, 1999).

Effects on teachers are important because the mechanisms for the delivery of the benefits of small class size to the students are unknown. The assumption is always made that students benefit from small class sizes because of increased individual attention but this causal
relationship has not been demonstrated. The other frequent assumption is that in small classes teachers are more able to use a wider variety of instructional methods and strategies. Again, there is no clear demonstration of this link. It is equally possible that the benefits of small classes accrue because of changes in the social and emotional environment of the classroom. In small classes, there are fewer behaviour problems of the two most common kinds—both the aggressive disruptions caused by some students and the emotional withdrawal of other students that may be precipitated by noise and stress. With the reduction in the number of disturbing incidents and a reduction in the number of disengaged students there is a change in the affective atmosphere of the classroom. It may be that a quieter, more serene environment yields better student outcomes, at least partly through the agency of heightened teacher attitudes and morale.

Teachers also have important perceptions of the way that the safety and viability of their classes as learning environments are enhanced by small size. They report that small classes are safer, partly because they are easier to manage and supervise. The class size issue has to be considered as well in the context of the increased expectations of teachers’ roles and responsibilities that have developed in recent decades. Teachers have always had a heavy workload, which includes scheming, marking, evaluation and teaching itself but they are now expected to take care of a wider range of student needs—including social and psychological needs. King & Peart (1992) described teachers’ work as essentially undefined and open-ended. Contracts usually define only minimum requirements while teachers almost universally do far more than are minimally required.

Some teachers try to do more than is physically possible on a sustainable basis. Small classes result in reduction of non-teaching duties. Schembari (1994) stated that workload constituted one of the main sources of stress for teachers. Gallen, Karlenzig & Tamney, (1995) describe teaching as a multi-track activity where teachers have to fill numerous roles under time pressure. Teachers have to make frequent decisions about the priority of several roles and, under pressure; the experience of role conflict is frequent. Tataryn, Rowan, Hanson & Goguen (1998) found that the largest single category of teacher disability was psychological disorders.

Miller-Whitehead (2003) suggested that small classes helped improve teacher morale and reduced discipline problems. She stated that small classes reduced the need for remediation through early identification and prevention of problems. Further, Miller-Whitehead (2003) claimed long-term benefits of small classes such as improved graduation rates, lowered dropout
rates, decreased teen pregnancy rates, a higher proportion of graduates with advanced or honors
diplomas and students who took the ACT and SAT college entrance exams or who planned to
attend college.

Normore and Ilon (2006) noted that smaller class sizes had a positive impact in several areas:
more time to cover curriculum, higher levels of student-student and student-teacher
engagement, and safer schools with fewer discipline problems.

**2.3.4 The effects of class size on student-teacher interaction**

A considerable body of research suggests that the academic behaviour of students is influenced
by the quality of teacher-student relationships. Teaching on logical and common-sense grounds
seems likely that the number of children in a class will decrease or increase the amount of time
that can be spent on instruction and dealing with individual students. Smaller classes yield
better results through greater teacher-student interaction. However, Shapson et al (1990) found
that there were no statistically significant differences between class sizes for most teacher
activities, and teachers did not alter the proportion of time spent interacting with the whole
class, with groups or with individuals. This conflicted with teachers’ own experiences - there
was, therefore, a gap between professional judgment and observational research findings.

Blatchford, Bassett and Brown, (2005) found that more interactive teaching took place overall
in smaller classes but this was restricted to the youngest age group studied (4/5 years).

Subsequent research has confirmed that smaller classes benefit all pupils of individual attention
from teachers but low-attaining pupils benefit more at the secondary level. Pupils in large
classes drift off task because of too much instruction from the teacher to the whole class instead
of individual attention and low attaining students are most affected. Anderson (2000) argued
that small classes encourage a more personalized and appropriate curriculum for individual
pupils. Larger classes can lead to pupils having a passive role in class. Research by Blatchford,
Bassett & Brown, (ibid) found that students in large classes were more likely to engage in
passive behaviour, listening to the teacher, while in smaller classes students were more likely
to interact in an active, sustained way with teachers. This was a consistent finding at both the
beginning and end of the primary school, Bourke (1996) found more student questions to
teachers in large classes but these were mostly requests for clarification or for other help from
the teacher.
Pascarella & Terenzini (1991:161) state that “the greater the student’s involvement or engagement in academic work, the greater his or her level of knowledge acquisition and general cognitive development.” The research support for active involvement is so formidable (Cross, 1998). Survey research reveals that student participation in the classroom is viewed as important for learning by both school and students (Nunn, 1996); however, large class size has been found to reduce the likelihood of classroom participation.

Using direct classroom observation as their methodological tool, Karp & Yoels (2006) discovered that in classes of less than 40 students, 4-5 students accounted for 75% of all classroom interactions; and in classes with more than 40 students, 2-3 students accounted for over half the exchanges. These observational findings mirror the results of research on students’ subject perceptions, which indicate that students in large classes report the highest degree of dissatisfaction on course-evaluation questions relating to the quality of student instructor and student to student interaction (Feldman, 2004; Carbone & Greenberg, 2008).

Furthermore, teachers may have a tendency to overestimate their students’ level of involvement in the classroom, as evidenced by the work of Centra (2003), who discovered large discrepancies between college professors’ self-perceptions of their degree of “interaction” and “openness” with students compared with student perceptions of their professors, i.e., professors tended to perceive themselves to be more open and interactive than did their students. These findings are reinforced by more recent research conducted by Fassinger (1996), who surveyed more than 1,000 students in over 50 classes from a wide range of disciplines that met at the same time period. She found that students perceive themselves as less involved in the classroom than school perceive them to be, and concluded that, “…because students say that they, as a whole, are even less active in classes than do teachers, the effects of students’ passivity may be felt more strongly by students than by teachers”.

The importance of classroom involvement for student learning is strongly supported by the results of a longitudinal study of students’ intellectual skill development conducted by Terenzini, Theophilides, & Loran (1994), who found classroom participation to be the only course experience variable that consistently correlated with students’ cognitive growth. A relationship between students’ active involvement in the college experience in general and their enrolment in small-sized classes is suggested by the work of Light (2001). He conducted in-depth interviews with more than 1600 students, and one of his principal findings was that
students who chose at least one small class each term was noticeably more engaged in the school experience. Since active involvement in the school experience is strongly correlated with student retention (Astin, 1993; Tinto, 1993), the aforementioned findings of reduced levels of active class involvement in large-sized courses may have disturbing implications for student persistence to ordinary level completion.

2.4 Summary

Chapter two provided literature relevant to the effect of class size on the teaching-learning process of mathematics. The literature review has shown that class size is an important factor in planning and realising of effective teaching and learning mathematics in schools. The following chapter outlines the methodology that was used in this study.
CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter outlines the way the study was conducted and the different instruments used to come up with data to answer the research question. The key components are research design, research instruments, reliability and validity of research instruments, population, sample and sampling techniques, data collection techniques and ethical considerations.

3.1 Research Design

Research design is a detailed plan or blue print on how the research is to be conducted. Bless & Achola (1998) defined research design as “the planning of any scientific research from the first to the last step.” The plan describes the when, where, what and how the data will be collected. Marshal & Rossman (1989) gave several examples of research designs that include histories, case studies and field studies and experimental methods from the logical positivism paradigm, surveys and document analysis. The choice of research design to use depends on the focus of the research and the desired time frame for the study. The study used a confirmatory survey research design to establish the factors influencing the size of a class on teaching-learning of Mathematics at Nyamanyora Secondary School and how can they be improved. The confirmatory research design was employed because information from teachers and students was very concrete. Furthermore, the study assumes that students in smaller classes learn more and better than students in larger classes, hence the use of the confirmatory survey to validate the above assertion. The principle advantage of this method is that it is economical and gathers large quantities of data within a short period of time at a less cost.

3.2 Research Instruments

A research instrument can be taken as a tool designed to measure the variable(s), characteristic(s), or information of interests, often a behavioural or psychological characteristic, such as observation, questionnaire and interviews (Schaefer, 2006). These instruments are vital during research study as they help researchers to keep a closer look of what has been observed and how to report it. For better results to be obtained, these need to be both valid and reliable. The study employed triangulation in data collection through the use of observation checklist that elicited qualitative data and questionnaires for quantitative and quantitative data. It is hoped that this methodological triangulation would enhance the quality of data.
3.2.1 Questionnaires

The questionnaire survey was the main instrument for data collection. Best & Kahn (1995) views a questionnaire as a data gathering instrument through which respondents answer questions or respond to statements in writing. The questionnaire was used because factual information was desired. The questionnaires are relevant in this study because they made it possible for a large number of respondents to respond, even when there was limited time and resources. Best & Kahn (ibid) gives economy of time as an advantage of the questionnaire. As Mhlanga & Ncube (2003) noted, questionnaires will result in improved reliability, as the written items will be asked in exactly the same way to each respondent. An added advantage of using it was that respondents were guaranteed anonymity and were free to give information without fear.

In the proposed study, it was possible to address several subjects simultaneously. The researcher prepared questions which attempted to answer the main topic, thus reducing chances of irrelevant responses. Denzin & Lincoln (2000) hold the opinion that the respondents are not stampeded into providing responses. On the other hand, this might result in delays in returning the questionnaires. Data gathering using this technique was not influenced by the researcher’s personal attributes such as dressing and oral skills among others. In order to overcome the problem of delayed and low returns a letter of transmittal was sent in advance to prospective respondents. The researcher used a five-point Likert scale (Agree, Strongly Agree, Uncertain< Disagree and Strongly Disagree). Those willing to participate got the questionnaires.

3.2.2 Observation

Chivore (1994) sees observation as an expletory phase in which the researcher can reliably and vividly identify the structures available through some systematic deliberate observations. The researcher not that information provided by respondents in questionnaires may be inaccurate. To address this challenge, the researcher used a classroom observation checklist to observe classroom practices. The advantage of this approach is that the researcher was able to get first-hand information from classroom practices. The procedure for conducting classroom observation involved researcher sitting in the classroom and made use of the observation checklist to record proceedings as they occurred.
3.3 Reliability and Validity of Research Instruments

Sound measurement must meet the tests of validity and reliability. Bryman & Cramer (1997:62) suggest that “when a concept has been operationally defined, that measure of it has been proposed, the ensuring measure device should both be valid and reliable.” Thus, these are the major considerations one should use in evaluating a measurement tool. Validity refers to the extent to which a measure what we actually wish to measure. Reliability has to do with the accuracy and precision of a measurement procedure. At the design stage, the researcher minimised threats to validity by selecting the appropriate instrumentation for getting the data required. In this study two instruments were used, that is, observation and questionnaires. Furthermore, to enhance validity an appropriate sample of 62 respondents, and the research was done in an appropriate time, six months.

3.3.1 Questionnaires: Validity and Reliability

Reliability is the extent to which a measure will produce consistent results. To achieve reliability the questions asked in questionnaires were short and unambiguous. Pre-testing was done to help the researcher to make vital improvements on questionnaires basing on the problem seen on them. One technique in considering the reliability and validity of questionnaires was the sampling. An unrepresentative, skewed sample, one that is too small or too large, can easily distort the data, and indeed, in the case of small samples, prohibit statistical analysis (Morrison, 1993).

3.3.2 Observation: Validity and Reliability

To ensure validity, a pilot study was carried out. This was done to ensure that the observational categories were appropriate, exhaustive, discrete, unambiguous and effectively operational to the purpose of the research. Reliability was guaranteed by the application of intra- and inter-rater reliability, this was so because observational research is more structured in nature and it yields quantitative data.

3.4 Population

According to Best & Khan (1993) a population is the entire collection of people and things the researcher is interested in. Cohen, Manion & Morrison (2004) perceive a research population as referring to all the individuals, units, objects or events that have one or more characteristics that are of interest to the researcher. According to Macrab, (1996), population is a group of
people which is supposed to be studied and to which the researcher wishes to generalise the events of the research. Relating to the three definitions a population is the totality of people or objects under study. The populations of the study covered from one to four pupils and teachers at Nyamanyora secondary school in Mudzi District. The classes are comprised of boys and girls with different cultural background.

3.5 Sample and Sampling Techniques

3.5.1 Sample

Best & Kahn (1995) see a sample as a small proportion of a population selected for observation and analysis. In this study, sampling was important because it is neither possible nor desirable to collect data from the entire target population. Borg & Gall (1989) recommended a sample size of between 10 and 15 percent of the target population. In this study, the sample size was 62 people drawn from both teachers and students. The breakdown of the sample size was as follows: 7 teachers and 55 forms three students. Sample size was determined by the style of research, in the study, the researcher required a larger sample since inferential statistics were to be calculated. Furthermore, too large a sample might have become unwieldy and too small would have been unrepresentative.

3.5.2 Sampling procedure

There are two main methods of sampling. The researcher opted for a probability sample and non-probability sample. In the former, every member of the wider population has an equal chance of being included in the sample; inclusion or exclusion is a matter of chance and nothing else. In the latter, some members of the wider population definitely will be included and definitely included (Cohen, Manion & Morrison, 2004:99). This study used stratified random sampling under probability sampling techniques because stratified sampling enables all members of the target population to have the same chance of being chosen for the sample. Stratified sampling involves dividing the population into homogeneous groups, each group containing subjects with similar characteristics (Cohen, et al, 2004: 99). The population was divided into two groups based on sex. This technique was useful since it was compatible with the type of research approach.
Under non-probability sampling techniques, the researcher employed the convenience and purposive sampling techniques. Convenience sampling is a non-probability sampling technique where the subjects are selected because of their convenient accessibility and proximity to the researcher (Schaefer, 2006). The researcher simply chose the sample from the sample which was easy to access. Furthermore, the technique was preferred because it was fast, inexpensive, and easy. It was enough to use convenience sampling; hence the researcher further went on to use purposive sampling. Of the total population of 446 participants under-study, only 62 were selected. This was determined by the researcher’s specific needs. The power and logic of purposive sampling is that a few cases studied in depth yield many insights about the topic. In the study 7 teachers out of 26 were purposively selected. As for students, the same procedure was used.

3.6 Data Collection Procedures

Firstly, researcher got a letter from Bindura University which seeks permission to carry out the project in Mashonaland East Province, the letter was taken to Marondera for permission from the Education Provincial Director(PED). The PED directed the researcher to District Schools Inspector of Mudzi District where Nyamanyora Secondary School happens to be located. The Schools Inspector gave the researcher a go ahead and to see the Headmaster of Nyamanyora Secondary school who also gave the researcher a green light to start the project.

Data collection was undertaken over a period of six months, during which questionnaires were administered to both teachers and students. Direct observations were done during Mathematics lessons with form threes at Nyamanyora Secondary School.

3.7 Ethical Consideration

Ethical concerns were adequately addressed in this study. To start with, informed consent was sought from the respondents and participants after informing them about the importance of the study.

For questionnaires, subjects were not asked to provide their names for confidentiality purposes. Enough time was given to them to complete the questionnaires. The purpose of the study was explained to both teachers and students to encourage a free interaction during the study. The
researcher observed ethics by requesting the respondents to voluntarily and willingly participate in the study.

3.8 Summary

This chapter discussed the methodology used to find information on the target population and the instruments that were used to gather information. Also provided were the merits and demerits of the chosen instruments and in some instances explanations were provided on how the researcher counter-acted upon the demerits to produce a substantive report. Some instruments that were used did not satisfy the researcher, hence a variety of instruments were used to try as much as possible to come up with a comprehensive data. Data collection procedures and ethical considerations were also included. The next chapter presents the research findings.
CHAPTER 4: DATA PRESENTATION AND ANALYSIS

4.0 Introduction

The main focus of the chapter is data presentation and analysis of findings obtained from the field research which was carried. The chapter presents the research findings in two ways. Quantitative data have been presented in tables, graphs, charts 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.

FINDINGS FROM QUESTIONNAIRES

(A) Presentation of the findings from teachers.

4.1 Respondents

Table 1(a) Response rate (teachers)

<table>
<thead>
<tr>
<th>ASPECT</th>
<th>FREQUENCY</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>Returned</td>
<td>6</td>
<td>86</td>
</tr>
<tr>
<td>Not returned</td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>

7 questionnaires were distributed to teachers and 6 were returned which gave an excellent response rate of 86%. Of the total questionnaires issued out, only 1 did not return and hence 14% of the total respondents’ views were not captured in this study.

Table 1 (b) Response rate (Students)

<table>
<thead>
<tr>
<th>ASPECT</th>
<th>FREQUENCY</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed</td>
<td>55</td>
<td>100</td>
</tr>
<tr>
<td>Returned</td>
<td>50</td>
<td>91</td>
</tr>
<tr>
<td>Not returned</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>
55 questionnaires were distributed to students and 50 were returned which gave a response rate of 91%. 5 questionnaires were not returned; resultantly 9% views were not taken into consideration.

Section A: Demographic data

4.2 Gender Composition of Respondents

Fig 1 Pie Chart: Gender Composition (Teachers)

71% (5 out of 7) of the respondents were male while 29% were female. This however does not show any bias in issuing out questionnaires but shows that the whole teacher population is more male than females. Analysing the teacher population, representative of both males and females were noted that is the girl child is well represented.

4.2.1 Age Distribution of Respondents

Table 2 Age Distribution: Teachers

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Number of respondents</th>
<th>male</th>
<th>Number of female respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-35</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>36-45</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>46 and above</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
There were 2 males and 1 female aged between 25 and 35, 2 males aged 36-45 and one male and a female whose age was 46 years and above.

Analysing, the result shows that the majority’s age falls below 45 years. The majority of teachers are still energetic to put all their effort in maximising learners’ performance. More so, most of them attended college when child centred methods were taught at college hence it is a known fact that they are well equipped with current teaching methods and creating environments that are conducive for learning which in turn helped in finding the major effects of large class size on the teaching of mathematics.

4.2.2 Educational Qualifications of Respondents

Table 3: Educational Qualifications

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Number of respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>5</td>
<td>71</td>
</tr>
<tr>
<td>HND</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Degree</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Post Graduate(Masters)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The table shows that 71% of the respondents are diploma holders, and 2 of the respondents have degrees contributing 29% of the total number of respondents.

Analysing, the level of education of respondents buttresses the fact that they are all qualified teachers. It can be urged that there is likelihood that the responses were very valid and that there is a strong possibility that correct findings will be arrived at.
4.2.3 Work Experience

Fig. 2: Bar Graph: Work Experience of Respondents

Figure 4 above shows the duration that each teacher has in the teaching field. As shown in the figure, out of 7 teachers who participated in the study, 3 had been teaching for 1 to 5 years, 2 for 6 – 10 years, 1 for 11 – 15 years and 1 for 16 years and above.

All the teachers in the sample taught at ordinary level. This shows us that the majority of teachers have enough experience to comment of the effectiveness of class size on the teaching-learning process. Thus, the teachers’ experience may have a significant effect on the solutions that are required by this study.

Section B: Effects of class size on the teaching-learning of Mathematics

The study sought to establish the effects of class size on the teaching and learning of Mathematics. Thus, when asked if class size 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 class size on the teaching-learning process. Findings from teachers were compressed and put into a single table below, the measures of central tendency mean, median and mode were used to analyse the data.
4.3 The effect of class size on the instructional methods

Table 4: The effects of class size on the instructional methods

<table>
<thead>
<tr>
<th>Question</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion groups result in positive attitude toward the subject.</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Large class size increase reliance on lecture method</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Students adopt surface learning in large classes</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Students in smaller classes learn more than students in large classes.</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Student academic achievement is lowered in subjects with large classes.</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Teachers have difficulties grading the flow of students’ work in large classes.</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Responses from teachers above was compressed into a table containing two rows where those who agree and strongly agree were added and put in the row agree. The rest choices of the teachers were put in the row disagree.

Table 5: The effects of class size on the instructional methods

<table>
<thead>
<tr>
<th>Agree</th>
<th>5</th>
<th>6</th>
<th>6</th>
<th>5</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean of the teachers who agree with the questions above
Mean of the teachers who disagree with the questions above

Mean = \frac{5+6+6+5+5+6}{6}

\begin{align*}
&= \frac{33}{6} \\
&= 5.5
\end{align*}

Mode of the teachers who agree = 6.

Mode of teachers who disagree = 1 and 0, bimodal data.

Median number of teachers who agree

5; 5; 5; 6; 6

\begin{align*}
&= \frac{5+6}{2} \\
&= 5.5
\end{align*}

Median number of teachers who disagree:

0; 0; 0; 1; 1

\begin{align*}
&= \frac{0+1}{2} \\
&= 0.5
\end{align*}

Since the mode, median and mean of teachers agreeing with the questions was approximately equal it implies that scores were almost the same for all the questions.

i.e. mode = 6 \approx mean = 5.5 \approx median = 5.5.

Commenting on the mean it implies that 92\%(5.5 of possible 6) of the teachers agree with the questions on class size. Mean which is a measure of position highlights that most scores were above half. Hence these findings claim that most participants agreed with the questions involving large class size on teaching-learning of mathematics.
Analysing the above workings and table, most teachers agreed that discussion groups result in positive attitude toward the subject, this might be so because groups help learners to grasp concepts easy and slow as they will be discussing at peer level. This is however also supported by Bligh (2002) who reports that students who become involved in active discussion of their ideas with other students are more likely to stay “on task” in class and spend more time synthesizing and integrating concepts, relative to students who listen to lectures. Costin (2002) review of close to 60 studies, spanning a 40-year period, which revealed that students better like the subject and its subject matter when they had small-group learning experiences in class.

However, learners can participate effectively if groups are relatively small than in large groups where some learners can be dormant. From the table, it is also noted that all teachers agreed that large class size increase reliance on lecture method, it’s irrelevant to teachers to use learner centred methods if the class is too large since most learner centred methods require more time which is not applicable when classes are large. It might also be because they want to curb indiscipline problem hence using lecture method. However, Hoyt and Pereira (2000), argue that lecture method do not promote thought, change attitudes, or behavioural skills.

It is also a known fact among teachers that students in smaller classes learn more than students in large classes. This is because in smaller classes teacher have the capacity and time to check progress of each and every student hence students’ missing the concepts can easily be given remedial work instantly. This is supported by Bligh(2000) who adds that students, who had the opportunity to interact in class with the teacher, and with other students, reported significantly higher levels of satisfaction with their learning experience than students in classes that were taught exclusively by the lecture method. As a result, students’ academic achievement is lowered in large class due to failure to grasp all the concept caused by the inability of the teacher to cater for all students in large classes.

Teachers are also unable to grade the flow of work of students in large classes, mathematics is a daily subject with written work, hence to meet the required standards teachers tend to mark and record for the purpose of meeting the minimum standards required by the ministry without helping much the students. Ratcliff (1992), who conducted interviews with over 300 teachers at five different schools, and reported that, “Class size is cited frequently as a major limitation on what could be accomplished in instruction and in what reasonably could be asked of students in class work and marking of leaners work” Hence it was confirmed by the measures of central
tendency that most teachers are also having challenges with large class sizes which are in turn affecting learners’ performance in mathematics.

4.4 The effects of class size on teachers’ and students’ attitude

4.4.1 Large class sizes have more discipline problem

In terms of class discipline, 50%, 3 teachers agreed with the statement that larger classes have more discipline problems, 33%, 2 teachers strongly agree with the statement. 0% was uncertain, and 17%, one teacher disagreed with the statement. 83% of the participants agree with the statement that larger classes have more discipline problems, the larger the class the more indiscipline it became. Among the reasons given on why large classes caused indiscipline were that when learners are too many in class, individualised attention became minimal and learners felt forgotten, hence engaged in off-task activities such as noise making, fighting, playing games 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,

“Sir, in our class we are 62 and because of being too many there is too much noise and fighting, and our teacher fails to identify those who are making noise, as a result she punishes even us who do not make noise and that is not fair”.

Another learner adds:

“Sir, surely in our class there is a lot of noise making and hearing what the teacher is saying is difficult and at the end we engage into activities that makes us not bored and not to sleep in the lesson”.

To add on, 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 inhibit disruptive classroom behaviour. Resnick (2003) also suggested that smaller classes benefited student achievement claiming that teachers in small classes paid greater attention to each pupil. Students in these classes experienced continuing pressure to participate in learning activities and became better, more involved students; attention to learning went up and disruptive and off-task behaviour went down. Student discipline tends to be more difficult in
large classes and more of an intrusion into the teaching and learning process. Large classes may allow students to be more disruptive, allow them to “hide” from participation, engagement, or even attendance (Lazear 2001).

On the other hand, the other teacher did not believe that large classes caused discipline. He attributed indiscipline in classes to other factors among which included the type of leadership the teacher exhibited in class, preparedness of the teacher, age of children, firmness and consistence of the teacher when dealing with pupils.

4.4.2 Students report less subject satisfaction in large-sized class

2 out of 6, (33%) agree that students report less subject satisfaction in large sized classes, 50%, 3 teachers strongly agree with the statement, 17%, 1 teacher disagree with the statement. 0% are uncertain and strongly disagree with the statement. Most participants, 5 teachers observed that satisfaction is an important factor in the teaching-learning process which unfortunately may be affected by class size.

Commenting on satisfaction facilitators adds that in most cases satisfaction is measured by students’ response in an exercise. One of the teachers has this to say:

“in large classes about a quarter of the class grasp the concepts during the lesson and this is reflected during marking. Most pupils will then get the concepts through reading and cramming which is most common. But in smaller classes the teacher leaves the class after almost everyone got a gist of the lesson”.

On the other hand, the other teacher highlighted that students will never be satisfied with the lesson. he highlights that students’ satisfaction is objective and it depends on the subject and concepts being taught. If easier most pupils will get the concepts and this has nothing to do with class size. He adds that:

“if you are to leave this school and a new teacher comes, you will find that these same students will say they never did a topic in which you spend most of your time on ”.

4.4.3 Class size and teacher exhaustion

33%, 2 teachers agree with the statement that large class size causes great teacher exhaustion 33%, 2 teachers strongly agree with the statement, 0% are uncertain, 33%, 2 teachers disagree with the statement. Most participants observed that teaching large classes was exhausting and
the reasons cited were that, one would be forced to speak loud in order for all to hear, dealing with disciplinary problems, marking a lot of work on limited time and trying to attend to all pupils in the class. Resnick (2003) suggested that smaller classes benefited student achievement claiming that teachers in small classes paid greater attention to each pupil and there is less work compared to large classes.

On contrary the other teachers cited that the teaching method implied would be the problem, encouraging that if student centred methods were used there will be no exhausting to talk about. They also add that quality work should be given not to give so many questions testing the same concept and learners should be the major participants in any lesson.

Analysing the findings from the effects of large class on teacher and students attitude, it is undeniable that most teachers finds it difficult to teach while students are misbehaving, hence in trying to control behaviour of learners’ time is lost leading to teachers rushing the concepts to meet deadline without giving much information to learners and this has a negative effect on attitude of the teachers which can lead to the destruction of that enthusiasm to teach students to know. It is also observed that student’s attitude and love for mathematics is destroyed by being in large class where students who misbehave are not easily identified which lead to them all being beaten. This affects the attitude of learners towards school work and might also cause students to hate their teachers leading to failure of learners in the subject area. Teachers reported that in small classes they were more able to concentrate on teaching (Johnston, 1989).

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

The following were the responses from students with regard to class size and its effects on the teaching-learning process. Responses obtained from students were put in a single table and a graph was used to present the findings from students regarding class size and performance in mathematics.
Table 7: Findings from students with regard to class size and learning.

<table>
<thead>
<tr>
<th>Question</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Smaller classes lead to substantially faster understanding of the concept taught</td>
<td>30</td>
<td>9</td>
<td>0</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>2 Class size does not affect my ability to learn</td>
<td>24</td>
<td>0</td>
<td>16</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>3 Small classes allow teachers to spend time on individual students</td>
<td>26</td>
<td>13</td>
<td>9</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Fig 3: Findings from students with regard to class size and learning.

From the graph and table above it is evident that most leaners agree with the questions concerning class size and learning. On question one, (30 students) agree that smaller classes lead to substantial fast understanding of the concepts taught, this is so because the teacher has time to help individual students who might be lagging behind unlike in large classes. This was also supported by Raimondo, (1990) who postulates that when it comes to the attainment of higher-order academic skills such as problem solving, application of concepts and critical thinking, students in smaller classes do acquire more of these skills than do students in larger
classes. However, on the second question 16 students were uncertain if large class size affects their ability to learn, this might be so because learners engage in selective listening in order to get what the teacher will be teaching.

The Chi-square analysis was also used to test the association at 5% level of significance between large class size and performance of pupils in teaching-learning of mathematics.

H₀: large class size has no effect on the teaching-learning of Mathematics.

H₁: large class size affects the teaching-learning of Mathematics.

Table 8: Chi-square.

Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
<th>Point Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>8.003a</td>
<td>1</td>
<td>.005</td>
<td>.009</td>
<td>.006</td>
<td></td>
</tr>
<tr>
<td>Continuity Correction</td>
<td>6.287</td>
<td>1</td>
<td>.012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>8.009</td>
<td>1</td>
<td>.005</td>
<td>.009</td>
<td>.006</td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear-by-Linear</td>
<td>7.843c</td>
<td>1</td>
<td>.005</td>
<td>.009</td>
<td>.006</td>
<td>.005</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McNemar Test</td>
<td></td>
<td></td>
<td></td>
<td>.180c</td>
<td>.090c</td>
<td>.061c</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decision

Since (X (1) =8.003, Pearson Chi-square) we reject the null hypothesis H₀.

Conclusion:

We conclude that there is an association between large class size and students’ performance and large class size affects the teaching and learning of mathematics at 5% level of significance.

Analysing the tables, most of the participants agree to a greater extent with the statement that smaller classes lead to substantially faster understanding of the concept taught, and that small classes allow teachers time to spend on individual students. Hence it is evident from the above information that large class size has effects on students’ performance as also seconded by the Chi square analysis that there is an association between large class size and students’
performance. This shows that as the size of the class increase the number of interactions between teacher and students decrease and thus adversely affect students’ progress

4.5 Class size preferred by students

![Bar Graph: Class Size Preferred By Students](image)

The above results show that students preferred small classes to large classes, 72%, 36 students preferred small class whilst 28%, 14 students preferred large classes.

The reason for this could be that small class allow more interaction between students and teachers and between students themselves. And for this reason, most learners prefer small classes because teachers will have all the time in the world to explain the hidden concepts and make sure those lagging behind are catered for. Miller-Whitehead (2003) suggested that small classes helped improve teacher morale and reduced discipline problems. She stated that small classes reduced the need for remediation through early identification and prevention of problems. Further, Miller-Whitehead (2003) claimed long-term benefits of small classes such as improved graduation rates, lowered dropout rates, decreased teen pregnancy rates, a higher proportion of graduates Using the graph above, it is assumed that a small percentage which vowed for large classes are those students who have already affected by large classes and now have adapted to its operations and may have negative attitude towards school work.
4.6 FINDINGS FROM OBSERVATION.

4.6.1 Presentation of the findings as obtained by researcher through class observations

In order to obtain a true picture on the challenges associated with teaching large classes, the researcher conducted class observations, using a designed checklist shown under appendix and the following were the findings:

Students shared a desk; two students squeezed themselves on one desk meant for one student. The classrooms were stuffy, limited space for movement for teachers.

Lack of participation in lessons by students, the students barely asked questions. The only activity that students were involved in was listening and copying examples and or taking notes.

The researcher observed that most teachers used teacher-centred methods of teaching, like demonstration and explaining the concepts not involving the students.

Students were involved in off-task activities such as poking each other, texting each other using pieces of paper and making funny comments about the teacher to keep themselves, occupied. It was observed that one student was fast asleep without the teacher noticing and caring, instead the teacher continued teaching.

Poor preparation of lesson on the part of the teacher, hence a lot of time was spent on settling in and preparing students for the lesson. Leadership style exhibited in classroom, most teachers were authoritative leadership style this in turn resulted in students dislike the lesson and failure of students to respect and cooperate with the teacher in class.

4.7 CHALLENGES ASSOCIATED WITH TEACHING LARGE CLASSES

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

Commenting on major challenges faced by teaching in a large class size, teachers stated that in large classes teachers concentrated more on teaching and completing their topics than attending to students’ individual’s needs.

Lack of venue to facilitate the lessons was highlighted as one of the major challenges been faced by the schools. By lack of venues, they meant lack of adequate and spacious rooms to match the matching numbers of students in classes.
Most teachers cited class control as one the major challenges faced by teachers when teaching large classes.

Lack of teaching resources is one of the factors identified by teachers as a major challenge when teaching large size classes. Teachers are forced to write down all the class activities on the chalkboard. This situation consumed much of the teaching time. On lesson noted that there are few adequate books to match the large numbers of students in the classes.

Teachers highlighted that teaching large classes was exhausting because teachers were forced to speak loudly in order for all students to hear him/her as a result of this; one would be very tired by the end of the day.

4.8 Summary

This chapter presented data from a sample of 62 participants, comprising of 7 teachers and 55 students at Nyamanyora Secondary School using a multiple data collection instruments. The collected data was presented in tables, with frequencies and percentages. Graphs, pie charts and inferential statistics were also used. The data collected in terms of emerging themes was verified through triangulation were necessary. The answers to the research objectives were provided through analysis and discussion of the collected data. In the next chapter the study is summarised, conclusions drawn and recommendations made.
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter gives an overview of the whole study from chapter one to four and used the findings of chapter four to derive the conclusions based on the research objectives. The chapter also reports the constraints and problems encountered during the study and how these were overcome. Recommendations are made in order to help Nyamanyora Secondary School and other schools curb the effects of large class size. The recommendations are based on the triangulation technique that takes into account the recommendations of respondents consolidated by input from the researcher as well from authorities of reviewed literature in Chapter Two. The size of the class affects the delivery of education in schools and hence the researcher was interested in large class size and its effect on the teaching-learning of Mathematics at Nyamanyora Secondary School. There is also a recommendation for areas for further study.

5.1 Summary

This research was aimed at effect of large class size on the teaching-learning of Mathematics at Nyamanyora Secondary School. The objectives of the research were to: explain the effects of class size on students’ performance, explore the effects of class size on the instructional methods, examine the effects of class size to both the teacher and learner’s attitude and discuss the effects of class size on student-teacher interaction. This research study was carried out at Nyamanyora Secondary School from 01 October 2016 – 30 March 2017.

Literature analysed in this research was touching on issues which have to do with class size, and how the class size impact on the teaching and learning processes in schools. Literature was taken based on the research problem at hand.

The methodology that the researcher used was confirmatory descriptive research design. The total population was from form one to four pupils at Nyamanyora Secondary School and teachers. Out of the 470 participants, 62 participants were drawn using purposive sapling method. The data was collected using both closed and open-ended questions for teachers, and closed for students. Furthermore, observations were done using a checklist in Mathematics lessons. Thus, triangulation of methods of collecting data was used to validate the information collected. Data collected was presented using tabulation, pie-charts and bar graphs depending on the nature of the data. The major findings were that small classes are superior to large classes.
in terms of educational process and methodology. From the findings, the majority of the
respondents raised the issue that increase achievement appears to be the function of class size.

Other major issues raised revealed that not only do smaller classes increase student achievement, but they have less discipline problems. Furthermore, small classes allow teachers to interact with students and help them with their school work. The research also revealed that teaching large classes is a huge burden as lecturers end up feeling exhausted at the end of the day. Most students prefer small classes to large classes.

Respondents also highlighted that in large classes the teacher-centred approach to teaching is mostly favoured, whilst small classes apply the learner-centred approach. Respondents also recommended that more class rooms should be constructed and there is need to increase the number of teachers to mitigate the challenge of large classes.

5.2 Conclusions

The research made the following conclusions based on the objectives raised in chapter one.

The study showed that there was a close relationship between size of class and the quality of outcomes. The study reveals that both teachers and students can benefit from smaller classes. In large classes interaction between teachers and children decline and thus in turn affect the student performance in class. This is because in small classes students are given more individualised instruction, which in turn allows more attention and teachers to work with each student individually.

Secondly, the study revealed that in large classes teachers were challenged with the use of teacher-centred teaching methods such as group work and discussion. Instead teachers relied more on teacher-centred approach like lecture method. Teachers were in a hurry to teach topics instead of teaching students. This means that teachers were more concerned with finishing their syllabi instead of getting concerned with whether students understand their lesson or not. Hence, the use of lecture method to students. Furthermore, the study revealed that large classes reduce the level of classroom participation. In the end students end up been engaged in activities that are not related to the lesson in hand, activities such as sending messages using pieces of paper whilst in class, sleeping during lessons. The researcher therefore feels that it is important for teachers to understand that participation of the learners in the lesson is very vital because when students participate in the lesson it enables them to understand the lesson than when they are passive.
Teachers’ attitude towards small classes is that teaching is more enjoyable. This is so because they argue that they spend less time in monitoring behaviour and class control. Students agree with their teachers as they highlighted that small class increases attendance of teachers, and interaction with other students.

In short, the study found that large classes had generally adverse effects on the teaching-learning of Mathematics that is low levels of engagement with the teacher, classmates and subject matter. High levels of indiscipline and low pass rates.

5.3 Recommendations of the study

From the findings and conclusions made in the study, the researcher with the help of those recommendations made by respondents came up with the following recommendations which when adopted by schools there will be remarkable improvement in the quality of education provided by the institution.

5.3.1 Class size and teaching method

Teachers to improve their level of teaching must employ multiple techniques such as team teaching, group work, reduce the workload and utilize whole class discussion. Herington & Weaven (2008) confirm that forming small group of students help to reduce the noise, save the time of performing a certain activity and allow teachers to concentrate on small numbers of groups instead on focusing on many individuals. It is also a useful technique to bring the distractions to its lowest limit by involving every student in the learning process. In other words, engaging students in challenging activities where individuals or groups compete with one another would bring positive effects of large number in classes.

5.3.2 Class size and student-teacher interaction

To improve student-teacher interaction, one way that should be considered is to set good rapport between teachers and students and among students themselves which will help to minimize the anxiety where all in the class will feel as part in the same learning context. Moreover, creating interesting activities that make students effectively occupied at the same time will increase students' on-task behaviour, minimize students' boredom and bring loafing to its lowest level and that of course will promote learning.
5.3.3 Class size and discipline

To overcome indiscipline in large class teachers should allow students to play an active role in class and involve them in all decision making about the classroom life as controlling the noise level or handling any disciplinary actions by setting rules and punishment among groups or individuals. Renaud, Tannenbaum & Stantial (2007) believe that students are willing to abide by rules they set and not only that but they will make sure that these rules are effectively applied. In other words, such action is expected to be useful in possible growth of some fruitful and compatible strategies in order to minimize the level of disturbance in class and maximize the level of learning.

5.3.4 Class size and student achievement

To improve performance of students in large class, teachers should give students group assignments. This improves students’ understanding of the concepts; at the same time, it makes it easy for teachers to mark the work of the students. It also promotes discussions and interaction between students, in the end improves performance of students in large class.

5.3.5 Class size and resources

The school should expand facilities and construct more class rooms and increase the number of teachers. If this is done the student-teacher role will become low.

5.4 Recommendation for future study

The results of existing studies are rather conclusive: smaller classes are favourable to large classes. However, what remains be answered is what other factors do affect the achievement of students besides class size. To this end, research should be done and look at factors such as the influence of parents academic background and social standing have on the student’s performance at school.
REFERENCES


New Forums Press and The Professional and Organizational Development Network in Higher Education.


Cross, P. K. (1998,). *What do we know about students’ learning and how do we know it?* Keynote address delivered at the national conference of the Association of American Higher Education, Washington, DC.


Finn, J. D. (1998). *Class size and students at risk: What is known? What is next?* Washington, DC:


Hattie, J. (2005). *The paradox of reducing class size and improving learning outcomes.* Keynote presentation at the International Conference on Class Size, University of Hong


Dear Sir/Madam

I am Norman Chikaura from Bindura University carrying out a research on the impact of large class size on teaching and learning of Mathematics. The results of this research will be used for academic purposes. You are kindly requested to respond honestly.

Responses to this questionnaire will be treated as STRICTLY CONFIDENTIAL.

Instructions:

- Please put a tick (v) in the appropriate box against each question
- Do not write your name on the questionnaire.

INTRODUCTION AND BACKGROUND INFORMATION

1. Your sex  Male  Female

2. Your age:  25-35 years  36-45 years  46 and above

3. Indicate your professional qualifications
   1. Diploma
   2. Certificate in Education
   3. Degree
   4. Post Graduate (Masters)

4. For how long have you been in the teaching field.  1-5 yrs  6-10 yrs  11-15 yrs  16 and above.

PART B: INSTRUCTIONAL METHODS

Below each statement rate the extent to which you agree with the question. The scoring is:

1. Agree
2. Strongly Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

2.1 Students involved in discussion groups develop a positive attitude towards the subject.

   6. Agree
   7. Strongly Agree
   8. Uncertain
   9. Disagree
   10. Strongly Disagree

2.2 Large class size increase reliance on the lecture method of instruction.
1. Agree
2. Strongly Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

2.3 Students adopt surface learning in large classes.

1. Agree
2. Strongly Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

PART C: TEACHERS’ AND STUDENTS’ PERFORMANCE

3.1 Students in smaller classes learn more than students in large classes

1. Agree
2. Strongly Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

3.2 Student academic achievement are lowered in subjects with large class size.

1. Agree
2. Strongly Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

3.3 Teachers have difficulties grading the flow of students’ work in large classes.

1. Agree
2. Strongly Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

3.4 Do large classes have more discipline problems? Yes/No ................. Give reason:

.............................................................................................................................................................
.............................................................................................................................................................
.............................................................................................................................................................
.............................................................................................................................................................
.............................................................................................................................................................

3.5 Students report less subject satisfaction in large sized class. Do you agree? Yes/No ............ Give reason:

.............................................................................................................................................................
.............................................................................................................................................................
3.6 Large class size causes teacher exhaustion. Do you agree? Yes/No …………………. Give reason:

PART D

In this part briefly answer the following questions, itemise where possible.

3.7 In your own view what are the challenges associated with teaching large classes

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

3.8 What do you think can be done to mitigate challenges involved in teaching large class sizes.

__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
I am Norman Chikaura from Bindura University carrying out a research on the impact of large class size on teaching and learning of Mathematics. The results of this research will be used for academic purposes. You are kindly requested to respond honestly.

Responses to this questionnaire will be treated as STRICTLY CONFIDENTIAL.

Do not write your name on the questionnaire.

Your cooperation is greatly appreciated.

**Instructions:**

Please put a tick (v) in the appropriate box against each question

1.1 Smaller classes lead to substantially faster understanding of the concept taught

1. Agree  
2. Strongly Agree  
3. Uncertain  
4. Disagree  
5. Strongly Disagree

1.2 The size of the class does not affect my ability

1. Agree  
2. Strongly Agree  
3. Uncertain  
4. Disagree  
5. Strongly Disagree

1.3 Small classes allow teachers to spend time on individual students

1. Agree  
2. Strongly Agree  
3. Uncertain  
4. Disagree  
5. Strongly Disagree

1.4 Class size which you prefer

<table>
<thead>
<tr>
<th>Small class</th>
<th>Large class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>