

**AN INVESTIGATION INTO THE PREVALENCE AND NATURE OF
BOREDOM IN GRADE 10 MATHEMATICS CLASSROOMS:
A CASE STUDY**

A thesis submitted in partial fulfillment of the requirements for the degree of:

**MASTER OF EDUCATION
(Mathematics Education)**

Of

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By

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DECLARATION OF ORIGINALITY

I declare that this thesis is my own work, and that all sources used or quoted have been fully acknowledged and referenced. It is being submitted for the Degree of Master of Education at Rhodes University, and has not been submitted for a degree or examination at any other university.

Xoliswa Lydia Mbelani

Signature.....

December 2014

ABSTRACT

This research report focuses on an investigation into the prevalence and nature of boredom in Grade 10 Mathematics classrooms in the Grahamstown region, South Africa. Boredom seems to be strongly evident in our classrooms. Quantitative data was derived from an initial survey questionnaire while semi-structured interviews were used to elicit qualitative data.

The data from the survey was analysed quantitatively using descriptive statistics. The quantitative data was categorised according to the structure of the survey. The data was represented in bar graphs and then discussed accordingly. In the final narrative I infused extracts from the interviews with my quantitative analysis. The qualitative data was analysed and coded according to different categories and themes that emerged through repeated engagement with the interview transcripts.

The findings revealed that boredom is a common problem in the 8 Grade 10 Mathematics schools in the Grahamstown region and this finding answered my first research question. To answer my second research question, the results showed that learners were bored due to many factors, such as; lack of understanding, repetition and the teacher's actions and many more. My findings align with what is highlighted by Nett, Goetz, & Hall. (2011) that many learners from particularly the senior secondary schools frequently report episodes of boredom. The study recommends that teachers make their teaching more interesting, much use of concrete teaching materials and make mathematics tasks to be relevant and real.

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DEDICATION

This thesis is dedicated to current, past and future generations of high school Mathematics teachers and learners.

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Chapter 1

Introduction

1.1 Introduction

The purpose of this study is to investigate the prevalence and nature of boredom in Grade 10 Mathematics classrooms in the Grahamstown region in South Africa. In this chapter I discuss the context of the study, the research goals, the methodology, the findings and the significance of this research. I end this chapter by presenting a synopsis of the thesis structure.

1.2 Contextualisation of the study

This study was triggered by Grade 10 learners' negative reception of Mathematics as one of the high school subjects. In my 17 years' experience of teaching in two different schools, 10 years at a rural high school and 7 years at a township school, I have always been concerned about the poor performance of learners in Mathematics. With the many curriculum changes in South Africa, I experienced many difficulties in teaching Mathematics. At first I upgraded my mathematics teaching qualification by enrolling for a Bachelor of Education in Mathematics Education. From there I enrolled for a Bachelor of Education (Honours) in Mathematics Education. Studying for these two qualifications capacitated me with both content and pedagogical knowledge of high school Mathematics. Yet, learners still did not flourish in my Mathematics classes. I became more and more interested to know the reasons for their poor performance.

I started my preliminary investigation by looking at emerging trends in Annual National Assessment (ANA) results and Grade 12 results at my school. From my analysis of the ANA mathematics results report, I examined the National Curriculum Statement (NCS) subject results for 2011. The results indicated a decline in performance in Mathematics.

The ANA and the NCS reports in Mathematics encouraged me to probe deeper into possible causes and solutions of the poor Mathematics performances in schools in my area. Whilst informally interacting with learners at my current school they told me that Mathematics did not make sense, they did not understand it. They were thus not motivated to continue with it. Many said that Mathematics was boring. This triggered my interest in researching boredom as a possible cause of learners' demotivation and under-performance in Mathematics. The concept of boredom originated from studies in the field of psychology, and has been variously defined as:

- an emotional feeling that emanates from unpleasant feelings that are associated with frustration and anger (Kanevsky and Keighley, 2003).
- a discomfort, chronic and persistent stressor that has psychological consequences (Eastwood et al., 2012 p. 482).
- an aversive state that occurs when one is not able to engage one's attention and participate satisfactorily in a given activity (Eastwood et al., 2012 p. 484).

From these three definitions it can be concluded that boredom leads to unpleasant and undesired emotion (Nett et al., 2011). In Chapter 2 I explore the concept of boredom in detail and relate it to poor mathematics performance.

When selecting their subjects at the end of Grade 9, South African learners have the choice of continuing with Mathematics or opting for Mathematical Literacy (Department of Education, 2003). For many learners this is not a straight forward decision as many have a negative attitude toward Mathematics.

According to Kanevsky and Keighley (2003), boredom has been identified as one of the causes of learners either skipping classes or pretending to be sick or leaving school permanently. This is confirmed by a report that was commissioned by Minister Naledi Pando, stating that there is indeed a sharp dropout rate, and a high rate of failure with subsequent repetition of classes, observed in Grades 10 - 12 learners in South Africa (Chuenyane, 2010). Boredom may well be a contributing factor to learners dropping out of school in South Africa. Wegner et al., (2008, p. 423) assert that there is indeed a high South African learner dropout rate as a result of high levels of "leisure boredom" that they experience at school.

From my own experience as a mathematics teacher, I concur with Brown's et al., (2008) argument that many learners decide not to continue with Mathematics as they perceive it to be a difficult and boring subject. I often encounter learners who are very demotivated and bored – this is often reinforced by their own teachers and families.

Furthermore, Larson and Richards (1991) recognise that boredom is frequently reported in senior secondary schools and suggest that boredom can lead to detrimental behavioural outcomes, such as skipping classes and pretending to be sick or leaving school permanently. They further argue that boredom manifests itself in learners' levels of motivation, the way they express themselves and even in their physiological conditions (ibid). Research done by The National Centre on Addiction and Substance Abuse in 2003 in North America, discovered that 91% of youth were experiencing boredom (Eastwood et al., 2012). These researchers concluded that "boredom is a common problem" (ibid). Boredom is however not a straightforward concept as some learners experience boredom whilst others do not get bored during the same mathematics lesson.

1.3 Research goal and questions

In light of the above context, this study aims to investigate the prevalence and nature of boredom in selected Grade 10 mathematics classes, by seeking answers to the following research sub-questions:

1. What is the prevalence of boredom in all Grade 10 mathematics classes in Grahamstown?
2. What is the nature of boredom in selected Grade 10 mathematics learners in Grahamstown?

1.4 Methodology

1.4.1 Orientation and design

This study is oriented in the interpretative paradigm and adopts a quantitative and qualitative approach. The interpretative paradigm “offers an opportunity to engage in in-depth description and understanding of action and events” (Babbie & Mouton, 2001) and phenomena. In my study the event can be described as the phenomenon of boredom that is overwhelmingly present in our classrooms. According to Bryman (1992 p. 59) qualitative research is associated with semi- and unstructured interviews and focus groups, whilst quantitative research is strongly associated with the survey techniques like structured interviewing and questionnaires.

1.4.2 Methods

This case study consists of two phases. In the first phase I focused on answering my first research question. This phase consisted of a survey of the prevalence of boredom in all Grade 10 classes in Grahamstown. There are 11 secondary schools in this region and I sent out questionnaires to be completed by all Grade 10 mathematics learners in these secondary schools. I worked closely with all the Grade 10 mathematics teachers in administering the questionnaire.

The focus in the second phase was to answer my second research question. In this phase of the study I selected 4 learners from a Grade 10 classroom to conduct in-depth interviews. Phase 2 of this study adopted a case study approach and investigated a “contemporary phenomenon within its real-life context” (Yin, 1984 p. 23). I engaged with four learners from my school in the Grahamstown region to explore their perceptions and views of the nature of boredom. The unit of analysis was thus their responses and perceptions about boredom.

1.5 Significance of the study

This study fills a gap in the literature and research on boredom in an educational context. A lot of work has been done in Psychology and other fields of study, and little in Education. In my reading of the literature and research on boredom, I observed that there is very little research that has been conducted about boredom in the mathematics classroom in South Africa in particular, and this study aims to fill that gap.

1.6 Overview of the study

Below is an overview of the five chapters of this thesis.

Chapter 1 provides an overview of the research context, and problematizes the prevalence of boredom in Grade 10 Mathematics as the trigger for this study. The chapter introduces the research goal and questions.

Chapter 2 reviews literature and research on the concept of boredom and relates it to the causes of poor performance or negative attitude towards Mathematics.

Chapter 3 describes and discusses the methodological foundations of this interpretive case study. The chapter presents the research design process which includes a mixed methods approach, sampling, data collection and analysis, validity and reliability, and ethical considerations.

Chapter 4 presents and discusses the findings of this study.

Chapter 5 concludes the thesis by providing a summary of theoretical, conceptual, analytical and methodological frameworks that hold this study together. It presents key findings, recommendations, limitations, future research and researcher's reflections.

1.7 Conclusion

This chapter introduced and discussed boredom as key concept which causes poor performance and/or negative attitudes towards schooling and learning. It further problematized boredom in mathematics teaching and learning, which is the trigger that sparked this study. The research goal and questions were presented. Finally, an overview of the five chapters of this research was presented.

Chapter 2

Literature Review

2.1 Introduction

In line with the main research goal of the study that investigates the prevalence and nature of boredom in Grade 10 Mathematics classes, this chapter reviews the literature and the research on boredom.

2.2 Conceptualisation of boredom in mathematics education

Boredom has been researched in numerous contexts and from different perspectives. Researchers have placed different emphases on boredom and have defined it in different ways for example, Pekrun et al. (2010) define boredom as an emotion that is caused by a lack of value in any given situation or activity. Kanevsky and Keighley (2003) characterize boredom as an emotional feeling that emanates from unpleasant sensations associated with frustration and anger. Farmer and Sundberg (1986) as quoted in Kanevsky & Keighley (2003) also define boredom as an emotion, suggesting that at various times everybody experiences it, but that some people get bored more frequently than others.

Kanevsky and Keighley (2003) agree with Nett, Goetz and Hall (2011) and Eastwood et al., (2012) when they describe boredom as an unpleasant and undesired emotion. Kanevsky and Keighley (2003) emphasise that boredom emanates from unpleasant feelings that are associated with frustration, anger, disengagement and many others. Nett et al., (2011) also identified boredom as an unpleasant, undesired and undesirable emotion. Eastwood, Frischen, Fenske and Smilek (2012 p. 482) perceive boredom as a discomforting, chronic and persistent stressor that has psychological consequences such as depression, stress and anxiety. These emotions are evident from the learners that I am working with; sometimes when learners do not understand a mathematics concept, they become frustrated, angry, stressed and uncomfortable, and decide to disengage during lessons.

Farmer and Sundberg (1986), (as quoted in Kanevsky & Keighley (2003)), assert that boredom is related to the nature of the individual and is also attributed to the nature of the environment.

Certain school or classroom settings may, for instance, induce boredom due to their uninteresting and uninspiring appearance. Similarly, some pupils may find a particular teaching context uninteresting, repetitive, or irrelevant. Eastwood et al., (2012) define boredom as an aversive state that occurs when one is unable to successfully engage with one's thoughts or feelings and environmental stimuli with the given activity in a satisfying manner. From my experience learners become more interested in a mathematics class when they are allowed to use their senses, for example touch, sight and hearing. So an environment that allows learners to especially see and touch the manipulative, limits the chances of being bored. For this reason Mathematics class environments should endeavour to be stimulating to learners.

Eastwood et al., (2012 p. 484) further define boredom as an aversive state that occurs when one is not able to engage one's attention and participate satisfactorily in a given activity. In the classroom context, Larson and Richards (1991) as quoted by Kanevsky & Keighley (2003), supports this and observed that when boredom is experienced in the classroom, it is associated with *diminished attention* and therefore can interfere with learner performance. This does not only demoralise learners, but also discourages teachers and parents.

Pekrun et al., (2010) argues that boredom is a severe problem for causing certain behaviour effects. Both Larson and Richards (1991) and (1986), (as quoted by Kanevsky & Keighley, 2003), interestingly suggest that boredom is one of the frequent causes of learners leaving school permanently or temporarily where they pretend to be sick and skip classes. Farmer and Sundberg (1986) agree with Larson and Richards (1991) that boredom has detrimental behavioural outcomes. From an educational perspective, boredom is sometimes defined as a resistance to interest as it also blocks motivation and reflective attention that is required by an individual to think effectively Gunn, (1988).

According to Pekrun et al., (2010), boredom is also viewed as an achievement-affecting emotion that might cause a lack of interest and affect the performance of learners. Rinzler (1988) believes that the feelings of boredom include a sense of dullness, emptiness and a feeling that nothing is happening or that nothing new is going to happen. Weir (2012) emphasises that bored people are likely to make performance errors. She observes that people who are highly prone to boredom tend to perform poorly.

Brown's et al., (2008) claim that learners perceive Mathematics as difficult, boring and useless resonates with my experience. It also corresponds with the issue of high numbers of learners who choose Mathematics Literacy over Mathematics because Mathematics is seen by them and some of their teachers as difficult and boring, as already highlighted in Chapter 1. In his report on the 2011 matric results in South Africa, Kenny (2012) said:

“Not only did fewer candidates write pure Mathematics, but only marginally more than 46% passed the Mathematics exam with a score of more than 30%. Of the 275 380 candidates who wrote Mathematical Literacy, 86% passed with more than 30%”.

This report confirms that many learners are actually opting for Mathematics Literacy instead of Mathematics and they seem to be doing better at it than those that are doing pure Mathematics.

2.3 Some research on boredom

In this sub-section, I explore some research on boredom by focusing on boredom and learning, boredom and motivation, boredom and confidence, and boredom and emotions.

2.3.1 Boredom and learning

Pekrun, Goetz, Daniels, Stupnisky, and Perry (2010) write about boredom in achievement settings. In their discussions, they look at the links that might exist between learners' boredom and their performance outcomes. They start off by defining boredom as an emotion caused by a lack of value in any given situation or activity. Thus they argue that why learners get bored during mathematics class is that they do not see the importance of learning Mathematics. According to Curriculum and Assessment Policy Statement, CAPS (2011) mathematics teaching and learning helps to develop mental processes that improve logical and critical thinking, accuracy and problem solving that will help in decision making. Learning Mathematics also helps in preparing learners for further learning and training and the world of work (CAPS, 2011 p. 8)

Pekrun et al., (2010) suggests that boredom is a severe problem for behaviour and performance in achievement settings. Some 16 years of my own teaching provides much anecdotal

experience of learners experiencing boredom often displaying behavioural problems when they do not understand the concept being taught, and expressing their boredom by performing destructive actions that disturb both the teacher and other learners.

Some consequences of boredom which directly affect learning have been identified by a number of researchers (Wasson, 1981; Sommer, 1985; Bearden, Spencer, & Moracco, 1989; Tidwell, 1988) as quoted by Pekrun et al., (2010). These are: irregular behaviour, absenteeism and a tendency to drop out. Presently in our schools we are faced with the challenge of learners misbehaving, missing or skipping classes or dropping out of school because learners do not understand or are extremely challenged by the mathematical concepts. All these boredom behavioural outcomes negatively affect learning.

In their research that was focused on achievement and performance outcomes, Pekrun et al., (2010) specifically looked at how boredom experienced by learners impacts on attention problems, motivation and perceived performance. Their findings indicated that:

- Learners' attention was reduced when they were bored. This manifested itself by a lack of concentration, distractibility and task-irrelevant thinking such as daydreaming and thoughts about going biking, meeting friends and having dinner.
- Boredom affects general motivation to learn. More than 40% of their respondents who experienced boredom associated it with lack of attention.
- Boredom reduces intrinsic motivation. Their respondents motivated to leave class and postpone or stop learning. More than 60% of them indicated that they were motivated to do something else instead of studying.

These researchers posit that boredom causes learners to cease learning and engage in task-irrelevant behaviour such as talking to classmates, drawing, or watching their classmates doing their work Pekrun et al., (2010). This results in reduced quality of performance and reduced concentration. Their findings confirm that boredom can cause attention problems and adversely affect motivational engagement and performance (ibid).

Kanevsky and Keighley (2003) made two important assertions based on their findings on boredom. They suggested that learning is the opposite of boredom and that learning

counteracts boredom. They agreed with Csikszentmihayi, Rathunde, and Whalen (1993) as quoted by Kanevsky and Keighley (2003) in their findings with regard to boredom in adolescents:

Adults, after all, commonly fault adolescents for what they perceive as laziness, lack of discipline and counterproductive defiance of authority. But what came through clearly in our study was an avid willingness to accept challenges and overcome obstacles when the problems were interesting and the necessary skills were within the individuals reach (p. 186).

Heinze, Reiss and Augsburg (2005) investigated achievement and interest in Mathematics from a differential perspective. In their study they used about 500 German Grade Seven and Eight learners. They focused on the relationship between learners' mathematics achievement and interest in Mathematics, as well as learner motivation in relation to Mathematics on an individual and classroom level. They found that:

- Low classroom level of achievement and inferior instruction had an influence on the development of reasoning and proof, which might be caused by teachers who teach without enthusiasm and in the process avoid arguing on a complex level. When this happens, learners are less active, become bored, and their achievement motivation during a mathematics class is reduced.
- Instruction by the teacher has an influence on the mathematical development and achievement. It is further suggested that learners need to have a sound knowledge base of solving mathematics based problems. They should also be able to generate strategies and follow them by using acceptable mathematical methods.

Heinze, Reiss and Augsburg (2005) used Helmke's model (2003) for teaching and learning which identified factors that play an important role in mathematics achievement and the related interest in Mathematics of a learner. Heinze et al., (2005) suggested the following facts that may help minimise boredom during a mathematics class:

- The **teacher personality** - A teacher should be an expert in his/her field of practice. For teachers to succeed in producing interest and reducing boredom during a

mathematics class, they need to be masters of the subject content. They also need to have good classroom management skills that create an inspiring environment for teaching and learning. At the same time, they foster appropriate values and objectives. In order to maintain a stimulating and inspiring classroom environment, teachers need to reflect on their lessons and their own self-efficacy in order to improve subsequent lessons.

- The quality of **instruction** - Although the learner is free to choose whether to participate in a lesson or not, the quality of the teaching should not be compromised. When the quality and nature of teaching is of a high standard and uses different teaching methods that enhance mathematics understanding, it encourages learners to participate. In order to minimise boredom in the mathematics classroom, teachers need to motivate learners, create learning opportunities and use materials that will continually challenge learners and keep them focused.
- Learners' **individual prerequisites** - This includes a teacher's sensitivity to the individual needs of the learners. Teachers need to ensure that their mediation process is appropriate and that learning activities are aligned to learner context. For learners to understand their mathematics lessons they need good interpretation skills, active involvement and the ability to relate what is done in class with the outside world.

Heinze et al., (2005) also suggest that there is a close relation between mathematics achievement and interest in Mathematics. According to Kanevsky and Keighley (2003) a true and meaningful learning situation is considered as one where the environment is stimulating and is not boredom inducing. These two authors recommend that teachers need to be aware of their learners' boredom. They need to ask learners about their boredom listen and probe until they clearly understand the reasons for it and then act accordingly.

In their study, Preckel et al., (2010) looked at the effects of ability grouping on learners' experiences of boredom. They focussed on gifted children and observed changes that occurred in their academic self-concept and boredom over a period of time. A sample of 186 Australian ninth-Grade learners were assessed over a period of time. These learners were from eight classes, four of which were comprised of gifted learners. The learners were evaluated three times after their respective transition from a regular mixed ability classroom to a more homogenous high-ability classroom. This was done in order to investigate the gifted students'

developmental trends of self-concept and boredom over time and compare it with those of students who remained in the regular classes. They also conducted self-report questionnaires and standardised IQ tests.

The Preckel et al., (2010) study expected that over time, gifted students would display a decrease in academic self-concept whilst attending the mixed ability classes. They also expected that as gifted students moved to high-ability classes, they would be more challenged and motivated than if they remained in the regular classes. Preckel et al., (2010) reported the following findings:

- Gifted students are often bored in the regular classes due to being under-challenged.
- In contrast, non-gifted students are bored from being over-challenged.
- Gifted students who moved to special gifted classes were more motivated and less bored. Conversely, remaining students experienced a decrease in their self-concept when the gifted students moved out of the classes.

2.3.2 Boredom and motivation

Heinze's et al., (2005) research showed that mathematics instruction does not only influence learners' individual achievement, but also individual subject-specific interest and motivation. These findings align with the notion that a learner's social environment influences the intrinsic individual's level of motivation. Hoffmann (1997) as quoted by Heinze et al., (2005) believes that intrinsic learning motivation causes a deeper elaboration of the learning content, whereas boredom and fear encourage superficial learning strategies. Their findings reflect that, at a classroom level, the nature of the instruction learners receive has an influence on the mathematical development of the learners in both mathematical reasoning and proof. For learners to achieve in Mathematics, they need not only to be taught sound mathematical knowledge, but they also need to be inspired and motivated. They need a favourable learning environment that motivates them to solve and verify mathematical tasks, formulate proving strategies and explore mathematical ideas.

2.3.3 Boredom and confidence

In their research in the United Kingdom on why students discontinue their studies in Mathematics and thus contribute to the serious shortage of people who are qualified in science, technology, engineering and Mathematics, Brown et al., (2008 p. 6) found that many learners discontinue Mathematics because they perceived Mathematics as “hard, boring and useless”. Their main findings were that most learners decided not to continue with Mathematics as they perceived it to be a difficult subject which their friends, family and teachers encouraged them to discontinue. As some people derive their identity partly from the messages that they receive about themselves from others, this finding has serious implications. Messages of low expectations often lead to low attainment and low confidence.

Interestingly, Brown et al., (2008) found that girls at all levels were reported to lack confidence in their own ability and were therefore less likely to select Mathematics as a specialist subject. Learners need to be assisted in dealing with their personal barriers to Mathematics to avoid being negatively influenced by teachers, friends and adults who base their advice on unfounded ideas. Learners also need to learn how to confront their inborn or natural boundaries hampering their progress. This can be done by increasing learner confidence and self-efficacy and by encouraging more positive pupil identities with respect to the subject. Positive pupil identities can be encouraged by exposing learners to, rather than protecting them from, the challenges that Mathematics poses. Brown et al., (2008) further suggests that schools should increase learner participation in Mathematics and create a critical mass that enjoys and is excited about the teaching and learning of Mathematics. This will reduce levels of boredom.

Gilderdale and Kiddle (2012 p. 1) suggest the following on developing learner confidence in Mathematics to minimise learner boredom:

- Use an extensive range of tasks and resources.
- Have teachers with a ‘can do’ attitude that will also encourage a positive attitude in learners.
- Create opportunities for learners to experience success and therefore become confident about their achievements.
- Develop hands-on approach to learning.
- Use real life examples and explore links with other subjects.

- Make Mathematics more enjoyable by introducing mathematics challenges, competitions and puzzles of the month. Celebrate learners' achievements.
- Share mathematics learning with parents. For example, organise Mathematics evenings that will encourage positive attitudes among parents and will have a positive effect on their children.
- During lessons, teachers should encourage learning from mistakes, as well as welcoming wrong answers as a springboard for new understanding.
- During the mathematics lessons, teachers are encouraged to use positive language to encourage learner abilities.
- Learner independence and small group research should be encouraged.
- Learners' varying approaches to problem solving should be valued.

If all of the above points are practiced during mathematics classes, teachers can boost learners' confidence and thus help minimise boredom.

2.3.4. Boredom and emotions

Nett et al., (2011) drawing from Larson and Richards (1991), identified boredom as an unpleasant and undesired emotion which is found to have detrimental behavioural outcomes. Pekrun et al., (2010) perceives boredom as a unique emotional experience that consists of multiple components. These include a **cognitive component**, which is a feeling that time is not moving, a **physiological component** which is manifested by low arousal and fatigue, a **motivational component** where learners feel like evading the boring conditions, and the **expressive component** which is validated by bodily and facial manifestation showing lack of willingness.

Harris (2000) and Mikulas and Vodanovich (1993) define boredom as an emotional state composed of unpleasant feelings, lack of stimulation and low physical arousal. This emotional state is manifested by aversive feelings, reduced arousal, and facial, vocal and postural expressions. All these symptoms are experienced by learners during and affect the teaching and learning of Mathematics. Pekrun et al., (2010) associated boredom with achievement emotion, where achievement emotion is defined as emotions that are tangled with the

achievement of activities. When learners do not achieve, fail or feel ashamed of their performance, they become bored and demotivated.

Nett et al., (2011) researched boredom because there was at the time a lack of research on boredom that is related to achievement-related activities. Pekrun et al., (2010) argues that one reason why the research on this topic has been neglected is that boredom is perceived as a silent feeling when linked to anger and anxiety. But it is nonetheless acknowledged by teachers as an influence in classrooms, thus Pekrun et al., (2010) found that some teachers regard boredom as an emotion that can lead to disruptive behaviour such as anger and anxiety.

2.4 Summary of the effects and consequences of boredom

The following is a summary of some of the effects and consequences of boredom as found by different researchers as discussed above. According to Pekrun et al., (2010):

- Boredom reduces intellectual resources by causing attention problems, and as such, learners tend to think about and do things that are not related to the lesson.
- Boredom also produces a negative effect that weakens a learner's intrinsic motivation, enjoyment and loss of interest in engaging in the given activity. This therefore affects the learner's academic achievement.
- Boredom can be associated with an achievement emotion and lack of interest, and can therefore be linked to poor performance.

According to Kanevsky and Keighley (2003):

- Learners gradually disengage from classroom learning, are disinterested in classwork and choose not to participate. This is particularly the case when the schoolwork is not sufficiently challenging or interesting. They also found the converse to be true, supported by my own experience, that 'ordinary' children can become bored when the classwork is too challenging and difficult. They also become disengaged and non-participative.
- Boredom in the classroom is associated with diminished attention and passiveness which can interfere with learner performance.

- School is boring when lessons are teacher-directed and textbook-based, and when the content is about things that learners already know.
- Meaningful learning should be the opposite of boredom, and should counteract boredom.
- Boredom is one of the frequent causes of learners leaving school either temporarily, skipping classes, pretending to be sick or leaving school permanently.

Preckel, Gotz and Frenzel (2010) report that gifted learners get bored because they may be under-challenged, whereas non-gifted students are bored because they are over-challenged.

Heinze et al., (2005) further highlights that motivation, interest and achievement in Mathematics can help reduce levels of boredom experienced by learners. Wegner, Flisher, Chikobvu, Lombard and King (2008 p. 423) report an important fact that there is indeed a high South African learner dropout rate which is as a result of high levels of “leisure boredom” that is experienced at school.

According to Nett et al., (2011):

- Boredom is frequently experienced by learners especially during mathematics classes where more than 50% are reported to be bored.
- Finally, manifestations that learners are bored during mathematics classes include a high dropout rate, absenteeism, unexpected behaviour, alcohol consumption and substance abuse.

2.5 How boredom can be overcome

Addressing issues of boredom, Kanevsky and Keighley (2003), who did their research in a suburban Canadian school district, worked with 15-18 year old students, who had been identified as gifted in elementary school, but had underachieved in high school. In some cases they were even suspended from school or dropped out of school. In their findings Kanevsky and Keighley (2003) recommend that teachers firstly need to ask learners about their boredom, to listen and probe until they know exactly what the major cause of boredom might be and what could be done about it. They suggest that teachers should make sure that they create

opportunities for personal **control**, **choice**, **challenge**, **complexity** and **caring** in classroom activities.

To start with, learners need **control** or self-determination in their learning experiences. Learners do not want the teachers to always tell them what to do, instead they must be given a chance to work as a team and also discover things on their own. Sometimes they make new discoveries that are also interesting to the teacher, so that experience makes the learners feel in **control** of their learning and reduces boredom. Kanevsky and Keighley (2003) further suggests that learners want their opinions to be listened to as they are seeking a sense of self-determination, the power to change the present situation and the authority to implement their choices. This resonates strongly with my own practice where I discourage learners from simply copying on the chalkboard and repeating or listening passively to my lessons.

Kanevsky and Keighley's (2003) work emphasises that learners need to be given a chance to make **choices** at school. In their research there are three important areas where the learners felt that their interests and opinions should be reflected in their education. Firstly, learners should be involved in **choosing the content** taught and the materials used must be relevant to their everyday life and make connections within the rest of the curriculum. Content that provokes their interest and relates to the real world reduces the chances of boredom in the mathematics class.

Secondly, teachers need to be sensitive as to how learners respond to their **teaching**. Teachers are encouraged to use methods that require high levels of thinking, a hands-on approach and the use of realistic materials. Learners should also be allowed to progress at their own pace but with minimal repetitions which additionally encourage boredom. Lastly, the environment that the learners are exposed to needs to be carefully considered to minimise levels of boredom in our mathematics classes. The environment involves teachers listening to the learners making choices about when to learn Mathematics, **with whom** they study and **how often** they attend classes. According to Kanevsky and Keighley (2003) flexible timetabling that will allow learners to have a say about what time of the day they want to engage with Mathematics should be considered. In my experience, learners enjoy Mathematics in the morning, as they are usually tired by the afternoon. I therefore think that morning mathematics classes in schools will minimise chances of boredom.

According to Kanevsky and Keighley (2003), learners highlighted that they should be allowed to work individually or in small groups or with peers of their **choice** who share the same interests. When it comes to attendance, learners suggested that their lesson attendance be made flexible in that they should attend classes when unfamiliar knowledge and new skills are introduced. I agree with this concept to a certain degree. The difficulty, of course, is balancing the school as an institution with necessary and appropriate rules and regulations which satisfy individual learner needs and school expectations.

Delisle (1992), Gallagher, Harradine, & Coleman (1997), Plucker & McIntire (1996), and Whitmore (1990), as cited by Kanevsky & Keighley (2003), highlighted the lack of **challenge** in mathematics classes as another factor that promotes boredom. This applies particularly to gifted learners. In the work of Kanevsky and Keighley, learners feel that they should be exposed to intellectually challenging mathematics problems at a fast pace and of greater complexity. These learners also suggested that differentiated curricula would allow gifted learners to do more complex content, move at a faster pace and reduce repetition of tasks. They should be allowed to move on without waiting for the rest of the class and enjoy a curriculum that is free from rote memorisation tasks, textbook-bound questions and answered assignments. These learners embrace struggles with new material, and supportive teachers.

According to Mikulas and Vodanovich (1993), as cited by Kanevsky and Keighley (2003), the **complexity** that these learners are looking for in mathematics class is a sense of unfamiliarity and challenge in the tasks set by the teacher. It is those tasks that are familiar, repetitive, concrete, decontextualized and simplistic that contribute to boredom in learners. To encourage complex learning and minimise boredom in mathematics classes, Kanevsky and Keighley (2003) emphasise that learners should be exposed to tasks requiring linking different topics with processes that involve a high level of thinking, and involving learners directly. This content should also stimulate the learners' emotions and interests and generate opportunities for them to work on their own and in a professional context. Kanevsky and Keighley (2003) suggests that complexity arises when learners are allowed to stick to a problem for longer than their classmates and slow down to engage with the topic. This motivates learners and reduces boredom. But these complex learning activities require time and flexibility that the timetable does not always allow for (Kanevsky and Keighley, 2003 p. 25).

The last important factor that Kanevsky and Keighley's (2003) suggested was "**caring**". This refers to teachers care for their teaching and their learners. They have found that teachers who

care for their students and put care into their teaching are the ones that are admired and valued for their professional integrity and commitment. Their classes are inevitably less boring. Kanevsky and Keighley (2003) describe these teachers as open-minded, fair, flexible and humorous. They are well-respected and welcome learners to contribute in a lesson and ask questions. They encourage learners to challenge and be challenged, and motivate other learners to want to know more of whatever that is placed before them. Caring teachers are well prepared and have a discovery orientated, inquiry based, hands-on approach to teaching. These teachers give their students control over some aspects of their learning while taking into consideration the students' skills, abilities and interests. **Caring** teachers are generally those who show concern for the well-being of individuals. They are enthusiastic about the content and prompt in returning assignments. These kinds of teachers in mathematics classes will ensure that boredom is minimised.

From a personal perspective, the five c's above align well theoretically with the core intentions of the classroom-culture intended by South Africa's Outcomes-based Education (OBE) system. According to Maree and Fraser (2004), OBE sought to redesign and transform the classroom to create a new climate and culture along similar lines to the five c's. The Revised National Curriculum Statement (2002) concurs with some of the five c's as it states that teachers are the key contributors to the transformation of education in South Africa. It further states that the envisaged teachers are qualified, competent, dedicated and caring.

But OBE itself, as we well know, has faced huge obstacles to achieve this intended transformation of classrooms. Jansen (1998) mentioned with reasons that OBE was going to fail. OBE requires trained and retrained teachers in terms of implementing new forms of assessment, new ways of teaching and learning, and classroom organisation and management. Drawing from my own experience and observations, the goals of creating "independent learners" were difficult to achieve as many SA teachers were not adequately and appropriately trained. This is corroborated by Jansen (1998) who emphasised the importance of teaching and supporting independent learning and being able to deal with what that means in classrooms. The goal of presenting students with 'challenging problems' requires the confidence and abilities of teachers who are really on top of their subject knowledge. We know however that many are not Jansen (1998). With regard to the goal of "choice", this is difficult to achieve in a South African education system that, in my view, is a highly controlled system, particularly in government schools. In my experience governmental control is, for example, exercised in

prescribing the smallest detail of lesson plan design and curriculum coverage. This coupled with a deep-seated South African tradition of little agency granted to teachers and students, makes it difficult to expect teachers to take control and exercise more autonomy.

It is thus important to recognise that the implementation of the recommendations made in this literature review are seen against a backdrop of a school culture that is still dominated by a very traditional and largely old-style authoritarian world view of teaching and learning. The challenge for me is to straddle this gap and gradually implement a sense of agency in my own school environment in order to create a space that fosters motivation and inspiration, as opposed to boredom and idleness.

Valerio (2012) further suggests that intrinsic motivation plays a vital role in a teacher's pedagogy. Teachers are expected to empower and assist learners by providing a supportive, quality learning environment where learning is achievable by both teachers and learners and boredom consequently limited. Intrinsic motivation can be achieved by providing choice and control, where learners are encouraged to choose themes or topics that will permit new knowledge, observable skills and understandings. When teachers allow learners to choose themes and topics, learners are encouraged to set goals that will help them investigate their interests and satisfy their curiosities. In that process, they are taking control of their learning and can therefore never experience boredom in a mathematics class.

Valerio (2012 p. 34) suggest that intrinsic motivation is a fundamental element in learners learning, with teachers having an influence to implement learning experiences that allow learners to see knowledge as worthwhile and take ownership over their learning. Valerio further suggests that teachers should implement rich tasks that will help learners to connect to the content and engage with the learning. The learning will then make sense to learners and chances of being bored are eradicated. Teachers are also encouraged to be role models for learners in terms of demonstrating their own passion and enthusiasm for learning. If they can transfer these qualities to the classroom, they are indirectly developing intrinsic motivation in their learners. When teachers motivate learners to learn for its own sake, a world of possibilities is opened and boredom in a mathematics class reduced (ibid).

Nett et al., (2011) suggest that teachers must develop engaging lessons that create a stimulating classroom environment which significantly lessens chances of boredom. Teachers should also

be aware of the influential nature of academic boredom despite the classroom context, teaching practices, and the effect of the learner's observations of classroom activities. Nett et al., (2011) further suggests that teachers and learners need to work together in reducing boredom and work towards facilitating academic motivation and achievement.

From my experience I feel that mathematics teachers should also discourage learners to simply memorise concepts or formulas that they do not understand. Instead, learners should be actively encouraged to ask questions about how for example formulas work. This will help them to develop an interest in the subject, and limit the chances of being bored. Teacher talking time and teacher-initiated writing which is not interesting to learners should also be avoided by mathematics teachers.

Nett et al., (2011) finally suggest intervention programs that will encourage learners to take full responsibility for their feelings of boredom by focusing on the usefulness of what they are learning. If they use cognitive-approach strategies for example, boredom will be minimised and learner motivation and achievement enhanced, leading to a more enjoyable classroom experiences for both learners and teachers.

Kilpatrick et al., (2001), in introducing his holistic model of teaching and learning of Mathematics, presents five intertwined strands that could help improve mathematical proficiency. These are conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. Productive disposition includes elements related to enthusiasm for Mathematics, and a belief in being able to do maths. These are seen as necessary motivational elements that can be developed given the right conditions, to avoid boredom.

2.6 Conclusion

According to research, boredom in our schools and specifically in our mathematics classes is severely affecting the teaching and learning of Mathematics. Teachers and learners need to be aware of this so as to help each other in its minimisation. Teachers need to take control of their mathematics content knowledge and use various teaching methods to create stimulating learning environments that enhance and maintain learner participation. In this teachers

themselves need to reflect whether they are bored or disinterested in mathematics, because this can so easily be reflected in their lessons. Teachers should also try to motivate learners and remind them of their own potential and responsibility to minimise their own boredom. On the other hand, learners need to be continuously reminded why they need education. They need to be encouraged to take personal responsibility for their learning and of their feelings of boredom. If they are earnestly inspired to enhance their own motivation and achievement and to enjoy their classroom experiences, boredom will be severely reduced.

Chapter 3

Research methodology

3.1 Introduction

Chapter 2 reviewed the literature and explored research on boredom generally and in Mathematics in particular. This chapter describes and discusses the research orientation, the research design, and the research process of the research project. It also discusses issues of reliability, validity and the ethical considerations that were pertinent to the project.

3.2 Research goal

As a reminder to the reader, the study aimed to investigate the prevalence and nature of boredom in selected Grade 10 mathematics learners as discussed in Chapter 1. This was done by answering the following research questions:

1. What is the prevalence of boredom in all Grade 10 mathematics classes in Grahamstown?
2. What is the nature of boredom in selected Grade 10 mathematics learners in Grahamstown?

3.3 Research Orientation

This study is oriented in the interpretative paradigm which offers the chance to participate in in-depth description and understanding of action and events Babbie and Mouton, (2001). In my study the event can be described as the phenomenon of boredom that is present in our classrooms. Parallel to the interpretive orientation, the overall study is framed by a social constructivist paradigm and Kilpatrick's et al., (2001) fifth strand of mathematical proficiency, which is productive disposition.

According to Carpenter (2003) a social constructivist paradigm expects learners to construct their own mathematical knowledge rather than receiving it in its finished form from either the teacher or the textbook. In a constructivist classroom, learners are actively involved in their

learning as they interact with teachers and peers alike. There is thus little room for boredom and idleness in an effective constructivist classroom. As argued in the literature review in Chapter 2, boredom undermines effective learning, particularly learning that is based on constructivist principles and processes. Learners in a constructivist classroom are expected to discuss ideas with other learners and work with these ideas in multiple ways. Learners should be involved in assessing their own work and reflecting on their learning. If the learners are bored, the above is not possible and the learning process is compromised. In constructivist classrooms teachers create opportunities for learners to explore ideas for themselves by assisting and encouraging rather than telling the learners what to do. Terwel (1999) also emphasises that learners become interdependent within this class of community of inquiry, and the feeling of boredom is minimised. Alesandrini and Larson (2002) advise that teachers should practice a constructivist approach in their classes to minimise boredom.

Wheatley (1992) emphasises that reflective practice is fundamental to the theory of constructivism. He says that people who reflect on their practises have greater control over their thinking and that this helps them to decide which path to take. Wheatley (1992) further suggests that we let learners reflect on their choice of methods in solving mathematics problems in their small groups or as a whole class. Encouraging learners to take responsibility for their own learning cannot but minimise boredom.

For my theoretical orientation I will also draw on Kilpatrick's et al., (2001) holistic model of teaching and learning proficiency, particularly on the fifth strand. Kilpatrick et al., (2001) identified productive disposition as an important fifth strand for mathematical proficiency. This refers to a tendency to see sense in Mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning Mathematics pays off and to see oneself as an effective learner and doer of Mathematics. Clearly, a bored disposition is not compatible with a developed productive disposition. Larson and Richards (1991) characterises boredom as a negative and destructive disposition that isolates learners and promotes low academic motivation. Kilpatrick et al., (2001) suggests that learner disposition towards Mathematics is a major factor in determining educational success. Boredom should thus be minimised as it does not encourage a productive disposition towards Mathematics. They also posit out that a productive disposition amongst teachers is crucial in teaching proficiency. A productive disposition in teaching implies a commitment to inspiring teaching and a dynamic attitude

towards Mathematics. This attitude in teaching will go a long way to ensuring that mathematics lessons do not foster boredom.

According to Kilpatrick et al., (2001), some learners fail to develop a productive disposition towards Mathematics during their time in high school because they avoid challenging mathematics courses and activities. This unwillingness to persist in the face of a challenge is the other side of the coin of what Kilpatrick calls ‘steady effort’. This, in my view, also in part links to boredom. The great shame in this unwillingness is that learners are disqualifying themselves from careers in science, technology, medicine and other fields that require a solid level of mathematical proficiency.

3.4 The research design

This sub-section explores the research design of this study by describing its case study nature.

3.4.1 Case study

This research project was conducted as a case study. A case study approach is suitable to investigate a “contemporary phenomenon within its real-life context” (Yin, 1984 p. 23). My overall case in this study is the current cohort of selected Grade 10s in the Grahamstown district. The unit of analysis in Phase 1 of the study is the prevalence of boredom. In the interviews in Phase 2 I explored the nature of the boredom that the learners reported on in the questionnaire in Phase 1. The unit of analysis is thus their responses and perceptions about the nature of boredom. Phase 1 enabled me to answer the first research question, and Phase 2 the second research question.

3.4.2 Mixed methods approach

A mixed method approach, which is a method that relies on collecting, analysing, and mixing both quantitative and qualitative data (Creswell & Plano Clark, 2007 p. 5) was adopted in this study. A quantitative approach was used to analyse data that was collected through a survey. The survey collected the data on the prevalence of boredom in selected Grade 10 learners in the Grahamstown region. The survey questionnaire thus mainly collected data to answer the

first research question. That data is analysed, discussed and represented graphically in Chapter 4.

A qualitative approach was used to analyse the interviews that I conducted with the four selected learners. The transcriptions of the interviews and analysis of the open-ended questions from the questionnaire were characterised according to the themes on the nature of boredom that emerged from the literature. Learners were interviewed to gain insight into how they experienced boredom, what might be the causes of their boredom and the extent to which they experienced it. I was also interested in their suggestions about how boredom might be minimised during mathematics classes. The advantages of using mixed methods according to Creswell and Plano Clark, (2007, p. 9) are that they provide strengths that balance the weaknesses of both quantitative and qualitative research. Mixed methods further help to answer questions that cannot be answered by qualitative and quantitative approaches alone.

3.5 Research process

There are two phases in study. In the first phase I focused on answering my first research question. This phase consisted of a survey as mentioned above. There are 11 secondary schools in the Grahamstown region but only 8 schools allowed me to work with them. I sent out questionnaires to be completed by all Grade 10 mathematics learners in these 8 secondary schools. I worked closely with all the Grade 10 mathematics teachers in administering the questionnaire.

The focus in the second phase was to answer my second research question. In this phase of the study I selected two Grade 10 classes to conduct in-depth interviews with 3 learners from each class.

3.5.1 Sampling

Initially I intended to work with all the 11 Senior Secondary Schools in the Grahamstown region. This would help generate rich data as Grahamstown has a wide range of different schools such as the privately run schools, ex-model C schools and township schools. After sending out detailed information about the project, eight schools accepted the invitation to

participate. Five of these were township schools (S4, S5, S6, S7 and S8), two were ex-model C schools (S2 and S3), and one was a private school (S1). Respondents were of mixed gender and between 14- 20 years as shown in Table 3.1 below.

Schools	Gender		Range ages per school							Number of respondents
	Females	Males	14	15	16	17	18	19	20	
S1	31	43	2	28	41	3				74
S2	10	5		9	4	2				15
S3		37		17	17	3				37
S4	22	16		12	21	4	1			38
S5	18	21	1	10	10	14	2	1	1	39
S6	26	11	1	8	19	8	1			37
S7	15	10	1	6	8	7	2	1		25
S8	5	5			5	2	2	1		10
Totals	127	148	5	90	125	43	8	3	1	275

For the second phase of my study I used convenience sampling (Cohen, Manion & Morrison, 2010) to select the interview participants. The criterion of selection was that I did not have to travel far to do the interviews. I thus wanted to use my own and a neighbouring school to seek four learners to engage in a semi-structured interview. Another criterion that I used to select the school was that the school needed to be a participating school of the FirstRand Foundation (FRF) Mathematics Education Chair project of which I myself am a participant. The FRF Mathematics Education Project is funding this study and my research forms part of its broader research agenda that seeks to find solutions to the mathematics education crisis in South Africa. Initially I wanted to interview 2 participants from my school and 2 learners from a nearby school. I however experienced time constraints and I thus had to work with participants from my own school only. Initially I selected the 4 participants on a voluntary basis. Ideally I wanted to choose my participants from my school on a performance basis, but that did not work as some were not willing to participate. I then asked any 4 participants to volunteer. The Grade 10 participants that I interviewed were not from my own classes. They were thus comfortable to participate in my study. Although the medium of instruction is English at my school, I communicated with learners in their mother tongue (IsiXhosa) when necessary. The respondents were free to express themselves in their mother tongue as I wanted to get their

honest views on the topic. When transcribing their scripts I translated what they were saying into English.

3.5.2 Data collection

In order to respond to the two research questions mentioned above, I used a survey questionnaire and interviews. According to Bryman (1992, p. 59) qualitative research is associated with semi-structured and unstructured interviews and focus groups, whilst quantitative research is strongly associated with the survey techniques like structured interviewing and questionnaires. In this sub-section I describe each of the two data collection methods that were used in this study.

3.5.2.1 Survey questionnaire

According to O’Leary (2010, p. 181) a survey questionnaire is a “process of collecting data by asking a range of individuals the same questions related to their characteristics, attributes, how they live and their opinions”. I used a survey questionnaire because I wanted to determine the attitudes, feelings and beliefs of the respondents towards boredom (Hardman, 2008, p. 138). I also wished to obtain a sense of the prevalence of boredom. The other reason for using a survey questionnaire is that it involves a form of self-report on the part of the participants, and when these two are used together they generate rich data (ibid). The use of a survey questionnaire was suitable for my study as I could target many respondents that were not going to be in contact with me as a researcher. I formulated 30 survey questions (see Appendix 1) that requested different responses from learners. Questions 1-3 were closed questions that requested learners to provide their biographical information such as age, gender and location. I used insights from theory and research on boredom that was discussed in Chapter 2 to formulate the remaining 27 survey questions. Questions 4, 5, 7-15(b) were open-ended questions that requested learners to provide a word to a paragraph response on what they understand by boredom and what, in their experience, causes boredom in general.

In addition to these, Questions 6 and 16-27 were designed as four to five point Likert scale questions to probe learners’ experiences of boredom in the mathematics classroom in particular. In these questions, learners marked an option that was closest to their responses.

For Question 4 I preferred to use the four point Likert scale and selected never, sometimes, often and always as I wanted to know the regularity of boredom of the respondents during mathematics classes. For questions 16-27 I preferred to use five point Likert scale questions where the respondents were expected to SD=strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree. I chose this terminology as the questions resembled statements. After I finished the first draft of the questionnaire, I piloted the questionnaire with my Grade 11 mathematics learners. O’Leary (2010, p. 185) suggests that the only way to know if something is going to work is to give it a try. From the pilot group I noticed that some questions were repeated or required the same response. As a result I improved the questionnaire. The respondents thus did not need any scaffolding in responding to the questionnaire.

The advantages of using a survey questionnaire is that I was able to ask what I wanted and how I wanted (O’Leary 2010, p. 180). The other advantage is that I was able to reach a large number of respondents. It also allowed for comparisons. The questionnaire also probed how boredom, in the eyes of the learners, could be minimised or prevented. I asked these questions because I wanted views from ones who are actually affected by boredom to suggest ways to improve the situation during their mathematics classes. The questions allowed respondents to articulate in depth what they thought about boredom Foddy (1993). The participants expressed what was on their minds without being influenced by the researcher (ibid).

I worked with the mathematics teachers of the participating schools to administer the questionnaire. My supervisor also assisted in distributing and administering these questionnaires. Participants were expected to write their responses on the questionnaire. A maximum of 30 minutes was provided to complete the questionnaire.

Working with closed questions is advantageous because they “allow respondents to answer the same question so that the answers can be meaningfully compared” (Foddy 1993, p. 128). Closed questions are easier to answer and analyse. The disadvantages of working with closed questions however is that respondents do not get the chance to clarify their responses.

I thus used the questionnaires to prepare for my interviews in order to get the respondents to clarify or give deeper reasons for their responses, especially in the closed questions of the questionnaire. The challenges that I encountered when I was analysing the closed questions were that some respondents ticked two responses or did not tick at all. In dealing with that

challenge I would look at the responses the respondent gave in the open-ended questions and try to compare and tick something similar as the questions were mostly related. It was because of these disadvantages of the questionnaire that I used interviews as a second data collection strategy to ensure research validity and reliability (see Section 3.8 below). In the next subsection I discuss how I used semi-structured interviews to collect further data for this study.

3.5.2.2 Semi-structured interviews

I used semi-structured interviews (Thomas 2011, p. 163) with four selected participants to probe more deeply the nature of the boredom they experienced in the mathematics classroom that they reported on in the questionnaire. As the survey was answered anonymously, I asked these four participants to re-write the questionnaire in order to ensure that their responses to the interview questions aligned to their questionnaire responses. The interview was one-on-one and it took about 20 minutes per interview. The interviews were conducted in my classroom. It was a quiet and convenient venue for me and the interviewees. The reason why I used the interview is because interviews, according to O'Leary (2010), provide ample opportunity for the interviewer to ask for explanations of vague answers or to provide clarification if a question is not clear. In the interviews I also explored more deeply the participants' views on possible solutions to overcome and minimise boredom in the mathematics classroom. This helped me to get more clarity than the questionnaires alone could provide. The interviews were recorded and transcribed. Transcriptions were done word for word. I translated those responses that were given in their mother tongue.

3.5.3 Data analysis

The data from Phase 1 was analysed quantitatively using descriptive statistics. The quantitative data was categorised according to the structure of the survey. The data was represented in bar graphs and then discussed accordingly. In the final narrative I infused extracts from the interviews with my qualitative analysis.

The qualitative data was analysed and coded according to different categories and themes that emerged through repeated engagement with the interview transcripts.

3.6 Validity and reliability

According to Muhammad, Muhammad and Muhammad (2008), with all qualitative research, validity and reliability ensures consistency, quality and trustworthiness of the results. Validity refers to credibility of the research deductions whilst reliability refers to the extent to which the selected procedures can produce similar results when applied at a different time (Bell 2010, p. 119). In this sub-section I discuss how I strengthened validity and reliability through triangulation.

According to Teddlie and Tashakkori, (2009, p. 203), a pilot study is a stage in a project where one collects a small amount of data to ‘test drive’ the procedures, identify possible problems in the data collection procedures, and then set the stage for the actual study.

The reason why I conducted a pilot study was that I wanted to assess if the research procedure is feasible, realistic and workable. The survey questionnaire was piloted with my Grade 11 mathematics learners. The ambiguities and unclear questions that were experienced and identified by them were modified when I finalised the survey questionnaire. The questionnaire was also used for the design of the interviews where I had a chance of doing follow-up questions for clarification.

The use of a triangulation design enabled me to compare and contrast quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data (Creswell & Plano 2007, p. 62). Creswell (1994, p. 175) states that triangulation in a classic sense seeks to converge results. Thus, the data from the questionnaire complemented the results from the interviews.

3.7 Ethical considerations

In this study I considered the following research ethics: informed consent had to be addressed and ensured, as well as confidentiality and anonymity (Cohen et al., 2005). I wrote letters to the headmasters/principals of the different schools to seek permission to research in their schools. I ensured the confidentiality and anonymity (O’Leary 2010, p. 41) of all the participants, i.e. those who answered the survey and those who I interviewed. Responses to the questionnaires and recordings of the interviews are in possession of the researcher and the

supervisor only. I undertook to share my findings with the individual schools as they may find the data interesting for their own purposes. Although I asked the four case study participants to redo the questionnaire so that I could identify their responses for purposes of the interview, they nevertheless remained anonymous for the research report. The interviews were conducted on the school premises and the learners that I interviewed participated at their own free will. Learners knew that they had a right to withdraw if they felt uncomfortable with the research process.

3.8 Challenges and limitations of this study

Administering of questionnaires to some schools was a challenge. Some teachers suggested that I administer the questionnaire myself after school but many respondents were not available at that time. Some suggested that due to the time constraints, they could give the questionnaires as homework. In this case I had to convince and beg the teacher as I was concerned that I might not receive them back. This would also have compromised the validity of the data.

The return of some questionnaires was also a challenge. I collected all the questionnaires myself. This became expensive as I had to organise transport to collect the questionnaires. Unfortunately I often had to do this during school hours.

The interview sample was very small. If the scope of this project were bigger, I would have liked to interview many more learners. Interviewing participants from my school only was also a limitation as I feel I did not get the variety and comprehensive responses that I wished for. Another challenge that I had to deal with was to assure the participants of the confidentiality of their responses as they were to reflect about my own colleague who was teaching them Mathematics in Grade 10. As I analysed the survey I would have loved to interview participants from other schools. This was however beyond the scope of this project and not possible as the questionnaire was anonymous.

3.9 Summary of design and tools

Below is the summary of the design and tools that I used in this project.

Phase	Tools	Purpose	Data
1	Survey questionnaire	To investigate the prevalence of boredom in Grade 10 Mathematics classes in Grahamstown.	Quantitative data from Likert scale questions. Qualitative data from open-ended questions.
2	Interview and transcription	To obtain a more nuanced understanding of learners' experiences of boredom	Qualitative data in the form of interview transcripts.

3.10 Conclusion

In this chapter I described the methodology and design of my research project. The research paradigm underpinning my study was also outlined. The qualitative and quantitative approaches that framed my study were also discussed. I also described the research tools that I used. The selection of my sample and participants was then outlined. I also gave an overview of how the data was analysed. Finally, I explored validity, reliability and ethical considerations and ended the chapter with a brief discussion of the limitations and challenges that I encountered.

Chapter 4

Research Findings and Discussion

4.1 Introduction

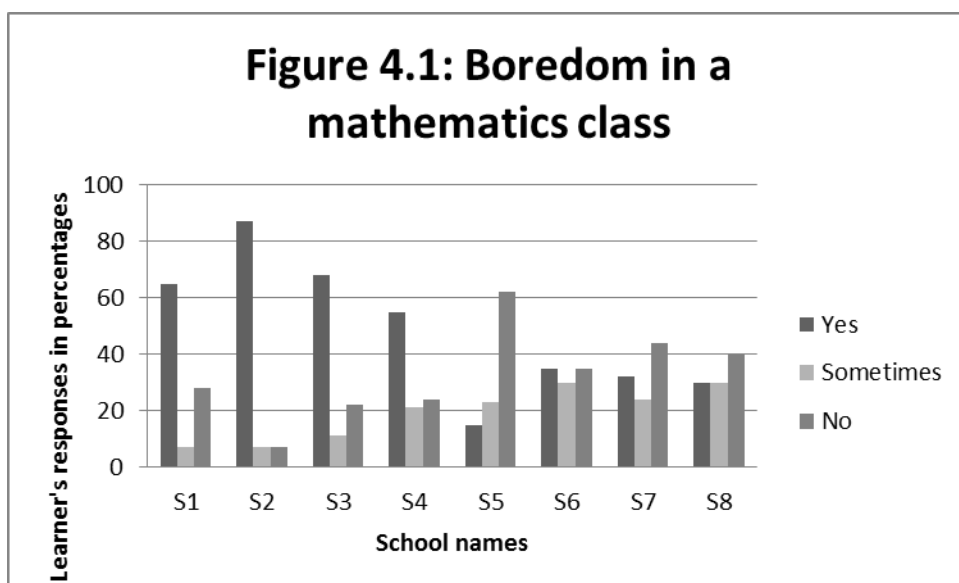
In this chapter I analyse and discuss my research findings. All the findings are consolidated at the end of the chapter.

4.2 Part A: Survey - Questionnaire

In this sub-section I present and discuss my findings of the open-ended questions and closed questions that I administered to 273 Grade 10 mathematics learners.

4.2.1 Prevalence of boredom

Respondents were asked if they experience boredom during their mathematics classes.

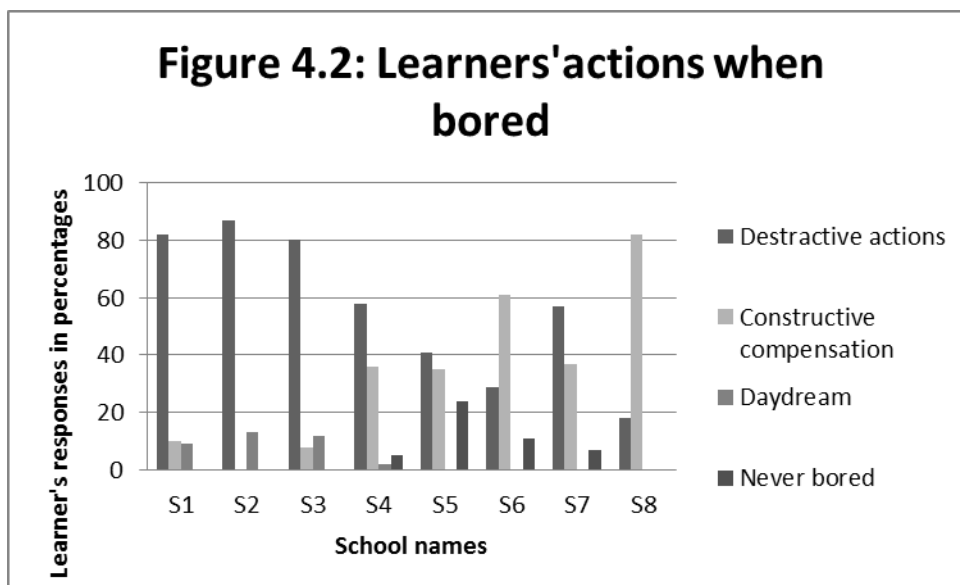


It was interesting to observe that most Grade 10 pupils in this study have experienced boredom during their mathematics classes. An average of 69% of pupils from S1, S2, S3 & S4 reported

that they are sometimes bored in their mathematics lessons. Interestingly, most of the respondents are from the participating private school and the ex-model C school. Ironically these are the schools with adequate teachers, ample school resources and having a middle class support group. They are also the ones that are producing generally good results. Only 35% of participants in S5, S6, S7 & S8 reported boredom during their mathematics classes. These are all from the township schools that are not producing good results. The above findings may be surprising as one would expect pupils from well-resourced schools to be more motivated and therefore less bored than pupils from less advantaged schools. The reasons for this apparent contradiction could be manifold. It could be that for the well performing schools, perhaps, there is too much repetition of the material that they already know, or the lessons are not interesting, or the teachers do not involve the learners in the development of the lesson. I would argue that the township school learners do not have the required pre-knowledge and as such tend to lack understanding of mathematical concepts. The material is thus not familiar to them and they thus do not experience boredom as a result. From my experience learners from the township schools are often scared to ask for clarification from the teacher and pretend to understand. It could be that learners in the township schools are reluctant to comment critically on their classroom experience and thus did not express their true feelings in the questionnaire. Overall, learners report a relatively high rate of experiencing boredom. Across the 8 schools an average of 48% of the Grade 10 learners indicated a yes to having experienced boredom in their mathematics class, and another 19% indicating sometimes.

4.2.2 Actions when bored

In response to the question of what one does when one is bored in a mathematics class, learners came up with five groups of responses. These are: destructive actions, constructive compensation, pretend to listen, daydream and never bored during mathematics class as shown in Figure 4.2 below.



An average of 57% of learners engages in what I call **destructive actions** during mathematics classes when they are bored. 82%, 87% and 80% of learners from S1, S2 and S3 respectively reported a high rate of feeling negative when they are bored. In all the 8 schools, learners perform these destructive actions when they are bored.

When learners are bored during their mathematics lesson they report that they deliberately do destructive things that are not in line with what the teacher is doing or expecting them to do. They reported that they talk and laugh with friends or group mates and do not listen to the teacher. Some learners reported that when they are bored during mathematics lessons they would irritate the teacher by rocking the chairs, cut papers, doodle and play lap drums and stab themselves. There are those learners who reported that they avoid being in trouble and choose to just sit, not participate nor write, not answer questions, stare at the teacher and feel restless. Another group of learners reported that when they noticed that they do not understand what the teacher is teaching, they “zone out”, do other homework and also plan for the next period.

Some learners said that when they are bored during a mathematics class they would make fun of things or people, make jokes and noise, and make “stupid” comments, so as to disturb the teacher. Some learners said when they get bored during the mathematics lesson they occupy their minds with other things like girl- or boyfriends, people, home, sport and the next period. They just do not concentrate, look around, stare out of the window, page through the mathematics text book and fiddle with stationary. Another destructive action that bored learners do is to “WhatsApp” (play with their cell phone) with friends and listen to music on their cell phone.

Larson & Richards (1991) mentioned that boredom has detrimental behavioural outcomes. Pekrun et al., (2010) also mention that boredom causes learners to cease learning and engage in task-irrelevant behaviour such as talking to classmates, drawing, or watching their classmates doing their work. My research confirms this strongly. Pekrun et al., (2010) warn that this can result in reduced quality performance and reduced concentration from learners. From an educational perspective, boredom is sometimes defined as a resistance to interest as it also blocks motivation and reflective attention that is required by an individual to think effectively (Gunn, 1988).

Other learners try and avoid or deal with their boredom in a positive way. On average 37% of participating learners deal positively with their boredom. 82% and 61% of learners from S8 and S6 respectively reported that they try very hard to do **constructive compensation**. S2 on the other hand reported nothing when it comes to constructive compensation. 10% and 8% of learners from S1 and S3 respectively reported that they try to act positively when they are bored during their mathematics classes. Learners from S8, S6, S7, S5 and S4 in decreasing order reported a high rate of trying to act positively when they are bored during Mathematics.

In trying to deal positively with boredom during a mathematics class, learners say they try very hard to concentrate, engage with the teacher and do mathematics work. Some learners said when they are bored during a mathematics class they just sit and listen to the teacher, write and simply copy what is on the chalkboard or do exercises. I am familiar with those learners who just sit and do what needs to be done. This might well be a positive way of dealing with boredom, but I think it can also be a waste of time as there is often little effective learning that is taking place in those situations. The learners think that they are just pleasing the teacher. Some learners say that when they are bored they pretend to be listening and working and deliberately write slowly until the bell rings. One group of learners said that in dealing with boredom in a positive way they look for help, ask questions and talk to a friend about Mathematics.

One respondent from the interview when asked what she does when bored during her mathematics class responded as follows:

Extract 4.1: Eliciting classroom response to boredom

T: Now, what do you do when you are bored in a mathematics class?

L: when I am bored?

T: this is you, you are in a mathematics class, and you feel bored

L: yes Ma'am I just keep quiet so that the teacher thinks that I am focused, I hear what she is saying.

T: Pretend as if you are listening?

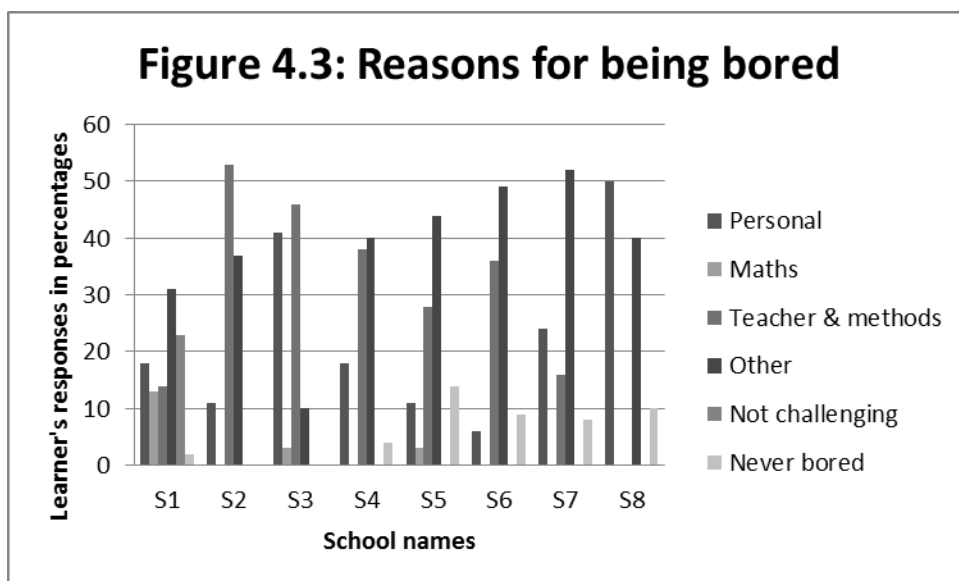
L: yes, I pretend as if my attention is all in what is done in the class, I am listening, I make sure that I do not disturb anyone, I be like ok and the teacher will think that I am all attentive and focused, but sometimes she notices that I am not focused, she would ask me questions, I wake up then she will notice that I am not listening.

The above response is from a respondent from a township school, who instead of acting in a destructive manner when bored during the mathematics class, chooses to pretend to be listening. In this way she is avoiding getting into trouble.

13%, 12%, 9% and 5% of learners from S2, S3, S1 and S4 respectively, say that when they are bored they **daydream**. They indicated that when they are bored they occupy their minds with other things and dream. This aligns with Pekrun et al., (2010) when they said that learners' attention was reduced when they were bored, and this is manifested by a lack of concentration, distractibility and task-irrelevant thinking such as daydreaming and thoughts about going biking, meeting friends and having dinner. None of the learners of the other schools mentioned daydreaming.

There are those learners that said they are **never bored** during their Mathematics classes. Learners from S5, S6, S7 and S4 reported that they are not bored during Mathematics lessons. The reasons they give is that they enjoy Mathematics and there is always something to do during the Mathematics class. Learners from S1, S2, S3, and S8 did not mention that they are never bored.

4.2.3 Reasons that lead to boredom



An average of 18% of the respondents revealed **personal problems** that contributed to their boredom during mathematics class. These personal problems included the following:

they had had a bad day, felt tired, felt hungry, felt like sleeping, were lazy or were sic. Some said they felt bored because of the weather when it was either too hot or too cold. These factors caused learners to struggle with their concentration. Some learners mentioned that when they had not done homework, or did not know the concept they tended to panic and lose focus. Also when they were not interested in the topic, they developed a short attention span and lost concentration. Sometimes peers were irritating when they had an attitude towards Mathematics. They became easily distracted when they were not good at Mathematics. This often led to boredom, they say. Some said it was discouraging when another learner was always working and finishing faster than them.

An average of 6% of the respondents from S1, S3 and S5 highlighted **Mathematics** as their reason for being bored. Learners from S1 strongly stated that Mathematics per se was boring. They did not enjoy it. It was too challenging and did not interest them. They just disliked it. To them Mathematics did not have meaning or it was not real. Some mentioned selected topics like Geometry that were boring. In my view these reasons are to be taken seriously, particularly if schools are forcing learners to take Mathematics.

An average of 37% of the respondents reported that **teachers** and their **teaching methods** were contributing factors to their boredom in the mathematics class. Some learners said they got bored when their teachers used a monotone voice, talked a lot or were loud. Some learners reported that their teachers were frightening and unfriendly and shouted at learners when they were asking questions. As a result, learners were reluctant to ask questions when they did not understand. Learners also identified the lack of good explanations on the part of the teachers as causes of boredom. Teachers often moved too fast and taught too much content within a short space of time. Some teachers were reported to seem bored themselves. They were often inactive and not relaxed during lessons, the learners said.

Another factor that made learners bored was when teachers absented themselves from school and did not mark their homework. Some of them said teachers used rote learning and did not encourage learners to interact and ask questions during the lesson. Some learners, particularly those from the private and ex-model C schools, mentioned that teachers often repeated what the learners already knew. Learners from the different schools mentioned that they got bored when teachers gave more work to some learners and less to others. Paying attention to certain

individual learners was another point that learners mentioned as a contributing factor to their boredom.

The last factor that learners mentioned as contributing to their boredom was when teachers talked about other things not related to the lesson. 53% and 50% of learners from S2 and S8 respectively said that the contribution of the teacher and the teaching methods was the most significant factor.

An average of 38% of the learners mentioned **other reasons** that contributed to their boredom during mathematics lessons. Some of the reasons mentioned by the learners were that they did not understand what was taught, or they felt that there was too much repetition. Other learners said they became bored when the topic that was taught was too difficult or they were not interested in the topic. Some said that they were bored when teaching and learning Mathematics was not fun. Another reason was when other learners were making a noise in the class and when Mathematics was the last period of the day.

A respondent interviewed responded as follows:

Extract 4.2: Eliciting reasons for boredom

T: what might be the reasons for you being bored in a Mathematics class? What causes this boredom?

L: sometime this happens when that topic is difficult, and then I develop a negative mind

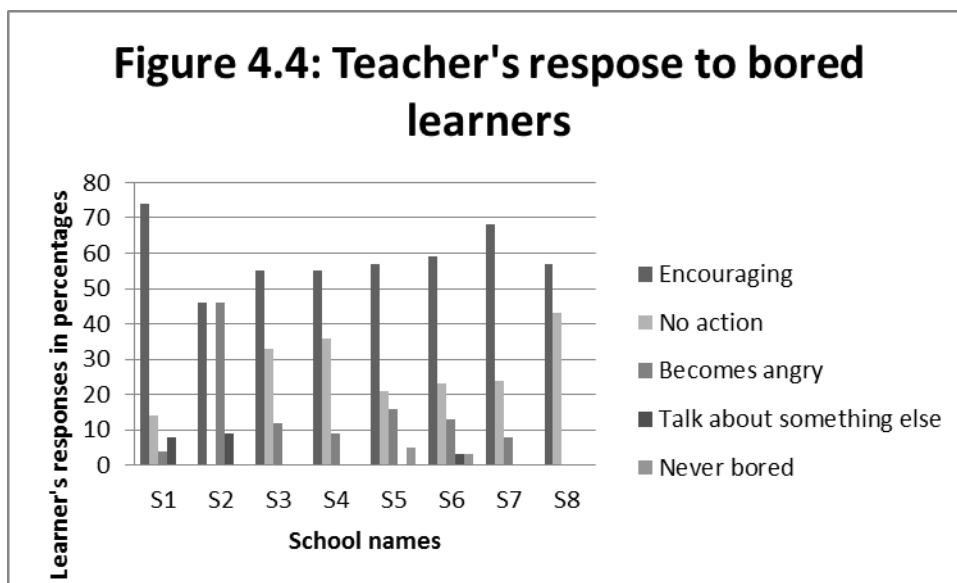
T: when you do not understand?

L:yes Ma'am, I just tell myself that I do not understand and know this and I am also not willing to try it because you will notice even those learners who know Mathematics, complaining that this that we are now doing is difficult, I would also think that I cannot even try, so develop a negative attitude towards Mathematics.

In the above extract the respondent indicated a lack of understanding as the main reason that leads to boredom and that led to a negative attitude towards the learning of Mathematics.

An important reason that was highlighted by learners from S1 was that they were bored because they were **not challenged**. The reasons for not being challenged during their mathematics classes were that there was repetition, the topic and examples were too easy and teachers focussed too much on individual learners. Preckel et al., (2010) confirmed that learners were often bored in the regular classes due to being under-challenged.

There were those learners who said they were **never bored** during their mathematics classes as they loved Mathematics. Others said they encouraged themselves even if they were tempted to be bored. Some said they did not have a reason to be bored as they were always attentive. It was also interesting to note that 23% of learners from S1 said that they were not challenged mathematically. 2% said that they never experienced boredom. Most learners from S5, S6, S7 and S8 never reported that they were under-challenged mathematically. On the other hand about 14% of them say they never experience boredom during mathematics classes.



When learners were asked as to what their teachers do when they noticed that learners are bored during their mathematics lessons they responded in four groups. They said that teachers were either encouraging, took no action, became angry or talked about something else. An average of 59% of the learners reported that their teachers **encouraged** them when they noticed that learners were bored. Some teachers simply talked louder, asked questions and called learners by names so as to catch their attention. Sometimes teachers were reported to change the subject and talk about something else or make a joke. Other teachers shouted, telling learners to wake up. They clapped and made learners stand for the rest of the period so as to make learners concentrate on what was done in the class. Some learners reported that their teachers gave them extra work and encouraged them to try to work when they showed signs of boredom.

Some learners reported that their teachers took **no action**. An average of 28% of the learners from the seven schools said that their teacher never noticed when learners were bored, and if they noticed they did nothing. Some learners reported that some teachers just continued with

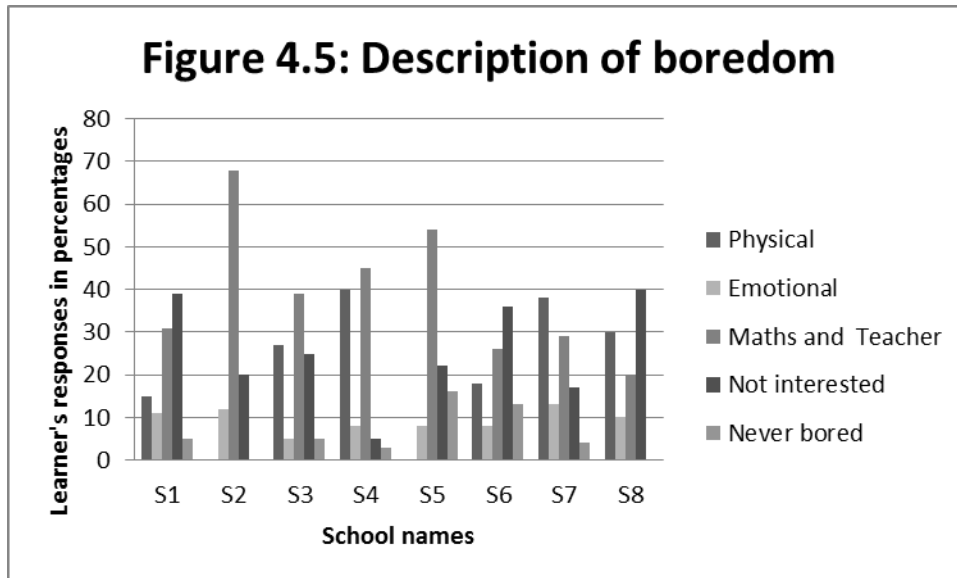
teaching even though they noticed that learners were bored, as if the teachers did not care. This response came from the learners from S3 and S4. According to Kanevsky and Keighley (2003) “**caring**” is amongst the five c’s they suggested on how to deal with boredom in a Mathematics class. They found that teachers who cared for their students and put care into their teaching were the ones that were admired and valued for their professional integrity and commitment. Their classes were inevitably less boring, the learners reported. Kanevsky and Keighley (2003) described these teachers as open-minded, fair, flexible and humorous. They were well-respected and welcomed learners contributing in a lesson and asking questions. They encouraged learners to challenge and be challenged, and motivated other learners to want to know more of whatever was placed before them. These teachers gave their students control over some aspects of their learning while taking into consideration the students’ skills, abilities and interests. **Caring** teachers were generally those who showed concern for the well-being of individuals. These kinds of teachers in mathematics classes will ensure that boredom is minimised.

An average of 15% of learners reported that when their teachers noticed that they were bored during their mathematics lessons the teachers **became angry**. Some learners said that when teachers noticed that learners were bored they stopped teaching, shouted and tried to deal with those learners that were disturbing the class with actions that showed their boredom. Some teachers’ punished learners by making them stand during the lesson or sent learners out of the class. Some learners said that their teacher patronised and embarrassed them in front of the class. 46% of learners from S2 reported their teacher was angry when she/he noticed that the learners were bored. This is interesting as this is the same school where 87% reported yes when the learners were asked if their teacher knew when they were bored. 87% of them also reported that they did destructive actions when they became bored.

A small average of 7% of learners from S1, S2 and S3 said that when their teachers noticed that learners were bored during mathematics lessons they **talked about something else**. Teachers would lighten their mood by changing the subject and talk about something more enjoyable like sports that would help learners to cheer up.

4.2.4 Boredom as an unpleasant feeling

When describing boredom, learners' responses were classified into five categories, namely physical, emotional, Mathematics and mathematics teacher, not interested and never bored.



An average of 28% of learners reported that they experienced **physical feelings** as a result of boredom during mathematics classes. This average was derived from the 40%, 38% and 30% of learners from S4, S7 and S8 respectively that reported a high rate of experiencing physical feelings. Learners from S2 and S5 did not report any physical feelings leading to boredom. Learners said they felt sleepy, tired, hungry, restless, dull, and did not want to participate in the lesson. Some learners felt as if they were sick and all they wanted to do was to be out of the mathematics class. Some said they sometimes felt that they were in the wrong place at the wrong time. All they wanted to do was to 'chill' with friends, to make a noise and not participate in the class activities, and at the end skip classes. This concurs with what Kanevsky and Keighley's (2003) suggestions about the outcomes of boredom. Boredom is one of the frequent causes of learners leaving school either temporarily, skipping classes, pretending to be sick or leaving school permanently. This aligns well with my findings.

An average of 9% of learners defined boredom in terms of **emotions**. Their feeling of boredom is not an enjoyable one. It is an unpleasant feeling. Some said when they are bored they feel terrible, awful, annoyed and irritated especially when they do not understand what is taught in the mathematics class. Some said when they are bored they feel frustrated, stupid and stressed

when they have tried to grasp mathematical concepts especially if some learners already understand the concept. They said they feel like “shooting their brains out” or screaming, and that they felt sad. The feeling of boredom according to some of the learners cannot be explained as they feel down, lonely and negative about everything. This resonates strongly with Kanevsky and Keighley (2003), Nett, Goetz & Hall, (2011), and Eastwood, Frischen, Fenske and Smilek, (2012) who defined boredom as an emotional feeling that emanates from unpleasant and undesired sensations associated with frustration and anger. These unpleasant emotional feelings are associated with frustration, anger, disengagement, discomfort, chronic and persistent stress and have psychological consequences such as depression, stress and anxiety. So the literature agrees with what has been highlighted by my participants.

There are those who when describing boredom referred to their **teacher and Mathematics**. 68% of learners from S2 and 58% from S5 are the ones that seem to be affected by their teachers’ practice. On average 42% of learners describe boredom as being directly linked to what the teacher is doing in the mathematics class. According to learners, when teachers are not interacting with them and do not allow learners to share ideas, that leads to boredom. As already mentioned, learners, noticeably from the private school and ex-model C schools, emphasised that they become bored when there is too much repetition, and little mathematical challenge.

The other component mentioned by learners that encourages boredom during mathematics classes is a loss **of interest**. On average 25% of the learners from all the 8 schools described boredom as a loss of interest. 40%, 39% and 38% of learners from S8, S6 and S1 respectively reported a high rate of loss of interest. When learners lose interest during mathematics classes they decide to “zone out” and daydream and refuse to focus on the lesson as already discussed. Some learners say that when they lose interest due to boredom they doze off, lose focus and do not concentrate on what is being done in the class. They just want to leave the class and go home. Some do not just become bored because they have lost interest, they have an attitude towards Mathematics and as such they do not see the point of attending the mathematics lessons and do not feel like doing Mathematics. Some learners reported that they lose interest because they do not know what to do and as such decide not to work and do not care. Some learners simply come late for a class and enjoy being chased away. The last thing that learners mentioned that is boring to them is that sometimes the teachers are tedious and as such they do not have fun in the class.

Some of these descriptions are also highlighted by Pekrun et al., (2010), in their definition of boredom where they say that boredom might cause a lack of interest and affect the performance of learners. Rinzler (1988) believes that the feelings of boredom include a sense of dullness, emptiness and a feeling that nothing is happening or that nothing new is going to happen.

Respondents were also asked in a Likert scale type question if they “Strongly Disagree, Disagree, are Neutral, Agree or Strongly Agree” with the following statement:

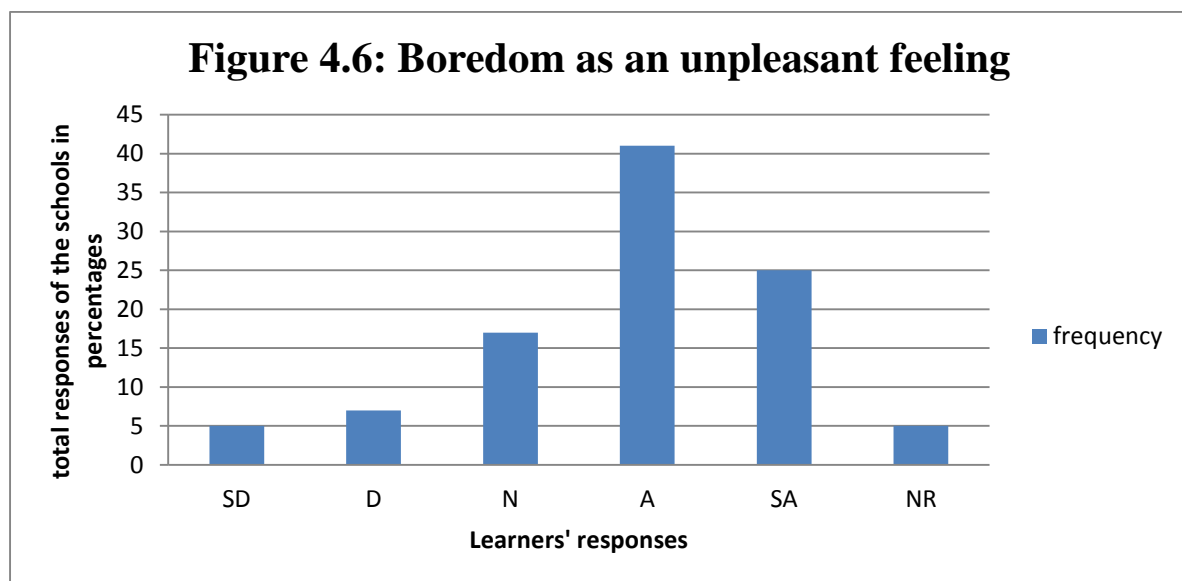


Figure 4.6 indicates that 41% of the learners agree and 25% strongly agree that boredom is an unpleasant feeling. This concurs with what Nett, Goetz and Hall (2011), Kanevsky and Keighley (2003) and Eastwood et al., (2012) say when they describe boredom as an unpleasant and undesired emotion. This shows that boredom is real and is a serious challenge to our learners in our mathematics classes. 17% of learners are neutral about their feelings of boredom. The other 7% and 5% of learners disagreed and strongly disagreed with the notion of boredom being an unpleasant feeling, while 5% did not respond

Extract 4.3: learners' description of boredom

T: now describe this boredom in your own words

L: boredom, it is as if I am left out during the mathematics class, as if I am not with other learners, I become bored and I don't know, I end up hating the teacher that is teaching, sometime it is as if I am panicking, I

would also wish that I would cry as I do not know what is happening to me, especially when I am supposed to write I just panic all the way, you wish you would stand up and go.

From the above extract the respondent indicates that when bored she feels like crying and gets into a panic. This shows that the feeling of boredom can be very unpleasant.

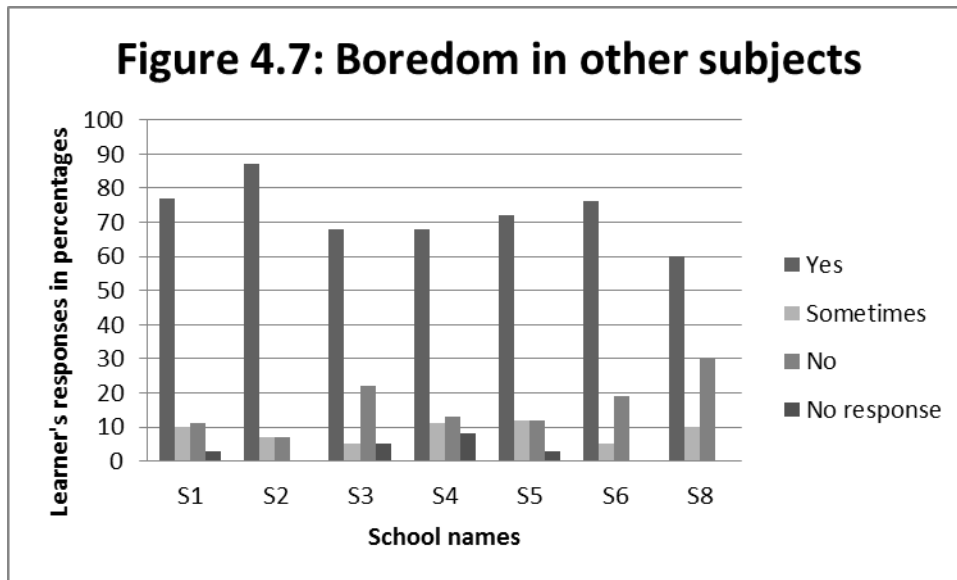


Figure 4.7 shows the responses of learners when they were asked if they get bored in other subjects. An average of 71% responded in the **affirmative**. Generally all schools reported high percentages of agreeing with this question. It is also interesting to note that learners from S2 reported a very high yes (87%). This suggests strongly that learners are not only bored during Mathematics but also in other subjects. This is a point of concern and should be taken seriously. In the context of boredom we should heed the warnings of Wegner, Flisher, Chikobvu, Lombard and King (2008) and Nett et al., (2011) when they report that there is indeed a high South African learner dropout rate due to absenteeism, unexpected behaviour, alcohol consumption and substance abuse that is experienced at school. These are all actions of bored learners.

An average of 9% of learners said that they only **sometimes** get bored in other subjects.

An average of 18% of the learners from the 8 schools reported that they **do not** get bored in other subjects.

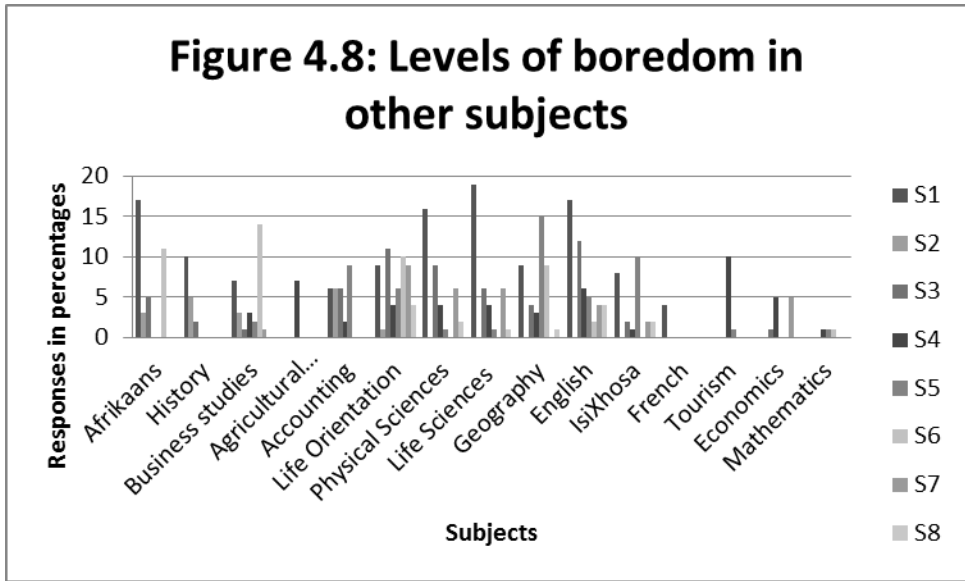


Figure 4.8 indicates the other subjects that the participants find boring. These subjects are Life Orientation, English, IsiXhosa, Life Sciences, Physical Sciences and Geograpy. Some schools do not offer subjects such as French, Afrikaans and Tourism.

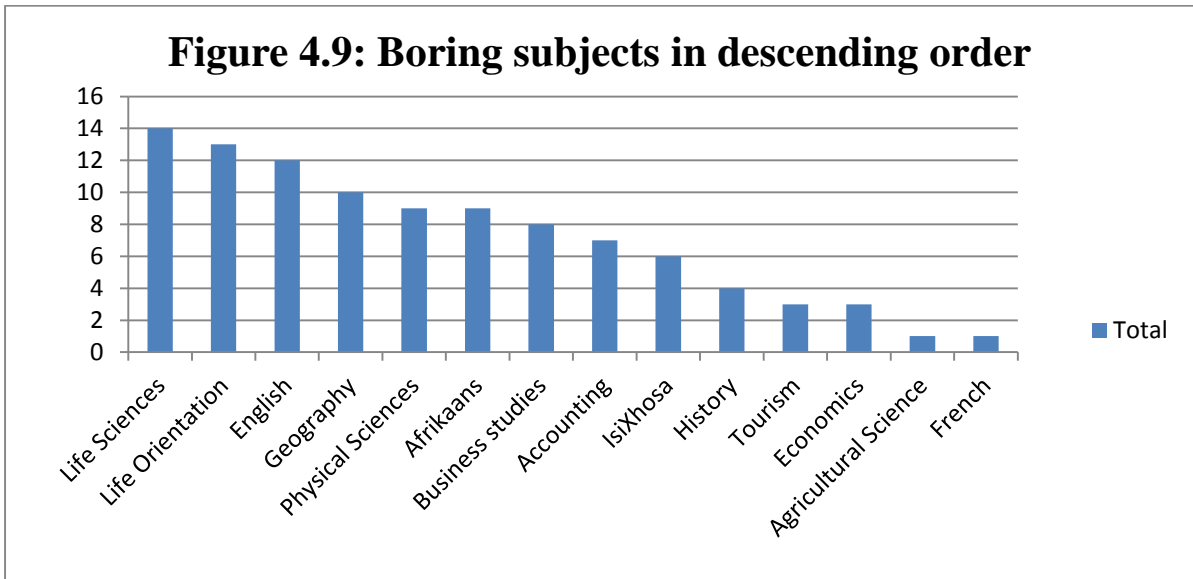


Figure 4.9 shows the extent of the respondents' boredom in other subjects in descending order.

4.2.5 Effects of boredom

The participants were asked to respond to a list of statements that related to the effects of boredom. They responded on a 6 point Likert scale.

Table 4.1 below shows a percentage summary of the responses to the Likert scale type questions.

Statement	SD	D	N	A	SA	NR
1. When bored I am unable to concentrate	4	10	7	38	40	1
2. When I am bored I feel like skipping class	17	23	15	25	19	1
3. When I am bored in a Mathematics class I feel frustrated that nothing new is happening	9	17	19	34	19	2
4. When I am bored I feel demotivated	8	15	19	34	21	3
5. When I am bored in Mathematics class my mind wanders to other things	3	11	11	43	28	3
6. I become bored in a Mathematics class when the tasks are too easy	23	34	14	15	12	3
7. I become bored in a Mathematics class when the tasks I have to do are too challenging	18	30	14	26	11	1
8. Mathematics in general is boring	31	34	15	11	6	3
9. Boredom affects my performance negatively	4	13	14	44	22	3
10. Not many of my friends are bored in my Mathematics class	26	17	22	25	8	2

40% and 38% of learners strongly agreed and agreed respectively that when they are bored during mathematics lessons they are unable to concentrate. This concurs with what Eastwood et al. (2012, p. 484) said when they defined boredom as an aversive state that occurs when one is not able to engage one's attention and participate satisfactorily in a given activity. Figure

4.2 clearly shows that when learners are bored they lose concentration and act in a destructive manner.

34% and 21% of learners agree and strongly agree respectively that when bored they feel demotivated. This resonates with Gunn's (1988) definition of boredom as a resistance to interest as it blocks the motivation and reflective attention that is required by an individual to think effectively. It is comforting to note that there is 15% and 8% of learners who disagree and strongly disagree that when bored during a mathematics class they feel demotivated. This shows that some learners try to avoid boredom and focus on the lesson.

It is interesting to note in Table 4.1 that the majority of learners responding to this statement do not find Mathematics to be boring. 34% and 31% of learners disagree and strongly disagree that Mathematics is boring. The learners' response in this question is in direct contrast with Brown's et al., (2008) claim that learners perceive Mathematics as difficult, boring and useless. Contrary to this, in graph 1 of this chapter, an average of 48% of the Grade 10 learners across the 8 schools indicated a yes to having experienced boredom during their mathematics class.

However there is a small 11% and 6% of learners who agree and strongly agree that in general Mathematics is boring.

A relatively high 30% and 18% of learners disagree and strongly disagree respectively that they become bored during mathematics class when the tasks that they have to do are too challenging. An average of 24% of learners seems to like the challenge that Mathematics brings to them. This concurs with what learners from S1 highlighted as an important reason that leads to their boredom (in Figure 4.3) that is, lack of challenge during the Mathematics class. However, there is an average of 19% of learners who agree that they become bored when they have to do challenging tasks. This indicates that there are learners that choose to do Mathematics because they love to interrogate a Mathematics challenge.

44% and 22% of learners agree and strongly agree that boredom affects their performance negatively. This concurs with Pekrun's et al. (2010) findings that boredom produces a negative effect that weakens a learner's intrinsic motivation, enjoyment and interest in engaging in the given activity and therefore affects the learner's academic achievement. Pekrun et al. (2010)

further states that boredom can be associated with an achievement emotion and lack of interest, and can therefore be linked to poor performance.

Extract 4.4: Learners' confirmation of boredom

T: Ok, boredom affects my performance negatively

L: strongly agree, yho I am not doing well in my Mathematics

The above extract from the interview confirms that boredom affect learners performances negatively.

The graph also shows that 13% and 4% of learners disagree and strongly disagree that boredom affects their performance negatively. This group of learners is from the private school and the ex-model C schools.

34% and 23% of learners disagree and strongly disagree that they become bored when the tasks they do are too easy. This suggests that the majority of our learners do not like to do overly challenging mathematics tasks. Preckel, Gotz and Frenzel (2010) in their report highlight that gifted learners are bored due to under-challenge, whereas non-gifted students are bored due to over-challenge. The 15% and 12% of learners agree and strongly agree that they become bored when the Mathematics tasks are too easy. These are the learners who are not inspired by challenging mathematical tasks.

Extract 4.5: Conversation on easy tasks

T: I become bored in a maths class when the tasks are too easy

L: no no Ma'am. I become excited, strongly disagree

T: so you like it when exercises are easy

L: and I understand them

Extract 4.6: More conversation on easy tasks

T: I become bored in a maths class when the tasks are too easy

L: wow I enjoy mathematics when the tasks are too easy; I even wish we can do as many as we can

T: so you don't become bored

L: no Ma'am, it is as if we can do more, you become interested too and be willing to help those who do not understand, you feel motivated and want to motivate other learners too

The above extracts from two learners confirm that they enjoy and are encouraged when the Mathematics tasks are easy. They wish that they could continue and are also willing to help other learners.

34% of learners agree and 19% of learners strongly agree that when they are bored they feel frustrated that nothing new is happening. This resonates with what Rinzler (1988) is saying that the feelings of boredom include a sense of dullness, emptiness and a feeling that nothing is happening or that nothing new is going to happen.

48% and 28% of learners agree and strongly agree that when they are bored in a mathematics class their mind wanders to other things. This corresponds with Pekrun's et.al (2010) findings that learners' attention is reduced when they are bored. This manifests itself by a lack of concentration, distractibility and task-irrelevant thinking such as daydreaming and thoughts about going biking, meeting friends and having dinner. Pekrun et.al. (2010) further states that boredom causes learners to cease learning and engage in task-irrelevant behaviour such as talking to classmates, drawing, or watching their classmates doing their work. Pekrun et.al (2010) further suggests that when learners do other things instead of concentrating or focusing on what is taught during a mathematics lesson, they become bored. This suggests to teachers that they need to pause and check as to what might cause boredom in that particular lesson so as to make sure that teaching and learning is more interesting.

26% and 17% of the learners strongly disagree and disagree that 'not many of their friends' are bored in mathematics classes. This means that most of their friends are not bored during mathematics class. On the other hand 25% and 8% of the learners agree and strongly agree that some of their friends are bored during mathematics classes.

Extract 4.7: Effects of boredom on friends

T: Ok, not all of my friends are bored in a maths class. Agree, disagree?

L: I can say my friend yhu, strongly agree, my friend most of the time they get bored during maths classes. They always regret that they chose maths, and say what do they want from this class?

The response from the above extract confirms that some learners experience boredom during mathematics classes to an extent of regretting doing Mathematics as a subject.

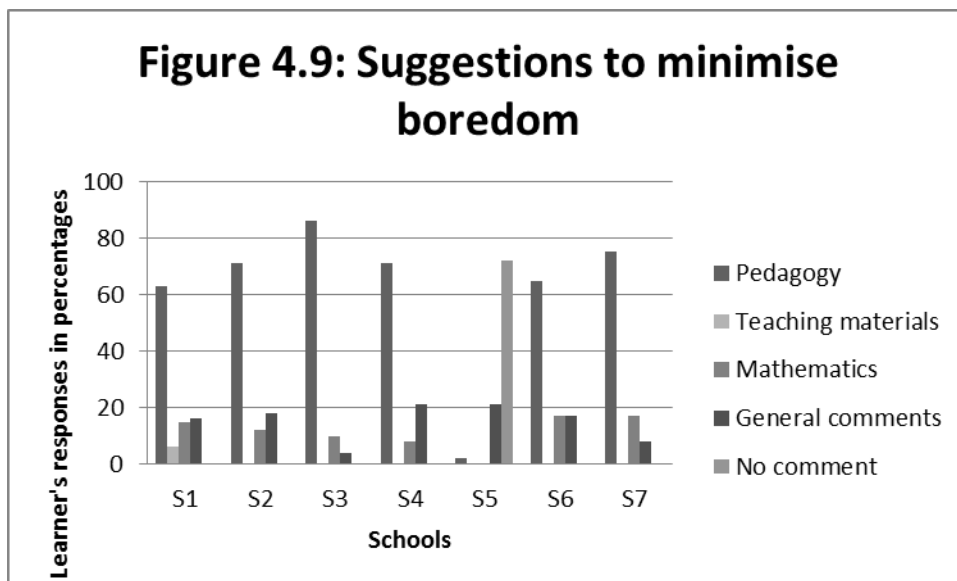
Extract 4.8: Further probing for causes of boredom

T: boredom is a common problem in my maths class, when you are looking at your class, when you hear them talking, are they bored during mathematics class?

L: yes Ma'am strongly agree
 T: is it because of maths or the teacher, or what is it?
 L: **all the subjects that require us to concentrate and think, as learners we do not want to think, we do not want to be kept busy.**
 T: you get tired?
 L: we get bored, we do not have patience

On the other hand this learner is highlighting another concern: that learners also are responsible for their boredom during mathematics classes as they are not tolerant with subjects that demand their concentration.

25% and 19% of learners agree and strongly agree that when they are bored they feel like skipping class. This is nothing new as according to Kanevsky and Keighley (2003) boredom is one of the frequent causes of learners leaving school either temporarily, skipping classes, pretending to be sick or leaving school permanently. From my personal experience learners skipping mathematics classes and dropping out of schools is a reality in our schools. This is a serious concern as we cannot allow our learners to either skip classes or drop out of school.



When learners were asked about their suggestions as to what should be done in a mathematics class to minimise boredom, they came up with four categories of suggestions. These are: pedagogy, teaching materials, Mathematics, general comments and those who did not comment.

An average of 62% suggested that the focus for avoiding boredom should be on **pedagogy**. Learners suggest that teachers should avoid repetition when teaching, try to do something different and change the schedule of everyday activities. Teachers should also try different teaching methods, plan enjoyable lessons, do maths practically and simplify the topic so that it

is understandable. Some learners also mentioned that they be given more work and have extra classes as they feel that what they do during the normal periods is not enough. Teachers should not teach the whole period as learners want to be given a chance to practice what the teacher has just taught. When introducing a lesson, teachers should start with easy content and move gradually to more complicated content. Learners would also love to have different teachers teaching Maths. The teachers would then complement each other, so that when the learners do not understand the one, they would perhaps understand the other. Learners also urge that teachers be present every day at school. If the teacher is going to be absent they should be notified and be given work for that day. Teachers, when giving work, should mark the classwork books. Teachers should also control the class continuously. Teachers need to have classroom management that will control the level of noise during teaching.

To minimise boredom, learners also suggest that teachers try not to use a monotone voice and try to create a fun-filled exciting mathematics class. Teachers are also asked that they be patient with learners and explain more, do homework on the board and engage in fun activities. They should move on with the lesson and not give attention to the bored learners. They should encourage slow learners and check if learners understand the work. Teachers should also make jokes inbetween.

Learners emphasised that they love it when teachers smile a lot and are not grumpy. Some learners suggested that teachers should try to make learners feel comfortable during the class and at least show that they care about the learners. Teachers must also be friendly. This will make things easier for learners to participate in the mathematics lessons freely without fear of being embarrassed. Learners also mentioned that they need to be treated fairly.

The other suggestion that learners had for minimising boredom is that they be allowed to discuss the lesson with their peers. Those learners who understand the content should be allowed to explain some concepts and procedures to the other members of the class. Learners would also like to be grouped according to their performances and be engaged in the lesson.

Learners also highlighted that teachers could organise maths competitions that would encourage the spirit of competition and of wanting to do more. These would act as incentives that would make Mathematics interesting.

6% of learners from S1 suggested that in order to minimise boredom they would love to have **materials such as an iPad** on which to play mathematics games and watch mathematics videos.

An average of 13% of learners suggested that to avoid boredom in a mathematics class teachers must choose the **Mathematics** tasks that are given to learners carefully. Learners would love to have tasks that are more relevant to real situations that would help them interact with the outside world and be useful in the real world. Learners said that they would also appreciate fun-filled activities, normal and more challenging tasks. Some learners said they would appreciate it if they were given easy tasks that will boost their moral.

An average of 18% of learners made the following **general suggestions** that might help minimise boredom in a mathematics class. Mathematics must not be the first and last period of the day. If it is the last period the learners are already tired and cannot concentrate. They said that learners need to be encouraged to communicate in the mathematics class with the teacher and with peers to ask and answer questions. Learners need to have a good attitude towards Mathematics. Learners also need to be encouraged to pay attention during teaching and learning. They also indicated that learners have to control their boredom. Learners also suggested that they needed to be encouraged to be responsible. When a learner is absent it becomes his/her responsibility to make sure that he/she follows on what was done in class. Learners also need to practice Maths and work hard. Some learners say that it is sometimes their personal issues that lead to boredom. Teachers also need to take note of that. Some said parents must also be encouraged to work with teachers and be involved in their children's education. Learners also suggested that they need 5 minute breaks in between teaching periods and also have some free periods. Those learners who are disruptive during class should be shown out of the class. Lastly Mathematics should not be taught every day. 72% of learners from S5 **gave no comment**.

Table 4.2 below provides a summary of the findings and is tabulated in a way that is helpful in answering the following two research questions:

1. What is the prevalence of boredom in all Grade 10 mathematics classes in Grahamstown?
2. What is the nature of boredom in selected Grade 10 mathematics learners in Grahamstown?

Table 4.2 below displays the summary of the learner responses from the questionnaire. The responses are grouped according to the prevalence and the nature of boredom that is experienced by the selected Grade 10 mathematics learners in Grahamstown.

Table 4.2: Summary of findings		
Questions	Prevalence of boredom	Nature of boredom
Why did you choose Mathematics as a subject?	40% of learners across the 8 schools chose Mathematics for personal reasons, 44% chose it for career purposes and 10% said it is important for their choice of degrees that they want to pursue at University.	
Are you ever bored in a Mathematics class?	48% of learners indicated a Yes when they were asked if they were bored during Mathematics lessons, while 19% said sometimes and 33% indicated no.	
Describe this boredom in your own words.		Learners described boredom as: physical (e.g. tiredness, lazy, sleepy etc.)-21%, emotional-9%, teachers' actions and their teaching methods-35%, when they are not interested in the teaching and learning of Mathematics-26%, never bored-9%.
What might be the reason(s) for your being bored in a Mathematics class?		Reasons for learners' boredom during Mathematics lessons: personal reasons-16%, Mathematics-2%, Teacher and their teaching methods-35%, other reasons (e.g. lack of understanding, maths being the last period etc.)-38%, Mathematics not challenging (only S1 which is a private school)-3%, and never bored (mostly township schools)-06%.
Do you think your teacher knows when you are bored?	When learners were asked if their teachers know that they are bored during Mathematics classes they said: Yes-37%, Sometimes-9%, No (mostly township schools)-50% and 06% did not respond.	
What does your teacher do when he/she notices that you are bored during the Mathematics class?		When learners were asked as to what their teachers do when they notice that learners are bored during Mathematics lessons they said: teachers encourage learners to cooperate-59%, some teachers do

		nothing (no action)-24%, teachers become angry-14% and some teachers choose to talk about something else-3%.
Do you get bored in other subjects?	When learners asked if they get bored in other subjects they said: Yes-71%, sometimes-9%, No-18% and some did not respond-2%.	
Which subjects?	The following are the common subjects in which learners reported that they experience boredom: Life Sciences-14%, Life Orientation-13%, English-12%, Geography-10% and Physical Sciences-9%.	
Boredom is an unpleasant feeling.		41% of learners agreed that boredom is an unpleasant feeling.
When bored I am unable to concentrate.		40% of learners strongly agreed that when bored they are unable to concentrate
When I am bored I feel like skipping class.	An average of 22% agreed and strongly agreed that when they are bored they feel like skipping a class while an average of 20% of learners disagreed and strongly disagreed	
Boredom is a common problem in my class.	23% of learners disagreed and agreed that boredom is a common problem in their Mathematics classes	
When I am bored in my Mathematics class I feel frustrated that nothing new is happening.		34% agreed that when they are bored in a Mathematics class they feel frustrated that nothing new is going to happen.
When I am bored I feel demotivated.		34% agreed that when they are bored they feel demotivated.
Mathematics in general is boring.	34% and 31% of learners disagreed and strongly disagreed that mathematics is in general boring.	
I become bored in my Mathematics when the tasks I have to do are too challenging.	An average of 24% (30% and 18%) of learners disagreed and strongly disagreed that they become bored in a Mathematics class when the tasks are too difficult while an average of 19% (26% and 11%) agreed and strongly agreed.	
When I am bored in my Mathematics class my mind wanders to other things.		43% and 28% of learners agreed and strongly agreed that when they are bored during Mathematics class their minds wanders to other things.

I become bored in my Mathematics class when the tasks are too easy.	34% and 23% of learners disagreed and strongly disagreed that they become bored in a Mathematics class when the tasks are too easy.	
Boredom affects my performance negatively.		44% of learners agreed that boredom affect their performances.
Not many of my friends are bored in my Mathematics class.	26% of learners strongly agreed that not many of their friends are bored during Mathematics classes.	
What do you suggest should be done in your Mathematics class to avoid boredom?		Learners' suggestions in helping to avoid boredom in a Mathematics classes: Pedagogy (teachers must make their teaching more interesting)-62%, Use of teaching materials-1%, Mathematics tasks must make sense and be interesting-10%, general comments like having 5-minute breaks in between-18% and those who did not comment-9%.

4.3 Conclusion

Findings revealed that boredom is a common problem in Grade 10 Mathematics in the 8 schools in the Grahamstown region and this finding answered my first research question.

To answer my second research question, the findings indicate a high percentage of learners that agreed that boredom is an unpleasant feeling, which leads learners to doing destructive actions during mathematics classes when they are bored. A large number of learners admitted that they experience boredom during Mathematics classes.

Findings also indicated that learners are bored due to lack of understanding, repetition and the teacher's actions. Some learners highlighted that the teacher's actions are the most contributing factor to their boredom during Mathematics classes. Lastly, findings also show that learners experience boredom during other subjects. My findings align with what is highlighted by Nett et al., (2011), that many learners from particularly the senior secondary schools frequently report episodes of boredom.

Chapter 5

Conclusion

5.1 Introduction

I conclude this study by providing a summary on the findings and making some recommendations. I also discuss the limitations and constraints I encountered in this study. I end the chapter with some personal reflections and proposed avenues for future research.

5.2 Summary of findings

As a reminder to the reader, my research aimed at answering two research questions which are:

1. What is the prevalence of boredom in all Grade 10 mathematics classes in Grahamstown?
2. What is the nature of boredom in selected Grade 10 mathematics learners in Grahamstown?

The survey indicates that a high percentage of respondents are bored during their mathematics classes.

Various reasons that lead to their boredom were highlighted by learners. Amongst those reasons were the teacher's actions and their teaching methods, and a lack of understanding.

Mostly the learners indicated that **the teachers and their actions** are major contributors to their boredom during mathematics classes. The survey confirms that learners thought that teachers do not engage with them in their learning, they use teacher-centred approaches and the learners are left out. The survey also showed that teachers are often harsh, impatient, get angry easily and do not explain properly especially when learners do not understand mathematics. Some respondents reported that their teachers are scary and unfriendly. Respondents think that the reason why some teachers act like this is because they are not passionate about teaching and some show signs of lacking confidence.

Some respondents reported that they get bored in a mathematics class due to a **lack of understanding**. This should be taken very seriously as there could be no learning or sense-

making taking place if one does not understand what is going on. Schools that reported the highest percentage of being bored due to lack of understanding are some of the township schools.

The other reason highlighted by respondents from a private school is that they are bored during mathematics classes because they are **not challenged**. The reason for not being challenged during mathematics classes is that there is repetition, the topic and examples are too easy and teachers focus too much on individual learners. This was also highlighted by two of the learners that I interviewed.

From the survey it was also reported that when respondents are bored some tend to do **destructive actions** especially those from the private school and the ex-model C schools. Most of the learners from the township schools reported that when they are bored they pretend to be listening. This was also mentioned by the learners that I interviewed as they said they would pretend because they do not want to be reported to the school principal.

Some respondents reported that when their teachers noticed that they were bored, they became **concerned and encouraged** them by talking louder, asking questions, asking learners by their names, changing the subject and making jokes. Some teachers are reported to **do nothing** when they notice that respondents were bored; they just continue with the lesson. Some respondents said that when teachers noticed that learners are bored during a mathematics lesson they became angry, stopped teaching and shouted.

The survey also highlighted that respondents are not only bored during mathematics classes, but they experience boredom in other subjects.

Learners from the survey suggested that to help avoid boredom in a mathematics classes teachers must try and do the following:

- make their teaching more interesting
- must try and use concrete teaching materials
- use mathematics tasks that make sense and are interesting

5.3 Recommendations

In light of the key findings of this study I put forward the following recommendations with regard to the teachers' practices:

Teachers should:

- Ask learners about their boredom. They should listen and inquire until they know exactly what the major cause of boredom might be and what could be done about it.
- Develop engaging and fun-filled lessons that create a stimulating classroom environment.
- Be sensitive to how learners respond to their teaching. They can do that by using methods that require a high level of thinking, a hands-on approach and the use of concrete manipulatives.
- Encourage learning from their mistakes, as well as welcoming wrong answers as a spring board for new understanding.
- Use affirming language to encourage learners' abilities.
- Create opportunities for learners to experience success. This will help learners to become confident about their achievements.
- Try and teach mathematics content in a way that provokes interest and relates it to the real world.
- Use real life examples and explore links with other subjects.
- Use a wide range of tasks (challenging ones and those that are attainable so as to encourage the under-achievers) and resources.
- Try and make Mathematics more enjoyable by introducing mathematics challenges, competitions and puzzles of the month and also celebrate learners' achievements.
- Care for their learners, as teachers who put care into their teaching are the ones that are admired and valued for their professional integrity and commitment.
- Empower and assist learners by providing a supportive, quality learning environment where learning is achievable by both teachers and learners.
- Implement learning experiences that allow learners to see knowledge as worthwhile and to take ownership of their learning.
- Be role models for learners in terms of demonstrating their own passion and enthusiasm for learning.
- Work together with learners in reducing boredom and work towards facilitating academic motivation and achievement.

- Generate intervention programs that will encourage learners to take full responsibility for their feelings of boredom by focusing on the usefulness of what they are learning.
- Encourage learners so that they believe in being able to do Mathematics.

Learners should:

- Take more responsibility for their own learning.
- Should be encouraged to deal with boredom in a constructive way.

5.4. Limitations of and challenges experienced in this study

The first limitation to this study is that it is a small case study and its findings cannot be generalised. The data that I collected from learners from the schools cannot be used to justify what is happening in other schools.

The fact that the questionnaires were anonymous was a challenge as I wished to interview some of the respondents who had interesting responses. It would have been interesting also to interview respondents from different schools instead of only interviewing respondents from my school.

Administering the return of the questionnaires was a challenge for me. Some teachers suggested that I administer the questionnaires myself after school but many respondents were not available at that time. Some suggested that due to the time constraints, they could give the questionnaires as homework. In this case I had to convince and beg the teacher as I was concerned that I might not have them returned. This would also have compromised the validity of the data.

The return of some questionnaires was also a challenge. Sometimes we would agree with the teacher that I will be collecting the questionnaires, only to arrive and find that they were not yet completed. This became expensive as I had to organise transport to collect the questionnaires again. Unfortunately I often had to use school hours to do this.

I also struggled to analyse the open-ended questions from the questionnaire as there were similar themes that learners suggested.

Lastly, I found it difficult to find reported research on this topic, both locally and internationally.

5.5 Personal reflections

This study helped me develop personally, academically and professionally. Being involved in this I have learnt to be patient as some schools did not respond to my permission letters, some teachers were reluctant and some forgot to administer the questionnaires. Also some learners did not avail themselves for my interviews.

Through studying the literature and the research process I gained a lot of insight as to what boredom is all about. The experience of going through this research especially when I was analysing the questionnaires and interviewing the learners, made me reflect on my own practices as a mathematics teacher. As I was going through the process of analysing the data I continuously made decisions concerning changing my own teaching methods and attitude towards my learners. I wish that all the mathematics teachers could hear what the learners had to say about their experiences during their mathematics classes.

Most learners in the study suggested precisely what has laid heavy in my heart recently - to teach for conceptual understanding, relate what we are teaching with their real life situation, and allow learners to make sense of what we are teaching by using concrete materials.

I am now more aware of the extent and nature of boredom that learners experience during their mathematics lessons. Teaching is a complex activity and as teachers we should all try to minimise boredom in our classes.

5.6 Future study

In view of the research findings, experiences and recommendations above, I recommend further research in the following areas:

- A similar study focusing on teachers. It would be interesting to hear what teachers say about boredom as learners are mostly attributing their boredom to teachers.
- A research study on linking boredom to performance in a mathematics class.

- A study on boredom and motivation would also be beneficial as I think when learners are motivated they would be able to deal with boredom in a constructive way.

5.7 Conclusion

This has been a worthwhile study. From the research findings and the recommendations made, many teachers could learn and possibly improve their own practice and thus contribute positively to the education system in South Africa. Boredom is a real phenomenon in our mathematics classes and it is important that lessons are learnt from this study.

References

- Alesandrini, K., & Larson, L. (2002). Teachers Bridge to Constructivism. *The Clearing House*, 75(3), 118-121.
- Babbie, E., & Mouton, J. (2001). *The practice of social research*. Cape Town: Oxford University Press.
- Bassey, M. (1999). *Case study research in educational settings*. Maidenhead, Berkshire: Open University Press.
- Bell, J. (2010). *Doing your research project: a guide to for first- time researchers in education*.
- Brown, M., Brown, P., & Bibby, T. (2008, March). "I would rather die": reasons given by 16-year-olds for not continuing their study of mathematics. *Research in Mathematics Education*, 10(1), 3-18.
- Bryman, A. (1992). Quantitative and qualitative research: further reflections on their integration. In J. Brannen (Ed.), *Mixing Methods: qualitative and quantitative research* (pp.57-78). Avebury: Thomas Coram Research Unit Institute of Education.
- Carpenter, S. (2003). Constructivism, A prospective teacher's perspective. *Australian Primary Mathematics Classroom*, 8(1), 229-32.
- Chuenyane, G. (2010, January 17). School dropout mystery. *City Press*
- Cohen, L., Manion, L., & Morrison, K. (2010). *Research methods in education*. 6th edition. New York: Routledge.
- Cohen, L., Manion, L., & Morrison, K. (2005). *Research methods in education*. 5th edition. New York: Routledge Falmer.
- Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand oaks, CA: Sage.
- Creswell, J.W., & Plano Clark, V. L. (2007). *Designing and Conducting: Mixed Methods Research*. London: Sage.
- De Chenne, T.K., & Moody, A. J. (1988). Boredom: Theory and Therapy. In E.M.Stern (Ed.), *The Psychotherapy and the bored Patient* (pp. 151-155). England: The Haworth Press.
- South Africa. Department of Education (2003). *National curriculum statement Grades 10-12 (General): Mathematical Literacy*. Pretoria: Government Printer.
- South Africa. Department of Education (2011). *National curriculum statement: Curriculum and Assessment Policy Statement. Further Education and Training Phase Grades 10-12. Mathematics*. Pretoria: Government Printer.

- South Africa. Department of Education (2002). *Revised National Curriculum Statement Grades R-9 (Schools)*. Mathematics. Pretoria: Government Printer.
- Eastwood, J.D., Frischen, A., Fenske, M. J., & Smilek, D. (2012). *The Unengaged Mind: Defining Boredom in Terms of Attention*. *Psychology Science*, 7(5), 482-495.
- Fehr, B., & Harasymchuk, C. (2010). A script analysis of relational Boredom: causes, feelings, and coping strategies. *Journal of Social and clinical Psychology*, 29(9), 988-1019.
- Foddy, W. (1993). *Constructing questions for interviews and questionnaires: Theory and Practice in social research*. Cambridge University Press.
- Freebody, P. (2003). *Qualitative Research in Education*. London: Sage Publications.
- Gilderdale, C., & Kiddle, A. (2012). Engaging Students, Developing, Confidence Promoting Independence. Retrieved October 31, 2013, from?obj id=6304&part.
- Gunn, R.W, (1988). Holding On When You Feel Like Letting Go. In E.M.Stern (Ed.), *The Psychotherapy and the bored Patient* (pp. 151-155). England: The Haworth Press.
- Hand, B., & Vance, K. (1995). Implementation of constructivist approaches within the science classroom. *Australian Science Teachers Journal*; 41(4), p37. Retrieved June 15 2009, from Academic search Premier.
- Harris, M. B. (2000). Correlates and characteristics of boredom proneness and boredom. *Journal of Applied Social Psychology*, 30, 576-598.
- Heinze, A., Reiss, K., & Augsburg, F.R. (2005). Mathematics achievement and interest in mathematics from a different perspective. *ZDM*, 37(3), 212-220.
- Herbert, A., Peter, P., & Bridget, S. (1993). *Teachers investigate their work: an introduction to the methods of action research* New York: Routledge.
- Horrocks, N.K.C. (2010). *Interviews in Qualitative Research*. London: Sage.
- Jansen, J.D. (1998). Curriculum Reform in South Africa: a critical analysis of outcomes-based education [1]. *Cambridge Journal of Education*, 28(3), 321-331.
- Kanevsky, L., & Keighley, T. (2003). To Produce or Not Produce? Understanding Boredom and the Honour in Underachievement. *Roeper Review*, 26(1), 20-28.
- Kenny, P. (2012). *Matric 2011: Playing number crunching game yet again*. CPLO briefing paper No. 280.
- Kilpatrick, Jeremy, Swafford, J., & Findell, B. (2001). *Adding it up: Helping Children Learn Mathematics*. Washington DC: National Academy Press.
- Larson, W.R., & Richards, M.H. (1991). Boredom in the Middle School Years: Blaming Schools versus Blaming Students. *American Journal of Education*, 99(4), 418-443.
- Maree, J.G., & Fraser, W.J. (2004). *Outcomes-Based Assessment*. Sandown: Heinemann.

- Mikulas, W. L., & Vondanovich, S.J. (1993). The essence of boredom. *The Psychological record*, 43, 3-12.
- Muhammad, B., Muhammad, T.A., & Muhammad, A. (2008). Reliability and Validity of qualitative and operational research paradigm. *Pakistan Journal of Statistics and Operation Research*, 4:1, 35-45.
- Nett, U. E., Goetz, T., & Hall, N.C. (2011). Coping with boredom in school: An experience sampling perspective. *Elsevier*, 36(1), 49-59.
- O'Leary, Z. (2010). *The essential guide to doing your research project*. London: Sage.
- Pekrun, R., Goetz, T., Daniels, L.M., Stupnisky, R.H., & Perry, R.P. (2010). Boredom in Achievement Setting: Exploring Control-Value Antecedents and Performance Outcomes of Neglected Emotion. *Journal of Educational Psychology*, 102(3), 531-549.
- Preckel, F., Gotz, T., & Frenzel, A. (2010). Ability grouping of gifted students: Effects on academic self-concept and boredom. *British Journal of Educational Psychology*, 80, 451-472.
- Rinzler, D. (1988). Characterological Boredom as Symptom and Tragedy. In E.M.Stern (Ed.), *The Psychotherapy and the bored Patient* (pp.55-61). England: The Haworth Press.
- Skovsmose, O. (2004). Critical Mathematics Education for the future. Aalborg University, Denmark. *CME-future-5*.
- Svendsen, L. (2005). *A Philosophy of boredom*. London:Reaktion.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. United States of America: SAGE.
- Terwel, J. (1999). Constructivism and its implications for curriculum theory and practice. *Curriculum studies*, 31(2), 195-199.
- Thomas, G. (2011). *How to do your case study: A guide for students and researchers*. Los Angeles: SAGE.
- Valerio, K.M. (2012). Intrinsic motivation in the classroom. *Journal of Student Engagement: Education matters*, 2(1), 30-35.
- Wegner, L., Flisher, A.J., Chikobvu, P., Lombard, C., & King, G. (2008). Leisure boredom and high school dropout in Cape Town, South Africa. *Journal of Adolescence*, 31 (2008), 421-431.
- Weir, K. (2012). Never a dull moment: Things get interesting when psychologists take a closer look at boredom. *American Psychological Association*, 44(7). 54.
- Wheatley, G.H. (1992). Role of reflection in mathematics learning. *Education Studies in Mathematics*, 23, 529-541.
- Yin, R.K. (1994). *Case study research: design and methods*. Thousand Oaks, Calif.: Sage.

Appendix 1: Grade 10 Questionnaire on Boredom

This questionnaire is designed to explore the extent of boredom that is experienced by Grade 10 learners in their Mathematics classroom. Please answer the following questions as honestly as possible.

Section A- Background information

1. Gender

Male		Female	
------	--	--------	--

2. Age (in complete years)

--	--

3. How would you describe the area in which you are residing?

Town	
Village	
Farm	
Other(specify)	

4. Why did you choose Mathematics as a subject?

.....

.....

.....

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.....

Section B – Contextual question on boredom during mathematics teaching

This section of the questionnaire explores the extent of boredom that you experience in a Mathematics class.

5. Are you ever bored in a Mathematics class? Please elaborate and provide details.

.....

.....

.....

.....

6. Indicate your levels of boredom in a Mathematics class by ticking one box below.

Never	Sometimes	Often	Always
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7. Describe this boredom in your own words.

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

8. What do you do when you are bored in a Mathematics class?

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.....
.....

9. What might be the reason(s) for your being bored in a Mathematics class?

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

10. Describe your feelings when you are bored.

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

11. When bored what do you occupy your mind with?

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

12. Does the teacher have anything to do with your boredom? Explain.

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

To what extent do you agree with each of the following statements? Please indicate your answer using the following 5-point scale where: SD=strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree	SD	D	N	A	SA
16. Boredom is an unpleasant feeling.					
17. When bored I am unable to concentrate.					
18. When I am bored I feel like skipping class.					
19. Boredom is a common problem in my Mathematics class.					
20. When I am bored in my Mathematics class I feel frustrated that nothing new is happening.					
21. When I am bored I feel demotivated.					
22. Mathematics in general is boring.					

23. I become bored in my Mathematics class when the tasks I have to do are too challenging.					
24. When I am bored in my Mathematics class my mind wanders to other things.					
25. I become bored in my Mathematics class when the tasks are too easy.					
26. Boredom affects my performance negatively.					
27. Not many of my friends are bored in my Mathematics class.					

13. Do you think your teacher knows when you are bored?

.....
.....

14. What does your teacher do when he/she notices that you are bored during the Mathematics lesson?

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

15 (a) Do you get bored in other subjects.....
(b) Which subjects?

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

29. What do you suggest should be done in your Mathematics class to avoid boredom?

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

30. Are there any other comments relating to boredom that you would like to make?

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

Thank you for completing this questionnaire.

Appendix 2: Sample of permission letter

Dear Sir/Madam

Request for permission to conduct research at your school

I am Xoliswa Mbelani, a post level one educator at XXXXXXX S.S.School. I am also a Masters student in mathematics education at Rhodes University under the supervision of Professor Marc Schäfer. We request you to grant us permission to conduct some fieldwork for my research project at your school. Our interest is to research the nature and prevalence of boredom amongst Grade 10 Mathematics pupils.

From our experience and the literature we studied, there is evidence that suggests that the levels of boredom experienced by pupils are a significant factor when learners are considering their subject choices i.e. whether to do Mathematics in Grade 10 or not. Within the context of the mathematics classroom, my study will thus specifically investigate different notions of boredom, its prevalence, its nature and the extent to which it has affected the subject choices of Grade 10 pupils. I wish to survey as many Grade 10 pupils in the Grahamstown region as possible and thus request the participation of your Mathematics Grade 10 learners.

The data collection process of the study that involves your school entails your Grade 10 mathematics pupils completing a questionnaire. The questionnaire consists of a mix of open-ended and Likert-scale type questions and should not take more than 30 minutes to complete. Once you have given permission for us to conduct this research we would approach the Grade 10 mathematics teacher you recommend, in order to plan access to the classes and assist with conducting the survey.

This research project has the approval and the ethical clearance of the Rhodes University Education Department's Higher Degrees Committee and we would highly appreciate your cooperation. The participating schools and pupils will remain anonymous, and we will gladly share the final thesis and findings with you.

Could we please ask you to complete the enclosed form and send it back to us in the stamped envelope.

I hope my request will receive your favourable consideration.

Yours faithfully

Mbelani Xoliswa (Mrs)

Prof Marc Schäfer (FRF Mathematics Education Chair and supervisor)

Appendix 3: Follow-up letter

Dear Sir/Madam

Re- Request for permission to conduct research at your school

This is a friendly reminder about the letter we sent you on the 12-02-2013 to request permission from you to conduct some research about the prevalence and nature of boredom amongst Grade 10 learners in Grahamstown schools for my Masters research project.

I am Xoliswa Mbelani, a post level one educator at XXXXXX S.S.School. I am also a Masters student in mathematics education at Rhodes University under the supervision of Professor Marc Schafer. We requested you to grant us permission to conduct some fieldwork for my research project at your school. Our interest is to research the nature and prevalence of boredom amongst Grade 10 Mathematics pupils.

From our experience and the literature we studied, there is evidence that suggests that the levels of boredom experienced by pupils are a significant factor when learners are considering their subject choices i.e. whether to do Mathematics in Grade 10 or not. Within the context of the mathematics classroom, my study will thus specifically investigate different notions of boredom, its prevalence, its nature and the extent to which it has affected the subject choices of Grade 10 pupils. I wish to survey as many Grade 10 pupils in the Grahamstown region as possible and thus request the participation of your Mathematics Grade 10 learners.

The data collection process of the study that involves your school entails your Grade 10 mathematics pupils completing a questionnaire. The questionnaire consists of a mix of open-ended and Likert-scale type questions and should not take more than 30 minutes to complete. Once you have given permission for us to conduct this research we would approach the Grade 10 mathematics teacher you recommend, in order to plan access to the classes and assist with conducting the survey.

This research project has the approval and the ethical clearance of the Rhodes University Education Department's Higher Degrees Committee and we would highly appreciate your cooperation. The participating schools and pupils will remain anonymous, but we will gladly share the final thesis and findings with you.

Could we please ask you to complete the enclosed form and send it back to us in the stamped envelope.

I hope my request will receive your favourable considerations
Yours faithfully

Mbelani Xoliswa (Mrs)

Prof Marc Schafer (FRF Mathematics Education Chair and supervisor)