

# **RHODES UNIVERSITY**

## **DEPARTMENT OF EDUCATION**

The teaching of Mathematics in Multigrade classrooms at the Upper Primary phase  
in selected Namibian schools.

Submitted by

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## **ABSTRACT**

The Namibian curriculum favours knowledge with understanding and application of knowledge and skills, because facts that are learned with understanding are easier to remember. This made learners to be able to represent mathematical situations in different ways and for different purposes. It also motivates teachers to contextualise the content to make mathematics teaching and learning more interesting and enjoyable to teachers and learners. However, some mathematics teachers are challenged by being required to teach multigrade classes, due to a massive response to improved access to education. Multigrade teaching is seen as a difficult practice especially when teachers are not well prepared to teach combined grades.

This case study focused on the teaching of mathematics at Upper Primary Phase. An Interpretive paradigm was used to understand the teachers' experiences and their teaching methods. Hence the study aimed to investigate how teachers deliver their mathematics lessons in multigrade classrooms, considering the good practices and challenges that may occur.

The findings revealed that teachers mostly use their monograde pedagogical knowledge, resulting in using quasi-monograde with a common timetable approach when teaching mathematics in multigrade settings. Although learners have access to the common mathematics syllabus, the quality of teaching the subject in multigrade classrooms seems to be affected due to the lack of teacher training in multigrade teaching. Also, equity and democracy need to be considered more than it currently is in terms of resource distribution to multigrade schools.

Good practice of multigrade teaching existed in building on lower grade competencies, introducing lessons with common activities, as well as the concentration on lower grades which make learners independent. However, insufficient time, lack of knowledge in multigrade and curriculum knowledge in particular seem to challenge teachers and learners. Therefore, multigrade teachers need to be part of curriculum development for them to master the syllabus. These teachers will assist in developing multigrade resources for integration, contextualisation and more enrichment activities for high achievers.

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## **DECLARATION**

I, Loide Ndakondjelwa Kapenda, hereby declare that the work contained in this thesis is my own work, and that it has not been submitted for any degree or examination at any other university.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

## **ACRONYMS USED IN THIS STUDY**

AT	Advisory Teachers
B.ED	Bachelor of Education
BETD	Basic Education Teacher Diploma
BIS	Basic Information Science
CPD	Continuous Professional Development
ECP	Education Certificate Primary
EMIS	Education Management Information System
ETP	Education Theory and Practice
ETSIP	Education Training Sector and Improvement Program
HE	Home Ecology
HOTS	High Order Thinking Skills
LCE	Learner-Centred Education
MBESC	Ministry of Basic Education, Sport and Culture
MEC	Ministry of Education and Culture
MoE	Ministry of Education
MUSE	Multigrade School Evaluation
NGO	Non-Governmental Organisation
NIED	National Institute for Educational Development
NSHE	Natural Science and Health Education
P.S.	Primary School
PAD	Planning and Development
PQA	Programme Quality Assurance
RME	Religious and Moral Education
SACMEQ	Southern Africa Consortium for Monitoring in Education Quality

## TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGEMENTS .....	iii
DECLARATION .....	iv
ACRONYMS USED IN THIS STUDY .....	v
LIST OF FIGURES AND TABLES.....	x
CHAPTER 1 .....	1
INTRODUCTION .....	1
1.1 Introduction.....	1
1.2 The context of the study.....	1
1.2.1 Why multigrade teaching in Namibian education?.....	2
1.2.1.1 Access to education.....	2
1.2.1.2 Migration to cities .....	3
1.2.1.3 Staffing norms.....	3
1.3 Research background.....	4
1.4 Research question .....	6
1.5 The research sites.....	7
1.5.1 Location and regional context.....	7
1.5.2 Economic activities .....	8
1.6 Overview of the study.....	8
CHAPTER 2 .....	10
LITERATURE REVIEW .....	10
2.1 Introduction.....	10
2.2 A historical background of Namibian mathematics education .....	10
2.3 Multigrade teaching .....	12
2.3.1 What is multigrade teaching?.....	12
2.3.1.1 Multigrade teaching - a necessity .....	13
2.3.1.2 Multigrade teaching - a pedagogical choice .....	14
2.3.2 Opportunities and challenges for multigrade teaching .....	14
2.3.3 Various practices of multigrade teaching .....	16
2.3.4 Multigrade teaching in the Namibian context.....	17
2.4 Teaching a mathematics multigrade classroom .....	17
2.4.1 The mathematics curriculum.....	19
2.4.2 The strategies of teaching and organizing a Multigrade teaching .....	21

2.4.2.1	Patterns of multigrade teaching .....	21
2.4.2.2	Strategies of multigrade teaching.....	24
2.5	Preparation of teachers in multigrade teaching.....	28
2.6	Continuous professional development for multigrade teachers.....	30
2.7	The analysis of the Namibian mathematics syllabus .....	31
2.8	Conclusion .....	36
CHAPTER 3 .....		37
RESEARCH METHODOLOGY.....		37
3.1	Introduction.....	37
3.2	Research design .....	37
3.2.1	Orientation .....	37
3.2.2	Sample.....	38
3.2.3	Method .....	38
3.2.4	Data collection methods.....	39
3.2.4.1	Interviews.....	39
3.2.4.2	Piloting the Instrument.....	40
3.2.4.3	Observation .....	40
3.2.4.4	Document analysis .....	41
3.3	Data analysis .....	41
3.4	Research ethics.....	41
3.5	Limitations .....	42
3.6	Conclusion .....	42
CHAPTER 4 .....		43
DATA PRESENTATION AND ANALYSIS .....		43
4.1	Introduction.....	43
4.2	Description of four schools, teachers, their classes and their teaching approaches.....	43
4.2.1	The visited Primary Schools (P.S.).....	44
4.2.1.1	Mbushoye Primary School.....	44
4.2.1.2	Haitange Primary School .....	44
4.2.1.3	Nelao Primary School .....	45
4.2.1.4	Jacky Primary School .....	45
4.2.2	Jatty .....	46
4.2.2.1	Jatty's profile .....	46
4.2.2.2	The arrangement and organisation in Jatty's class .....	46
4.2.2.3	The resources in Jatty's class .....	48
4.2.2.4	Planning for multigrade teaching.....	49
4.2.2.5	The teaching of combined grades .....	50
4.2.2.6	Vignette of Jatty's lesson .....	50

4.2.3 Janet .....	53
4.2.3.1 Janet's profile.....	53
4.2.3.2 The arrangement and organisation in Janet's class .....	53
4.2.3.3 The resources in Janet's class .....	55
4.2.3.4 Planning for multigrade teaching.....	55
4.2.3.5 Teaching of combined grades .....	55
4.2.3.6 Vignette for Janet's lesson .....	56
4.2.4 Bibi.....	59
4.2.4.1 Bibi's profile .....	59
4.2.4.2 The arrangement and organisation in Bibi's class.....	59
4.2.4.3 The resources in Bibi's class .....	60
4.2.4.4 Planning for multigrade teaching.....	61
4.2.4.5 The teaching of combined grades .....	61
4.2.4.6 Vignette for Bibi's lesson .....	62
4.2.5 Shiwa.....	65
4.2.5.1 Shiwa's profile .....	65
4.2.5.2 The arrangement and organisation in Shiwa's class.....	65
4.2.5.3 The resources in Shiwa's class .....	66
4.2.5.4 Planning for multigrade teaching.....	67
4.2.5.5 The teaching of combined grades .....	67
4.2.5.6 Vignette for Shiwa's lesson.....	68
4.3 Commonalities and differences.....	71
4.3.1 Classroom arrangement and organisations .....	71
4.3.2 Seating arrangements .....	71
4.3.3 The location of the teachers' tables .....	72
4.3.4 Distribution of resources in multigrade classrooms.....	72
4.3.5.1 Supply of facilities in multigrade schools.....	73
4.3.5.2 Distribution of resources in teachers' classrooms .....	74
4.4 Teaching of combined grades .....	75
4.4.5 Introduction.....	75
4.4.6 Planning for multigrade teaching.....	75
4.4.7 Classroom management strategies.....	76
4.4.8 How do teachers teach the two grades at the same time? .....	77
4.4.9 Teaching strategies.....	81
4.4.10 The use of language in multigrade classroom.....	83
4.4.11 Time management/ timetabling .....	85
4.4.12 Learners' involvement in multigrade teaching .....	86
4.4.13 Teachers' support from the regional or local school management .....	87
4.5 The Namibian syllabus with multigrade teaching .....	89
4.6 Teachers' experiences of teaching mathematics in multigrade classes .....	90
4.7 Challenges facing the multigrade teachers .....	91
4.8 Conclusion .....	92
CHAPTER 5 .....	94



CONCLUSION AND RECOMMENDATIONS .....	94
5.1 Introduction.....	94
5.2 Overview of key findings.....	94
5.2.1 Good practice in multigrade teaching.....	96
5.2.2 Challenges.....	98
5.3 Recommendations.....	98
5.4 Overview of the research process .....	100
5.5 Limitations of the study .....	101
5.6 Conclusion .....	101
REFERENCES .....	102
APPENDICES .....	109
APPENDIX A: Checklist for multigrade classroom observation.....	109
APPENDIX B: Checklist for lesson observation.....	110
APPENDIX C: Interview checklist .....	111
APPENDIX D: Teachers’ profile instrument .....	112
APPENDIX E: Letter to the regions .....	113
APPENDIX F: Interview transcript for Jatty.....	114
APPENDIX G: Interview transcript for Janet .....	122
APPENDIX H: Interview transcript for Bibi’s lesson.....	130
APPENDIX I: Interview transcript for Shiwa .....	135
APPENDIX J: Classroom observation transcript for Jatty .....	140
APPENDIX K: Classroom observation transcript for Janet.....	152
APPENDIX L: Classroom observation transcript for Bibi.....	161
APPENDIX M: Classroom observation transcript: Shiwa .....	173
APPENDIX N: Acceptance letter from Khomas Region .....	182
APPENDIX O: Acceptance letter from Hardap Region.....	183
APPENDIX P: Informed consent form for the teachers.....	184
APPENDIX Q: Bibi’s lesson preparation.....	185
APPENDIX R: Jatty’s lesson preparation .....	187
APPENDIX S: Janet’s term planning .....	188
APPENDIX T: Shiwa’s lesson preparation .....	189

## LIST OF FIGURES AND TABLES

### FIGURES

Figure 1: Regions of Namibia.....	7
Figure 2: Diagrammatic presentation of mathematics teaching methods .....	21
Figure 3: The diagrammatic presentation of different patterns for multigrade teaching.....	23
Figure 4: Floor plan of Jatty's class .....	48
Figure 5: A map of lesson presentation for Jatty's lesson.....	52
Figure 6: Floor plan of Janet's class.....	54
Figure 7: A map Janet's lesson presentation .....	58
Figure 8: Floor plan of Bibi's class .....	60
Figure 9: A map of Bibi's lesson presentation .....	64
Figure 10: Floor plan of Shiwa's class .....	66
Figure 11: The diagrammatic presentation of Shiwa's lesson .....	70

### TABLES

Table 1: The framework for improving curriculum.....	19
Table 2: The overall plan of the Upper Primary mathematics syllabus.....	32
Table 3: Profiles of Multigrade Upper Primary teachers.....	45

# CHAPTER 1

## INTRODUCTION

In small schools, multigrade teaching will be the norm. Wherever possible, no more than three year grades from the same phase ought to be in the same class. Special attention must be given to learners in Grade 1. Multigrade teaching often involves planning topics to be taught simultaneously at the different levels. In these situations, it is possible to organise group work around the same theme or topic.

(Namibia. Ministry of Education, Sport and Culture [MBESC], 1996, p. 30)

### 1.1 Introduction

Namibia is a country with sparsely populated areas, especially in the remote and mountainous regions. In these areas, the numbers of learners are very low (Namibia. Ministry of Education [MoE], 2006b). These learners too have the right to be included in the education plans for their geographic areas. To ensure that; the education sector have committed itself to finding ways to provide education to all children in the country, including those in sparsely populated areas or on farms. This will enable Namibian children living on distant cattle posts or in dense urban settlements to become part of the education system. Namibia. Ministry of Education and Culture [MEC], (1993), pointed out that “these learners will be given learning opportunities that are suited to their circumstances, and that permit them to enter the formal education system when that becomes possible” (p. 13).

This chapter introduces my study on the teaching of mathematics in Upper Primary multigrade classrooms. In addition to this introduction which is regarded as section one; there are six sections in this chapter. Section two contextualises the study by providing the background of the investigation. In section three, I provide the historical background of the research sites, and describe the location of the schools. Due to the unique characteristics of the schools in the study, I have avoided linking schools to regions. The fourth section indicates the research question. The fifth section deals with the approach used in conducting the research. The sixth section provides an outline of the thesis.

### 1.2 The context of the study

Namibia reformed her education policy after independence and shifted from “education for elite” to “education for all” (Namibia. MEC, 1993, p. 2). This move follows article 20 of the Namibian constitution which states that “All persons shall have the right to education” (Namibia. 1990, p.

14). The reform prioritized the teaching of mathematics, regardless of learners' gender, race, culture and ethnic group (Namibia. MBESC, 1996). It also emphasised that all learners should have the opportunity and necessary support to learn mathematics with depth and understanding. To fulfill the educational aims for equity, quality, access and democracy, mathematics was made compulsory up to grade 10 (Namibia. MEC, 1993).

Despite the driving force in the teaching and learning of mathematics, present outcomes reveal a low quality of learning achievements in mathematics, especially in the Upper Primary level (Namibia. Ministry of Basic Education Sport and Culture [MBESC], 2003). Thus, the Namibian education system is challenged by the provision of quality education, which includes the quality teaching of unified mathematics content to learners in sparsely populated and remote areas (Namibia. MBESC, 1996). In these areas, learners are few in number and they are therefore taught in combined grades. "Multigrade teaching" is the standard international term used for such a combination of grades (Birch & Lally, 1995, p. 1).

The teaching of combined grades has become one of the main concerns in Namibian education and it is receiving special attention from the Ministry of Education. This is done to provide accessible education to all children regardless their age, culture, gender or race and for them to have access to quality education (Namibia. MBESC, 1996). According to Little (2001) multigrade classes are seen as a solution to the provision of education to rural and sparsely populated areas.

### **1.2.1 Why multigrade teaching in Namibian education?**

According to Beukes (2006) multigrade teaching is not a new concept in Namibian education. It has been in existence since the introduction of formal education. During the reform, the ministry of education made it a norm, but none of the syllabus developers have addressed the issue of teaching in multigrade classes. However, it is seen to be addressing educational disparities by providing access for schooling (Namibia. MEC, 1993).

#### ***1.2.1.1 Access to education***

The principal component of extending access to education is to expand capacity. This involves an increase in the number of schools and classrooms. There are sufficient places for all Namibian

children. Providing access alone cannot be reached without considering quality, equity and democracy (Namibia. MEC, 1993).

Multigrade teaching existed to include all Namibian children, whether living on distant cattle posts or in dense urban settlements in the education system. This was done to increase the rate of participation of all citizens in basic education, because many parents registered their children in schools, to respond to “access” as an educational goal (Namibia. MEC, 1993, p. 13). More schools were established on farms as well as in other sparsely populated areas. In some rural and farm schools, this resulted in a low ratio of learners per teacher and the schools had no option but to combine grades.

#### ***1.2.1.2 Migration to cities***

Basic education was introduced to prepare Namibians for self employment. By doing so, the Namibian government attempted to reduce the flow of people from rural areas to cities (Namibia. MBESC, 1996). However, the lack of employment in rural areas caused many people to migrate to townships, where jobs could be found. These people moved with their immediate families, including their children. Also, the lack of teaching and learning materials in rural schools has contributed to the growing number of learners in township schools. As I observed, some rural parents who can afford to pay, have moved their children from rural schools to better equipped schools in towns.

Multigrade existed in these areas due to various movements to and from the cities. Thompson (1981) sees migration to cities as “a natural and essential movement because it contributes to proper economic activity” (p. 104). This movement is supported by Amukugo (1993) who observed the linkage between education and social change. As a result of this migration, some rural areas were left with too few learners to make up a class. Consequently, many of these areas combined learners of two or more grades to form multigrade classes.

#### ***1.2.1.3 Staffing norms***

Human resources or, rather, the lack of them is a critical factor in the continued existence of Multigrade Teaching. In some countries, formulae exist which determine the staffing complement to be assigned to schools: in others it is simply a matter of appointing a given number of teachers and in the event that the number is inadequate

to cover the number of grades required Multigrade Teaching results: in still others one teacher is appointed to cope with the children who attend in whatever way is possible with a Multigrade Teaching approach being inevitable (Birch & Lally 1995, p. 17).

In Namibia, the number of teachers teaching at each school is determined by the staffing norm. This norm aims for a ratio of 35 learners per teacher at the primary level and 30 learners per teacher at secondary level (Titus, 2004). The staffing norms are “cheap approaches” (Birch & Lally 1995, p. 17) used by governments to respond to the educational challenge of access to education, without considering quality, equity and democracy. This therefore contributed to the existence of multigrade teaching on many occasions. Before independence, the central and southern education regions had more qualified teachers, but these teachers were transferred to other regions due to overstaffing (Titus, 2004). This ministerial restriction left schools with no other option than to combine two or three grades where there are more grades than teachers. Therefore, multigrade teaching existed in these areas.

### **1.3 Research background**

The Namibian education reform mandated the National Institute of Educational Development (NIED) to be responsible for curriculum development and teacher education. Single grade syllabuses are developed at this institution. Although multigrade classes exist in Namibian education, there were no materials to assist and guide teachers in teaching multigrade. Based on this, a committee was established at NIED to look into possible solutions to assist multigrade teachers in Namibia. This committee consists of education officials from broad curriculum; professional development and research sub-divisions; and two representatives from regional education offices. The committee was tasked with developing a multigrade teaching manual (Namibia. [MoE], 2007b) and a multigrade teachers’ guide (Namibia. [MoE], 2007c) which could assist teachers in teaching multigrade classes effectively.

Being a research representative on a multigrade committee with a background in mathematics syllabus development, I recognised a need to gain knowledge about how teachers use the current mathematics curriculum in multigrade classes. This research aims to focus on and explore the teachers’ practice of teaching mathematics in multigrade settings. It will enable me to identify some of the problems and successes related to the teaching and learning of mathematics in

multigrade classes in Namibian schools. Many previous studies on multigrade teaching and learning focused on the causes and effect of learners' performance in multigrade settings (Veenman, 1995; Veenman, 1996; Russell, Rowe & Hill, 1998). Others have researched the differences between teaching in monograde and multigrade classrooms (Little, 1996).

In Namibia, very few studies have been conducted on multigrade teaching. Titus (2004) examined the management and leadership challenges that face principals in multigrade schools. In addition to that, Beukes (2006) looked at the views and perceptions of the educators involved in managing multigrade classes in Namibia. She also investigated the teaching of mathematics in the schools which follow the different ungraded system. However, none of these researchers studied the teaching of mathematics at Upper Primary Phase. It is against this background that the study was done to understand how mathematics is taught in Upper Primary multigrade classrooms in Namibia.

This research focuses on teachers, and explains how they teach in the Upper Primary Phase. This is because in my experience, Upper Primary is the most neglected phase in terms of teachers' Continuous Professional Development (CPD) training in Namibia. Since independence, I have observed that most teachers' professional development programs have focused on training of Lower Primary and Secondary teachers. In my view, if teachers at this phase are left out in terms of training, then the country will always have high failure rate at Grade ten.

In Namibia, "education for all requires that we develop a new way to think about our system of education and training and how we organize it" (Namibia. MEC, 1993, p. 4). It is against this background that the information gained during this study will be used to provide insight into the type of action which the MoE could take in order to assist the teachers that are handling multigrade classes in Namibia. The results will also be used to improve teachers' professional development activities, in order to address the gap between teacher education and real classroom practice. Through mentoring, teachers will then be assisted to overcome the problems they experience during this transition. Recommendations will be made on how the shortcomings in the mathematics curriculum or the implementation thereof could best be addressed. The

identification of successes or good practice in multigrade teaching may also help the Ministry of Education to identify the multigrade centres of excellence, where teachers can go for mentoring.

The study will also be used to:

- inform the Mathematics and Science sub-division at NIED. This sub-division will develop strategies to assist teachers of multigrade classrooms to improve their teaching and learning strategies;
- help mathematics teachers teaching in multigrade settings to overcome some of their challenges and also to share opportunities for multigrade teaching; and
- to inform the revision of mathematics curriculum by making it more suitable to multigrade classroom teachers.

#### **1.4 Research question**

This research aimed to answer the following question:

- How do teachers teach mathematics in multigrade upper primary classrooms in Namibia?

In particular, I wanted to find out:

- the teaching strategies that teachers use to teach mathematics in multigrade classrooms.
- the extent of assistance given to multigrade teachers by colleagues at their schools, clusters, circuits and at regional level; and
- if there are good practices in the classrooms visited, which one can recommend to be used by other multigrade teachers in Namibia.

This question was selected because the teachers in Namibia are not trained to teach multigrade classes. I therefore developed a keen interest in finding out how they use their knowledge of teaching in monograde classes to teach a multigrade class. Also, as I mentioned in the previous section, the Namibian curriculum is designed for monograde teaching, not for multigrade teaching. For this reason, there is a need to research how multigrade classes are taught, and also to see if one may identify elements of good practice which may be adapted to assist teachers in this situation.



## 1.5 The research sites

### 1.5.1 Location and regional context

The study was conducted in four schools which are located in different educational regions: Omaheke, Khomas and Hardap. Pseudonyms were used to protect the identity of the schools. The sample included two farm schools, a town school and a school in semi urban area, or village. Each of these schools has combined the teaching of two Upper Primary grades in a multigrade class. The enrolment in combined Upper Primary grades ranged between 15 and 30 learners per classroom. All of these schools have infrastructure (permanent structures) covered with corrugated iron.



**Figure 1: Regions of Namibia**  
(Abraham, S. 2006, Graphic Design Unit, Rhodes University, Grahamstown),

The three regions where the study was conducted share boundaries, with the Omaheke region sharing a border with Botswana. The inhabitants of these regions rely heavily on commercial farming. It is against this background that multigrade classes exist, because of the poorly populated areas in the farming community. The inhabitants of these regions mostly speak Afrikaans which is not their mother tongue, but the regions and schools are multicultural. Some people also speak Otjiherero and Khoekhoegowab. A few people working on the farms speak Oshindonga, Oshikwanyama, and Silozi and Rukavango dialects. All the above mentioned dialects are recognised languages and they are taught as a medium of instruction from grades one through to three in Namibia.

### **1.5.2 Economic activities**

Most of people in these regions are employed by the government and also by Non-Government Organizations (NGOs). A number of them are also employed by individuals and some work on commercial farms. Most people, especially in Omaheke and Hardap depend on commercial farming of livestock. Some of the people on farms are not employed and this has caused them to migrate to towns in their respective region or in other regions, for them to be able to earn enough income to assist their families.

In many cases, this has resulted in school children staying alone or with their relatives apart from their biological parents. If this happens, children have no other option but to do domestic work after school, which prevents them from doing their homework after normal school hours.

Most teachers in farm schools commute from nearby towns. In many cases, these teachers travel back to town immediately after school. This limits the attention they pay to the learners' problems after normal school hours.

## **1.6 Overview of the study**

This thesis consists of 5 chapters. The first chapter gives an overview of the study and explains why it was conducted.

Chapter 2 is a literature review that gives an overview of multigrade teaching in Namibia, teaching and classroom management strategies used to teach multigrade classes, as well as the teaching of mathematics.

Chapter 3 presents the methodology used to carry out the study. It also provides the research design as well as the methods used to collect, analyse and report the collected data.

Chapter 4 is the presentation and analysis of data. This chapter gives an understanding of what teachers are doing in their respective multigrade classrooms during the mathematics lesson. It also indicates how well or how difficult it is to teach mathematics in multigrade classrooms.

Chapter 5 concludes the study. It also gives recommendations for multigrade teaching as well as the problems experienced during the research process.

## **CHAPTER 2**

### **LITERATURE REVIEW**

Since it will take us some time to expand our schools sufficiently, to accommodate all young Namibians, we must find ways to enable those who are not in school to be active learners as well. Whether living at distant cattle post or in dense urban settlements these youths, too, must become part of our education system. For them, we must be especially imaginative in creating learning opportunities that are suited to their circumstances and that permit them to enter the formal education system when that becomes possible.

(Namibia. MEC, 1993, p. 13)

#### **2.1 Introduction**

Finding ways to accommodate all learners in schools has been at the heart of education in independent Namibia. The aim was to provide access to education despite the environment in which the children are found. In some cases where there is a shortage of teachers, or in cases where learners are few, teachers attempt to teach combined grades.

This chapter presents the historical background of mathematics education in Namibia. The chapter will present the definition of multigrade teaching as well as its status and prevalence in the Namibian education system. It will also discuss the teaching of mathematics and in particular the teaching of mathematics in a multigrade class. Finally, it attempts to establish whether the implementation of multigrade teaching has been informed by educational aims of access, equity, quality and democracy. To do that, I present an overview of multigrade teaching theories and briefly point out how these theories relate to the teaching of mathematics in a multigrade setting in Namibia.

#### **2.2 A historical background of Namibian mathematics education**

The education system before independence tended to ignore key subject areas such as mathematics and science because of the beliefs underpinning apartheid and colonial education that the 'Bantu' were to be educated for entering the manual labour market (Amukugo, 1993). Mathematics and Science were severely neglected and regarded as being for the elite. This became one of the reasons why apartheid education was seen as inferior. It is against this background that the reforms which were brought about by independence had a goal of making

mathematics serve the same purpose for all Namibian citizens in promoting functional numeracy and mathematical thinking to all learners in Primary and Secondary schools. By doing so, mathematics is believed to prepare the Namibian children for the world of work at the end of Primary and Secondary education. Namibia. MEC, (1993) states the principle underlying the teaching of mathematics in Namibian schools which is embodied in the following aims:

- to develop positive attitudes towards mathematics,
- to assist learners in acquiring the basic number concepts and numerical notation,
- to help learners understand and master the basic mathematical concepts and operations,  
and
- to help learners apply mathematics in everyday life.

(p. 56)

With such detailed aims, mathematics is seen to have the potential to promote learning. Its aims are in line with the educational goals of access, equity, quality, democracy and efficiency in education for all (Namibia. MBESC, 1996). Moreover, mathematics can be used as a tool which could help transform the nation into a knowledge based society (Namibia. MoE, 2006a) and assist the country to reach its vision 2030<sup>1</sup>.

In my opinion, all learners need to understand the purpose of doing mathematics at school in order to have an interest in the subject. This subject mathematics is important because it provides learners with more opportunities to choose career paths (Namibia. MoE, 2006b). The need is more crucial for those intending to become teachers, medical doctors and nurses as well as economists. It is against this background that the subject was made compulsory up to Grade 10 (Namibia. MBESC, 1996). The implication of this is that learners are given more time to complete the basic mathematics competencies which are required for life. Although mathematics educators are challenged by the poor performance in mathematics, the Education Training Sector and Improvement Program (ETSIP) assume that mathematics will be compulsory up to Grade 12 (Namibia. MoE, 2008). I regard the selection of the mathematics content which will be made

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<sup>1</sup> The dream aiming at improving the quality of life of the Namibian people by 2030.

compulsory as a challenge to the curriculum developers and mathematics experts in the country. The human resources to teach compulsory mathematics in Namibia also seem not to be available.

Since independence, the head of state aimed to upgrade the teaching of mathematics. Despite this, present outcomes reveal the low quality of learning achievements in the subject (Namibia. MoE, 2007a). Various studies have been done, in order to ascertain the factors contributing to poor performance in mathematics, in order to inform its teaching methodologies. Namibia (2002) identified the lack of equity in the distribution of resources in the nation as a contributing factor to poor performance in mathematics. This includes a lack of qualified mathematics teachers, especially at Upper Primary level. Marope (2002) has stated that poor learning of mathematics at the primary level carries over to higher levels. The analysis of national examination results since 1990 has also revealed the evidence observed by Marope (2002). This statistic shows that 46 per cent of the candidates for the Junior Secondary school examination (Grade 10) attained the minimum level required for entry into Grade eleven. Only 7 percent attained an average of a 'B' grade or higher. Statistics also revealed that the proportion of "un-graded and incomplete" scripts (i.e. clearly failed scripts), was 40 percent for Grade 10 mathematics and 27 percent for Grade 12 mathematics. In addition, Namibia ranked the lowest in the Southern and Eastern Africa Consortium for Monitoring and Educational Quality (SACMEQ) test for primary school mathematics which took place in 2002 (Namibia. MBESC, 2003).

The above mentioned studies provided a clear indication that there are problems with mathematics that need to be addressed. The problems could be related to the mathematics curriculum. They could also be attributed to the way in which the subject is implemented and taught in schools. The situation could be worsened when the teacher instructs combined grades.

## **2.3 Multigrade teaching**

### **2.3.1 What is multigrade teaching?**

Multigrade teaching is an educational system whereby learners of different ages, grades and abilities (Birch & Lally, 1995; Little, 1996; Mason & Burns, 1996) are taught in a single classroom or in the same group (Little, 1996). It can also be defined as a class comprising of two or more grade levels for which one teacher is given responsibility (Mason & Burns, 1996) or an administrative device used to cope with declining students' enrolment or uneven class sizes

(Veenman, 1996; Mason & Burns, 1996). They further stressed that multigrade cannot be confused with multi-age groups, where children of different ages are grouped together for educational and pedagogical benefits.

As seen above, the definition of multigrade teaching is elusive because of the wide meaning attached to the concept. In some countries, various names are used such as “multilevel”, “multiple class”, “composite class”, “vertical group” and “family class” (Little, 1996, p. 8; Little, 2006). Some schools are called Multigrade Schools or Unitary Schools because there are only “one teachers teaching two or more grades simultaneously” (Wolff & Garcia, 2001, p. 1). However, the following definition might be of great assistance to this study: “two or more grades are taught simultaneously” (Little, 1995, p. 17). This definition was chosen because of its relevance to the Namibian education system which uses the grading system and teaches two or more grades simultaneously. Hence the international term “multigrade teaching” was adopted.

Aksoy (2007) stated that multigrade teaching is widespread in rural areas of developing countries, and it aims to provide access for children to “universal primary education” (p.1). Thomas & Shaw (1992); Bray as cited in Benveniste & McEwan (2000, p. 33) also regarded multigrade as “a cost-effective” alternative to expanding educational access in thinly populated areas. Therefore, multigrade teaching can take many forms due to its numerous meanings and situations. It can arise through necessity or through pedagogical choice.

#### ***2.3.1.1 Multigrade teaching - a necessity***

In many developing countries, multigrade teaching was introduced as a necessity. This means that the system existed to remove the educational imbalances. The terms “combination classes”, “forced mixed age classes” and “forced mixed grade” usually refer to settings arising through necessity. UNESCO/APEID (1982) in Little, 1994; Murlyan-Kyne, 2007) see multigrade systems which are introduced through necessity as more complex, with many problems in terms of financial, geographic and demographical challenges. Some of these are associated with large classes, few teachers with few incentives, insufficient training, and few resources.

### ***2.3.1.2 Multigrade teaching - a pedagogical choice***

Multigrade classes are widespread and the concept is associated with rural schools, but urban schools can also employ multigrade schools (McEwan, 1998). While developing countries are struggling with multigrade resources, developed countries have chosen multigrade as a pedagogical method of teaching. In these countries, multigrade teaching is presented as a powerful pedagogical tool for promoting independent and individualised learning (Little, 2001). The pedagogical choice of Multigrade teaching results when the practice is purposely selected by the institution. The terms ‘vertical grouping’, ‘ungraded’, ‘non graded’ and ‘family grouping’ usually refer to settings arising through choice. For this reason, provision is made for policy makers and citizens to decide on the appropriate pattern and extent of multigrade teaching (Little, 2004). Birch & Lally (1995) believe multigrade to be “the best form of education for children”, hence it is more observed in lower primary schools (p. 13).

### **2.3.2 Opportunities and challenges for multigrade teaching**

Multigrade teaching is believed to benefit learners in different way (Mulryan-Kyne, 2005). In addition to this, a UNESCO/APEID study cited in Little (2004, p. 10) also identifies the benefits of multigrade teaching thus:

- Learners develop self study skills
- Learners cooperate across age groups, resulting in collective ethics, concern and responsibility
- Learners help each other
- Teachers can organise both remediation and enrichment activities for low and high achievers respectively. more discreetly than in monograde classes

These benefits are in line with McEwan (1998, p. 1) who believes that multigrade promotes “participatory learning” where learners learn at their own pace. It was also noted that low-achieving learners have more opportunities to repeat work which is not the case with single-grade settings because learners are promoted to a new class with a new teacher. Younger children are also believed to learn more quickly and absorb the content from the older learners (Namibia. MoE, 2007b). In turn, this can help learners in lower grades to cope with their work for the upcoming year.



Moreover, multigrade teaching benefits teachers because they spend more time with learners, which can help them to detect specific learning difficulties and know the development of each child very well. Having this knowledge will enable teachers to have sufficient information on how to assist specific learners. As we have combined grades, the teacher has to use the prepared teaching aids for all classes, especially when teaching similar topics. This will then give them more time to prepare because information which is relevant to all the grades can be shared at the same time using the same resources. This suits the common timetable (Lungwangwa, in Little, 2001) where learners are taught the same subject and the same topic, with only the basic competency differing. Sharing of resources across grades also has its disadvantages of repetition, and this can cause boredom, especially for high achievers.

Although the above-mentioned advantages of multigrade teaching exist, there are also challenges in multigrade settings. Boredom is regarded to be the worst challenge to learners in multigrade classes because if a learner stays in an unmotivated teacher's class where learning is not taking place, they will be wasting their time. According to Kyriacou (1991, p. 55) teachers need to maintain learners' involvement and to be "withitness<sup>2</sup>" during their teaching. In addition, Birch & Lally (1995) noted that multigrade teachers experience problems of poor communication, isolation and delays in receiving messages from outside their institutions, due to the distances where the schools are located. They see the lack of communication as an advantage which can prevent multigrade schools from being disturbed by outside sources, but it can also be a burden because teachers cannot receive information on time with regard to professional development activities.

Lack of resources ranging from fixed seating and physical structures to basic health facilities such as toilets are also experienced. In many Namibian multigrade schools, the local community has been involved in the provision of facilities, while the government provides the rest. This is not always the solution because the provision of these facilities depends on the wealth of the community. As Birch & Lally argue, "In unequal situations equity will only be served with some form of equalisation policy which must come from the centre" (1995, p. 16). In Namibia, the

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<sup>2</sup> A general knowledge of what is going on in class.

centre can either be the Ministry of Education, the Regional Education Office or an NGO which supports the schools.

In addition, lack of curriculum resources and teaching materials for multigrade teaching is also part of the challenge (Birch & Lally, 1995; Little, 1990). This lack is complicated by other issues such as distance and communication problems. Even in countries which may be regarded as reasonably well resourced for single-grade teaching, too little attention has been given to providing multigrade teachers with appropriate resources. This may be a result of the entirely mistaken view that what is available can be readily adapted. The adaptation will therefore result in a greater work load for a multigrade teacher who is under stress due to additional high teaching demand.

### **2.3.3 Various practices of multigrade teaching**

Birch & Lally (1995, p. 7) identify several forms of multigrade teaching that are used in some countries. These are:

- practice used to teach the nomads and teacher follows the community;
- residentially stable teacher who serves communities as they pass;
- the combination of the two approaches, where more stable nomads and more mobile ones have resident and itinerant teachers respectively; and
- the fixed schools where teachers and learners use the permanent infrastructures.

This situation highlights the fact again that multigrade teaching is found in association with other forms of social and economic deprivation. The needs of such persons embrace a range of services including health and welfare, as well as education. To support this, Birch & Lally (1995) assert:

Multigrade Teaching is believed to provide an excellent opportunity for the needs of the whole child and the child in his or her community to be recognized and addressed. In this context, Multigrade Teaching is not merely about 'academic' education but addresses the health, education and welfare needs of children – in the social and community context in which they live. (p. 10)

However, multigrade teaching can also occur in towns where there are very few learners in certain schools.

#### **2.3.4 Multigrade teaching in the Namibian context**

Namibian curriculum assumes multigrade teaching to be the norm in small schools, but it opposes the combination of three grades as well as the combination of Grade 1 with other grades (Namibia. MBESC, 1996). However, what is happening in reality is the combination of Grades 1 and 2; 3 and 4; 5 and 6; as well as 6 and 7. In some cases, the combination can consist of three grades but in the case where the school has no other alternative, they combine all the Lower Primary grades or all Primary grades - Grades 1 to 7. This study focused on the combined upper primary grades.

Despite its prevalence in many schools; multigrade teaching remains invisible in Namibian education. The Educational Management and Information System (EMIS) have failed to produce relevant statistical data on these types of classes. As Little (2001) observes, these types of classes are a solution to the provision of education to rural and sparsely populated areas aimed at removing educational imbalances.

Based on these assertions I wind up this discussion by briefly looking at the teaching of mathematics in general as well as the teaching of mathematics in the multigrade Upper Primary Phase. I would also like to see how suitable the mathematics curriculum in Namibia is, for multigrade schools.

#### **2.4 Teaching a mathematics multigrade classroom**

Sawyer (1993) asserted that successful teaching and learning of mathematics depends on the quality factors of planning, teaching and evaluation; interaction between teachers and between teachers and learners; the support given by the mathematical coordinator; the support given by heads of teachers as well as the quality and availability of teaching materials. Similarly, Kyriacou (1991) argued that teachers' development in teaching relies on agencies both within schools and outside schools. Support in Namibian schools appears poor due to distance as well as the availability of resources to enable Advisory Teachers and Inspectors of Education to assist multigrade teachers. A good example of this was the training of all multigrade teachers which took place for the first time in the Namibian history in 2007. This failure in training teachers supported Berry (2006) who noted that "teachers find planning and preparation for multigrade classes more difficult and time consuming than planning and preparation for monograde classes"

(p. 31). Namibian multigrade teachers had similar problems before they received training. Since this training occurred only once and had no follow-up, some teachers might also be in need of another round of training in order to become proficient in the teaching of multigrade classes.

Askew (1998) identified three aspects of the mathematics curriculum which are generally used in UK as:

- *The intended curriculum* – these are expectations of what learners should learn and it includes what is stated in the syllabus, year plans, schemes of work, lesson preparation, text books and other planned teaching and learning materials.
- *The implemented curriculum* – this includes what teachers are doing in their lessons and how they are doing it. There may be a difference between the implemented curriculum and intended curriculum.
- *The attained curriculum* – this includes what learners have learned. Even if learners have gone through a similar implemented curriculum, they will have different ways of grasping the knowledge due to their pre-knowledge and experiences. Hence the attained curriculum will differ too.

Mathematics teachers need to consider these aspects of curriculum in order to understand the teaching of mathematics. Those practicing multigrade teaching are not the exception here either because they need to implement the intended curriculum which is set for monograde and see if it is also applicable to multigrade teaching. However, the training of multigrade teachers did not include the above mentioned types of curriculum. The understanding of curriculum to some teachers is also questionable because some of them are teaching without teacher qualification.

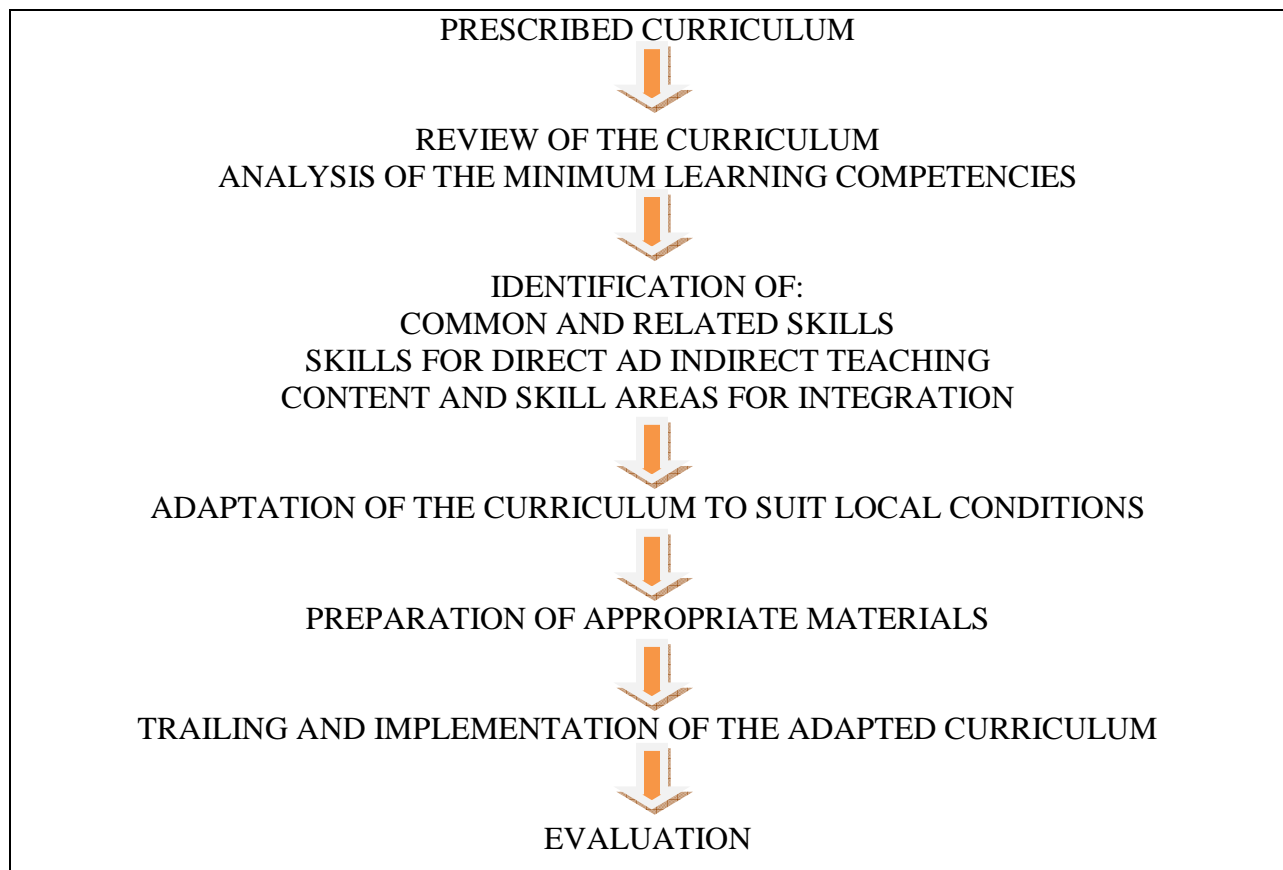
Mathematics, being the most feared subject in Namibia (Namibia, MoE. 2009 in printing) needs to be taught thoroughly and efficiently in multigrade classrooms. For teachers to teach effectively, their content knowledge (Kilpatrick, Swafford, & Findell, 2001) pedagogical knowledge and the knowledge of the curricula need to be well developed. According to Simmons (1993) the curriculum knowledge required in this case is that of knowing the vertical relationship (basic competencies in the same subject but different grades) as well as the horizontal relationship (basic competencies in different subjects of the same grade). Although all teachers need to know these relationships (horizontal and vertical), multigrade teachers need to

understand the horizontal and vertical relationship of the mathematical content more, because they are dealing with two or more grades in their daily teaching lives. These teachers also need to know the link between the mathematical content and other subject content for them to be able to “teach across the curriculum” Namibia (2006, p. 2).

#### 2.4.1 The mathematics curriculum

As explained above, knowledge of the curriculum is required in the teaching of multigrade classes. Birch & Lally (1995) suggested a framework for improving the curriculum as indicated in Table 1 below.

**Table 1: The framework for improving curriculum**  
Adapted from Birch & Lally (1995)



The above-mentioned framework is done in curriculum development processes, which involve curriculum developers, mathematic experts and teachers. Many countries have a spiral curriculum, including Namibia. Thus, this process seems to be important in the teaching of

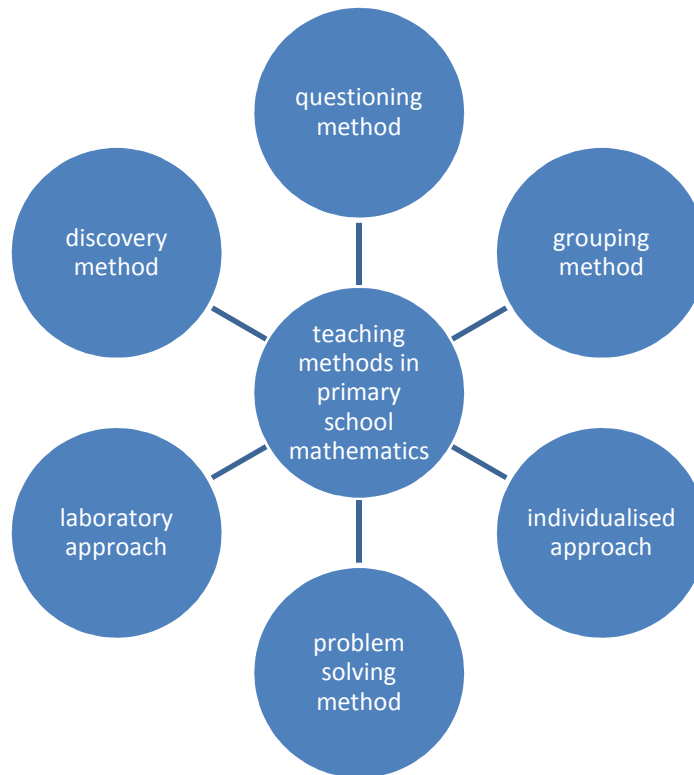
multigrade classes too, because teachers have to study the syllabi for the combined grades and devise mechanisms of presenting the content to these combinations of learners.

Birch and Lally (1995) recommend that teachers be involved in curriculum development. Yet the Namibian mathematics curriculum development does not include multigrade teachers. The curriculum development meetings take place three times a year and this made it difficult for multigrade teachers to participate in the curriculum because their classes will not be attended for the duration the teachers are attending the meetings. This made it impossible for them to be represented in curriculum development and also to see the relevance of the curriculum to multigrade teaching.

Although curriculum knowledge is required for teachers to teach well, subject matter knowledge is needed too. Leinhardt & Smith, 1985, cited in Simmons (1993, p.10) stated that the knowledge of subject matter includes knowing the:

- Concepts,
- Algorithmic operations,
- Connections amongst different algorithms,
- The subset on the number system being drawn upon,
- Understanding of types of pupil errors, and
- Curriculum presentation.

In addition to content knowledge, teachers also need to know a variety of successful teaching methods used to present mathematics lessons in general and multigrade lessons in particular. In order to teach well, teachers need to apply various teaching methods. Following is a self drawn diagrammatic representation of teaching methods in primary school mathematics listed by various researchers (Kalejaiye, 1985; Askew, 1998).



**Figure 2: Diagrammatic presentation of mathematics teaching methods**

In view of the above-mentioned methods, teachers have to consider “the level of the class, the abilities of learners, the nature of the mathematics topic, and the availability of facilities that they have at school in order to choose a suitable teaching method” (Kalejaiye, 1985, p. 22). However, the teaching methods need to be also selected whilst considering teaching strategies even if the extent to which teacher can be able to use suitable teaching strategies is not yet known in Namibia.

## **2.4.2 The strategies of teaching and organizing a Multigrade teaching**

### ***2.4.2.1 Patterns of multigrade teaching***

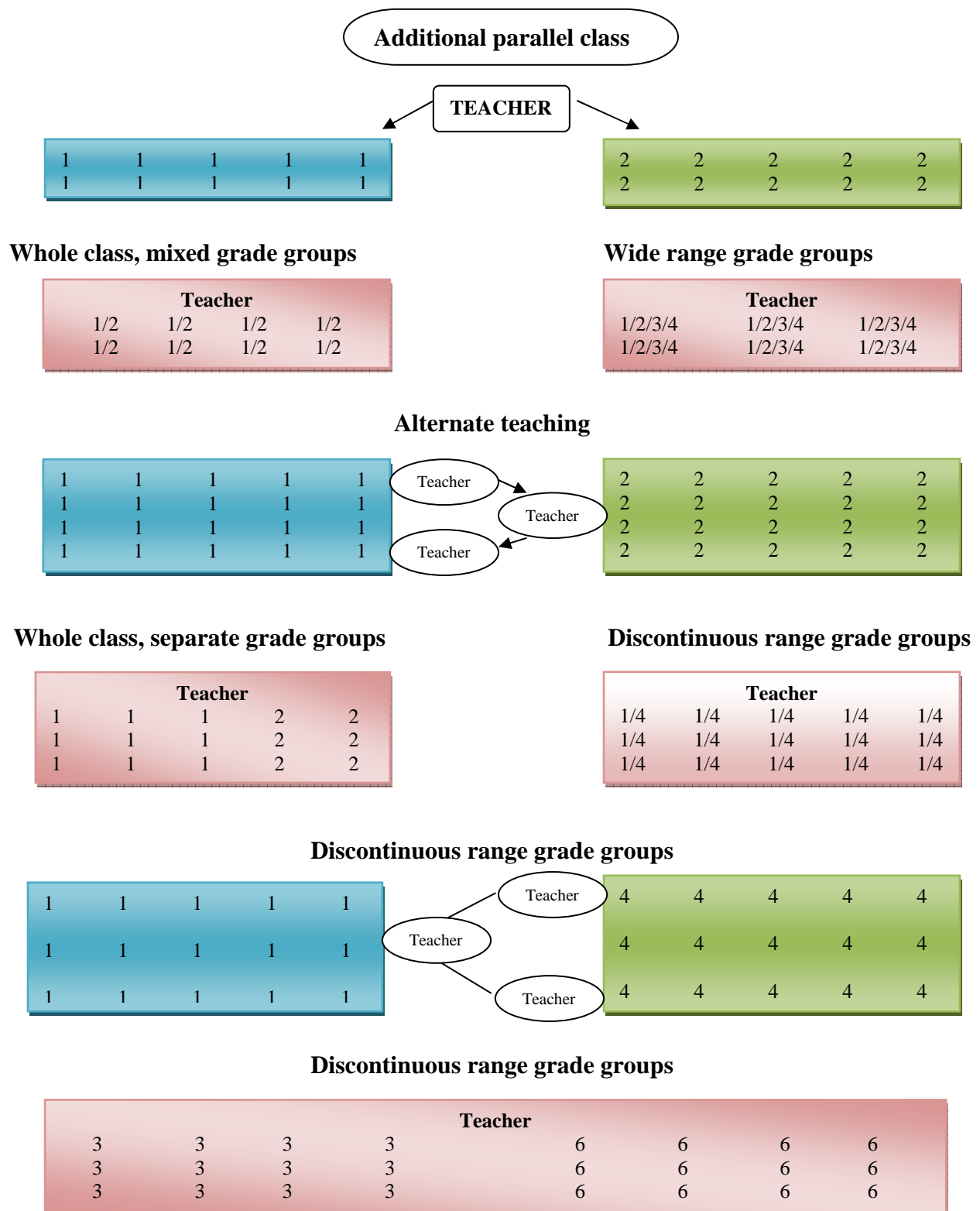
Lewin (2006) identified various patterns which are commonly used in multigrade settings as follows: additional parallel class where the teacher is teaching one grade and keep an eye on the other grade which may be doing individual or group activities; whole class, mixed grade groups where the teacher arranges the learners from different grades to sit in mixed groups and teaches the same content to the whole class; alternate teaching where the teacher takes turns to teach different grades which can be in the same or different class; in whole class, separate grade groups the teacher accommodates learners in one class but gives them the same or different

activities. The teacher can also decide to have wide ranging grade groups where the combination can stretch to cover more than two groups.

Lewin (2006) further describes three cases of discontinuous range grade groups. This can be done when the teacher compares the two grades that are not consecutive in one classroom with the learners from different grades seated in pairs of younger and older learners for pedagogic reasons. The second option for discontinuous groups is when the teacher alternates between two grades that are non-continuous and have rare cases of common activities because of the grade difference. The last option for discontinuous range grades is when the teacher groups discontinuous grades in one class but has them seated separately on different sides of the class.

Papert (1971) observed that a well organised classroom prepares children to think, to communicate their thinking, to accept that wrong answers can also be helpful, and to listen to and question their peers' ideas when asking for justification. Although Namibian teachers do their level best to arrange their classes for multigrade teaching, some schools in Namibia tried to avoid multigrade teaching by arranging double sessions where they can teach one grade in the morning and another one in the afternoon. The diagrammatic presentations of the above-mentioned patterns are shown below.





**Figure 3: The diagrammatic presentation of different patterns for multigrade teaching**  
 Adapted from Lewin (2006, p. 240 - 241)

As stated previously, multigrade teaching occurs mostly in schools where there are no resources. In many cases, learners of different grades are seated in one class. However, where the school has enough resources, they also separate the learners, and teachers walk from one grade to another during the time he/ she is teaching multigrade.

#### ***2.4.2.2 Strategies of multigrade teaching***

There are various strategies which one can use in teaching mathematics. One of these is whole class teaching (Miller, 1991a) which is commonly used in many classrooms. In addition to this, Little (2001) noted four curriculum adaptation strategies that are effective for multigrade classrooms. These are:

- *Multi-year curriculum spans* which spread the units of curriculum content across two to three grades rather than one, and require learners to do common topics and activities.
- *Differentiated curricula* which cover the same general topic/theme with all learners and allow them to be engaged in learning tasks appropriate to their level of learning;
- *Quasi monograde* whereby a teacher takes turns to teach grade groups as if they were monograded. The same or a different subject is taught at the same time and teachers have a mandate of distributing time equally/unequally between grade groups, depending on the tasks they are busy with; and
- *Learner and materials-centred* which is heavily reliant on the learner and learning materials rather than on the teacher's input. This strategy allows the curriculum to be translated into self-study graded learning guides, and allows learners to work at their own speed with support from the teacher and structured assessment tasks.

Moreover, Cash (2000) also identified “popular strategies for multigrade teaching” that are also suitable for the teaching of mathematics:

***The individual workcard or workbook model*** is a set of instructional or problem based cards written out with the content to be taught in the specific lesson or topic. Learners are given the cards with instructions to work out the problems, and a learner who gets correct answers is required to pick another workcard.

***Holding activities*** is when some children who are not in direct involvement or communication with the teacher are given something to do. This model requires a classroom assistant (employed assistant or adult employee from the community or a class monitor) who will look after the learners that are not in direct communication with the teacher. This is when it is correct to use the community members to assist in the teaching of multigrade class.

***The staggered approach*** is used when the teacher teaches the first group of learners and gives them an activity before he/ she starts teaching the second group. The teaching may involve the introduction of a mathematical concept. When the concept is mastered, learners are given activities to complete while the teacher is teaching the second group of learners where he/she will present another mathematical concept. The teacher will keep on shifting his/ her attention depending on the need of the individual class groups or individual learners.

***Differentiated direct teaching*** which begins with revision of previous work, a common introduction or quizzes which motivate children's thinking and using the mathematical concepts and skills they will need for the lesson. The aim of the lesson is explained and the work is introduced through direct teaching with examples. The learners are involved by asking them questions and they are given chances to practice the use of the introduced concepts. The teacher visits individuals or groups to facilitate learning. The lesson will be concluded by asking learners to discuss what they have learned.

In my view, the strategies identified by Cash (2000) elaborated the learner-material centred strategy. However, Cash (2000) indicated that covering all multigrade teaching models is not important. Some models are very demanding in terms of preparation time, while others require additional human capacity. The staggered start is seen as a successful model for teaching mathematics in a multigrade setting but it requires good lesson planning and preparation. According to Kyriacou (1991, p. 27) "planning and preparation go hand in hand and many planning decisions are taken when preparation is going on". But the work card model poses a rather demanding role for the teacher because he/she has to write all the instructions or questions with different High Order Thinking Skills (HOTS).

In addition to the above mentioned strategies, both Little (1994); Little (2001) highlighted three approaches of timetabling multigrade lessons as:

- *Common timetable* which involves teaching the same subject to all grades at the same time. It requires the teaching of a common topic, but recognizing the basic competencies of individual grades.
- *Subject staggers* which involve the teaching of two different subjects which have no relationship in basic competencies. E.g. teaching mathematics and religious education
- *Subject grouping*. This is the teaching of basic competencies that are related to each other from different grades and different subjects.

The Namibian Education Department has adopted these approaches in addition to the *integrated day*, the strategy in which learners are given permission to decide on the content they would like to learn provided that they inform the teacher who will assist them to identify the basic competencies. (Namibia. MoE, 2007b). These approaches can be used with various teaching strategies in multigrade classrooms such as individual learning, whole class teaching, small group teaching, peer group and self study. Little (1995) sees the last two as the mostly associated with multigrade teaching.

Most of Namibian schools seemed to follow the quasi monograde system with common timetable. This resulted from the lack of teaching and learning materials (because multigrade schools are rarely supplied with sufficient materials) as well as the lack of preparations of multigrade teachers (Namibia, MoE, 2009). The grade specific syllabus and the arrangement of basic competencies in the mathematics syllabus can also motivate teachers to practice this strategy. Moreover, the inflexibility in the Namibian school timetables can cause teachers not to use approaches other than the common timetable because teachers are mostly guided by the monograde timetables which are set in schools.

Despite the above-mentioned approaches and strategies, Miller (1991b, p. 3) noted that “the classroom organization, classroom management and discipline, instructional organization and curriculum, instructional delivery and grouping, self directed learning and peer tutoring as

instructional dimensions” can also affect successful teaching in a good multigrade classroom. However, (Cash, 2000) alluded:

Those who are in the business of education are there . . . to ensure that every child receives an education of the highest possible standard, regardless of gender, religion or social position. And regardless . . . that they . . . live in poor, rural communities where multi-grade teaching is necessary because of a lack of teaching staff (p. 6).

Multigrade teachers need additional and specific resource support in order to cope with the daunting task of teaching combined grades at the same time. According to Leshem (2005) “When ... teachers enter the multigrade classrooms, they are faced with instant and immediate situations that turn into need-driven and CPD” (p. 12). Even though, teachers need to know the core of educational practices which has to do with,

How teachers understand the nature of knowledge and the student’s role in learning, and how these ideas about knowledge and learning are manifested in teaching and classwork. The “core” also includes structural arrangements of schools, such as the physical layout of classrooms, student grouping practices, teachers’ responsibilities for groups of students, and relations among teachers in their work with students, as well as processes for assessing student learning and communicating it to students, parents, administrators, and other interested parties (Elmore cited in Benveniste & McEwan, 2000, p. 35)

Based on the above assertion, mathematics teachers need to deliver effective lessons in whatever situation they find themselves. They need to be creative and innovative in producing their own materials (Namibia. MEC, 1993).

Mathematics, a practical subject, needs to be taught properly in multigrade classes. The subject is perceived to be difficult by many learners. But its success depends on the great effort which learners need to put into doing homework, class work and preparation for tests. Many times learners are grouped in mathematics lessons, but the method of teaching used is more teacher-centred. Lack of resources also contributes to the failure to do “self-instructional learning guides in mathematics” (Benveniste & McEwan, 2000, p. 36). Even though, Birch & Lally (1995, p. 10)

clearly state that “apart from the professional teacher, several other teachers for Multigrade Teaching can be identified”. These can be:

- Para-professional teachers such as monitors to assist the teacher, particularly when the former are drawn from the local community;
- Peer teachers using the capacity of children to teach each other is a rich resource to be used; and
- Community members and parents who can also be utilised positively in the teaching process, which also incidentally binds the community and school more closely.

In Namibia, some teachers are not qualified to teach, but they are teaching multigrade classes to assist the learners in their community. Note that multigrade classes exist mostly in poor and disadvantaged communities where people have less finances. Thus, although the Ministry of Education and some NGOs have been assisting these schools in terms of subsidising the teachers’ salaries, the community members still cannot afford to employ additional teachers due to the lack of finances.

## **2.5 Preparation of teachers in multigrade teaching**

Although research was done and several recommendations were made with regard to the training of mathematics teachers in terms of content and instructional skills (Namibia, 2000), some schools are challenged by multigrade teaching, which has become an extraordinary problem added to the existing problem of poor performance and lack of mathematics knowledge in some primary teachers. Little (1995) observed that “The knowledge required for effective multigrade teaching is rendered illegitimate by those with a responsibility for training and supporting teachers in their work” (p. 11). Based on this, teachers need to be well equipped for them to be able to assist learners. Researchers (Birch & Lally, 1995; Vinjevold & Schindler, 1997; Aldridge & Bobis, 2001; Beswick & Dole, 2001; Parry, Way & Southwell, 2005) noticed the importance of teacher education for multigrade teaching and to mathematics teaching in general because it transforms student teachers’ beliefs about the learning and teaching of mathematics.

The importance of teacher education in general and more specifically in mathematics teacher education has been entertained by many researchers because it builds knowledge and skills over a period of time. Inprasitha (2006) argued that high quality educator preparation makes a

difference in student learning, teacher preparation increases teacher retention, and teacher preparation helps candidates acquire essential knowledge and skills. In the same vein, Benveniste & McEwan (2000) argue that teaching practice is heavily affected by the provision of training. The common point made by the two assertions above is the focusing on teacher training and learners' results. This is therefore an indication of a serious need for multigrade teacher training which is lacking in Namibia.

According to Darling-Hammond (1992) the key to successful school reform is best achieved through the development of the capacity of teachers and schools as inquiring, collaborative organisations rather than through the imposition of a state-mandated curriculum. In addition to that, Birch & Lally (1995) see the need for multigrade teachers to be enabled to share their concerns and materials during meetings despite the problems of isolation, distance and communication. These meetings might be needed even more when untrained teachers are employed, and where teachers trained for single-grade teaching are concerned, there is a crying need for a more sustained effort at in-service training for such teachers. However, Thomas & Shaw (1992) alluded that

Teacher education programmes for multigrade need to focus on effective teaching practices including: peer tutoring, self-directed learning, teacher preparation (planning, organisation, and delivery methods), maintenance of an orderly environment, and assessment and feedback skills. Teachers also need to be helped to use classroom materials effectively, to layout their classroom and group their pupils appropriately (p. 27)

Despite the differences between multigrade and single grade teaching, Murlyan-Kyne (2007) argued that the skills one needs to teach well in single grade are similar to those needed for multigrade teaching. She does not see the need for separate teacher education for multigrade teachers. However, she insists that an emphasis be put on multigrade teaching during teachers' training. I disagree with Murlyan-Kyne (2007) opposing her suggestion, just like Birch & Lally (1995) who alluded that:

The view that any teacher trained in single-grade level teaching could be automatically expected to be a Multigrade teacher is discounted . . . Multigrade teaching is of its own kind and must be recognized as such. In countries where

local content is a significant part of the curriculum, it is particularly important to resolve the issue of appointing well-trained and locally-oriented teachers. (p. 10)

Birch & Lally (1995) further describe professional teachers as key resources in the multigrade context. Hence they need to be compensated for their lack of appropriate training in multigrade teaching (Russel, Rowe & Hill, 1998). Since this is a worldwide outcry, teacher educators need to look into incorporating multigrade teaching into the teacher training curriculum, and Namibian teacher institutions are not exceptional in this matter.

Despite the assertion above, Namibia has no separate teacher training for multigrade teaching. The recent revision of the Basic Education Teacher Diploma (BETD) made multigrade teaching a part of the Education Theory and Practice (ETP) syllabus which is currently being piloted (Namibia. [MoE], 2006c). In the absence of training for multigrade teaching, most teachers use their “situated knowledge” (Lave & Wenger as quoted by Leshem, 2005, p. 6) to respond to the multigrade context. They constitute their knowledge in action, and learn through practice. Their world of teaching is unique to individual teachers and it is influenced by their personal beliefs, values and histories (Leshem, 2005, p. 6). The situation might even be worse for teacher educators because they also seem to lack knowledge in multigrade teaching.

## **2.6 Continuous professional development for multigrade teachers**

Becoming a doctor is not the end of formal education. The development of new understanding of health and illness, the refinement of techniques, and the lessons of accumulated experience all require that doctors take supplementary courses throughout their professional careers (Namibia. MEC, 1993, p. 13).

In line with the above quote, Diaz-Maggioli (2003) noted that professional development activities have become important in ensuring that teachers succeed in matching their teaching goals with their students’ learning needs. Similarly, Schafer (1999) noticed that “in-service and pre-service teacher education needs to cater for multigrade teaching; and offer support, advice and training in coping with an approach which is fundamentally different from the traditional single grade” (p. 93). In Sri Lanka, the teachers’ modules were developed with the assistance of Vithanapathira (2006). The modules were developed to assist teachers with teaching mathematics in multigrade classes by compressing the common topics to be taught at the same



time. This development involved the translation of the mathematics content into self study graded learning guides. With these guides, the teaching is made more learner- and material-centred than teacher-centred.

In Namibia, some schools have highly educated mathematics teachers, extensive equipment, and relatively small classes. Other schools have teachers who have limited training and classrooms that are overcrowded and poorly equipped (Namibia. MEC, 1993). This indicates the need for professional development which will bring together the different kinds of knowledge to teachers. As a result, teachers will have the same understanding and present high quality lessons to learners.

According to Kilpatrick, et al. (2001) “Learning to teach well cannot be accomplished once for all in a pre-service program; it is a career long challenge” (p. 12). Also, Darling-Hammond (1999) argued that “Professional development, well-defined and carefully targeted, is the most potent weapon for continuing the growth of well-trained teachers and helping others overcome the gaps that may have been left by inadequate pre-service education” (p. 12). However, she observed that teachers are confronted by everlasting problems in teaching. It is therefore worthwhile for Namibia to help her teachers develop the expertise and skills that will enable them to stimulate learning, particularly in multigrade classrooms. Namibia. MEC (1993) noted that teachers’ professional education must begin before they enter the classroom and continue the course of their professional careers. Even though, these professional development courses have not yet included multigrade teaching.

## **2.7 The analysis of the Namibian mathematics syllabus**

The Namibian Education system follows the graded system. The mathematics syllabus for Upper Primary is spirally arranged and the topics are taught in Grade five through to seven, with the exception of percentages which is taught in Grade seven only. However, teachers are required to cover the basic competencies for a specific grade, and promote learners to the next grades at the end of each year. Learners in the Primary Phase are doing the same topics throughout the primary phase. During the syllabus revision, some topics became obsolete due to technology while others remained depending on their importance. It is against this background that the use of the calculator was removed and the emphasis was put on mental arithmetic strategies which, it

is believed to train learners' minds mathematically. Themes in the syllabus are shown in the Table 2 below.

**Table 2: The overall plan of the Upper Primary mathematics syllabus  
(Namibia, 2005. The Mathematics syllabus for Upper Primary Phase)**

<b>THEMES AND TOPICS</b>	
<b>NUMBER CONCEPTS</b>	<b>Operations with whole numbers, common fractions, decimals and percentages</b>
<b>MEASUREMENT</b>	<b>SI units and operations for mass, length, capacity and time</b>
<b>TIME</b>	<b>Time units and conversions, operations with time units</b>
<b>MONEY</b>	<b>Operations and integrated activities with Namibian currency</b>
<b>GEOMETRY</b>	<b>Properties of geometrical figures and measurement of lines and angles, perimeter, area and volume</b>
<b>DATA HANDLING</b>	<b>Pictographs, bar graphs, pie charts and calculation of mean (average)</b>
<b>PROBLEM SOLVING</b>	<b>Solving problems in context</b>

As seen in the table above themes and topics are presented this way but teachers are not limited by this order. They need to ensure that all the basic competencies for the Upper Primary Phase are covered. This agrees well with Fennema 1990, cited in Qing (1999) who observed that “Teachers play a crucial role in implementing school policies, whatever the formal organization of the setting in mathematics is taught” (p. 66). Beukes (2006) observed that some private schools in Namibia where multigrade teaching is selected by choice; the primary school syllabus is covered during the total years of primary schooling.

For Namibia to reach her educational goals: access, equity, quality, and democracy, the education system aims for all learners to become mathematically proficient. These goals drove Namibian mathematics syllabus into a revision process which looked at the close relationship between mathematics as a discipline, as a school subject and also as part of the people's lives. Mathematics content that is relevant to economic activities became part of school mathematics. This revision supports Kilpatrick, et al., (2001) who observed that what mathematics students need to learn today is not the same as that of their parents and grandparents. In addition, Ersheng as cited in Greer & Mukhopadhyay (2003) also noted that most students need

mathematical abilities in schools to prepare them for their future jobs. The syllabus revision is then regarded as taking stock of the learning content which replaces the outdated content with the updated one.

The Namibian syllabus revision combined the Upper Primary learning content into one document for three grades (grades five to seven). The teachers are therefore given the Upper Primary phase syllabus for them to be able to make links between the grades in the phase. The syllabus covers the basic competencies and learning objectives one needs to be mathematically literate and teaching is more learner-centred. The former is important because it describes an aspect of learners' learning (Kyriacou, 1991). The changes attempt to improve the mathematics curriculum in Namibia which enabled all learners to have the opportunity and necessary support for learning significant mathematics with depth and understanding.

The revision aimed to assist learners in acquiring the basic number concepts and numerical notation, and helping them to understand and master the basic mathematical concepts and operations. Kilpatrick et al., (2001) defined conceptual understanding as an integrated and functional grasp of mathematical ideas. Moreover, Papert (1971) also argued that educators' concentrate on teaching concepts and terminology, which enable learners to be accurate about the process of developing a mathematical analysis. The concept of numbers and fractions is spirally developed from lower to upper grades. Hence learners are required to master and use concepts correctly before they move to another grade.

Kilpatrick et al. (2001) observed that

Knowledge . . . learned with understanding provides the basis for generating new knowledge and for solving new and unfamiliar problems. When students have acquired conceptual understanding . . . they see the connections among concepts and procedures and can give arguments to explain why some facts are consequences of others. (p. 119)

As observed in the quote above, the Namibian curriculum favours above all knowledge with understanding as well as application of knowledge and skills because learners with conceptual understanding can connect new ideas to their existing knowledge. Also, facts that are learned

with understanding become easier to remember and learners have a better opportunity to represent mathematical situations in different ways and for different purposes. The curriculum motivates teachers to use local materials and integrate mathematics with other subjects. By doing so, the mathematical concepts are learned and related to real life situations. This is believed to make mathematics teaching and learning more interesting and enjoyable to teachers and learners. This situation is also supposed to be experienced in multigrade teaching and learning activities. However, teachers tend to ignore the intended curriculum and teach the mathematics the way they were taught during their days of schooling. This was observed during the classroom visits on the mathematics research in 2008 because teachers were found teaching from previous Mathematics syllabi (Namibia. MoE. 2009b).

In addition to learning the concepts, the close relationship between procedural fluency and conceptual development is noted in the Namibian mathematics curriculum because learners are motivated to be accurate by showing their work when doing mathematical activities. According to Kilpatrick et al. (2001, p. 121) procedural fluency refers to the knowledge of procedures, which include the “when and how” to use the procedure appropriately and skills in performing them flexibly, accurately and efficiently. Kilpatrick et al. (2001) further state that procedural fluency supports conceptual understanding in numbers as well as the analysis of similarities and differences between methods of calculating. However, learners can also be fluent if they know the content and method which can be illustrated on chalkboard and discussed with others.

The use of the calculator was part of both the Primary and Secondary curriculum and teachers were to teach learners to perform calculations with or without a calculator. Most of the Primary school mathematics teachers failed to cover this topic well and the use of mental arithmetic strategies died out in some schools. As a result, calculators were removed from Primary school, while mental and arithmetic strategies together with paper and pencil methods were emphasized. Strategic competency refers to the ability to formulate, represent and solve mathematical problems. It is similar to problem solving and problem formulation in the literature of mathematics education and cognitive science. Strategically competent learners know which method to use to solve a certain problem. Learners can represent the problem numerically, verbally, symbolically or graphically as long as they are able to capture the core mathematical

elements and ignore irrelevant features. These learners are flexible in problem solving processes, and they have broader knowledge required for solving routine and non-routine problems (Kilpatrick et al., 2001, p. 124). In the same vein, Papert (1971) motivated teachers to focus on the development of mathematical thinking and reasoning; rather than focusing on correct answers.

The mathematics curriculum in Namibia emphasises that learners should be trained to do mathematics and talk about it through co-operative learning. The revision of Upper Primary Mathematics syllabus in Namibia highlighted problem solving more significantly and extensively, and made it part of almost all topics taught because it helps learners to become independent problem solvers in real life. Teachers are therefore motivated to prepare and teach the content that covers different knowledge, analysis, application, comprehension, synthesis and evaluation in order to prepare learners for solving routine and non-routine problems using any relevant methods, which arrive at the correct answers.

The Namibian curriculum allows consideration of learners' pre-knowledge during lesson planning and presentation. Learners are motivated to link the home and school environment and teachers teach from concrete to abstract. If this was well understood and fully implemented, it could give them a chance to present and discuss their findings with others using adaptive reasoning. Adaptive reasoning is a "capacity to think locally about the relationship among concepts and situation" (Kilpatrick et al., 2001, p. 129). Kilpatrick et al., (2001) therefore noted that learners are motivated to think and reason logically in justifying their own work. This can be done if one has 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 (p. 131).

Consideration of learners' pre-knowledge in Namibia is supposed to indicate that what is happening at school is linked to home experiences. This will develop the tendency to make sense of what they have learned and to perceive the subject as useful and worthwhile (Kilpatrick et al., 2001). Learners are motivated to participate in Mathematics and Science Fairs at school, regionally, nationally as well as at international levels, and this is the best way of applying the

learned mathematical knowledge in the outside world. The involvement of outside partners in enriching teachers' mathematical skills and knowledge has played a role in exposing them and their learners to such opportunities. Even if all of the above-mentioned issues are mentioned in the intended curriculum, the implemented curriculum may differ to a large extent, depending on the individual teacher as well as the situation in which they find themselves.

Although Namibia has a syllabus for mathematics, the nonexistence of multigrade teaching in educational statistics has made it impossible for the system to be known and considered by curriculum developers. If careful measures are not taken, the linkage of the subject content to learners' real life situations will also be affected. It is therefore valid to note that:

If we have to expand access to education that is meaningful to our people and our country, we must be clear that our focus is on learning and not simply schooling. Schooling without learning may lead to diplomas and certificates, but for many students it also leads to frustrations and self doubt. Learning, in school or out, leads not only to individual achievement, but also to self reliance, self confidence, and empowerment (Namibia. MEC, 1993, p. 34).

Namibian children need to have access to quality mathematical knowledge for them to become responsible citizens and contribute productively to society (Namibia. MBESC, 1996, p. 119). Learners need to be trained to think independently (Namibia. MEC, 1993) and critically (Splitter, 1991). For learners to master the strategies for identifying, analysing and solving problems, teachers need to deliver quality lessons with cognitively demanding tasks (Kilpatrick et al., 2001, p. 12). The above-mentioned issues can only be observed if mathematics teachers in multigrade settings are well trained and assisted through teacher education and CPD activities such as workshops and cluster meetings because the MoE has promised to offer high quality formal schooling/education (Namibia. MEC, 1993).

## **2.8 Conclusion**

In this chapter, I provided the historical background of the Namibian education system and that of mathematics teaching in Namibia. The chapter also examined the literatures which informs multigrade teaching as well as the teaching of mathematics in general and also in multigrade classrooms. The next chapter deals with methodology.

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

As was indicated in Chapter One, this study aims to discover how mathematics is taught in Upper Primary multigrade classrooms. Since this has to do with teaching, the study focuses on the teacher practice although learners cannot be left out of the teaching process. To achieve this goal, a number of questions shown in chapter one were developed. I wanted to find out:

- the teaching strategies that teachers use to teach mathematics in multigrade classrooms.
- the extent of assistance given to multigrade teachers by colleagues at their schools, clusters, circuits and at regional level; and
- if there are good practices in the classrooms visited, which can be used by other multigrade teachers in Namibia.

#### **3.2 Research design**

##### **3.2.1 Orientation**

Nickson (2000) observed that the classroom is the most useful area to carry out research into mathematics teaching. Moreover, Bernstein in Nickson (2000) identified two facets of mathematics as theory and practice. Therefore, this study focused on teachers' practice as one of the mathematics facets. I also wanted to have steadfast and individual contact with selected teachers (Patton, 1990) in order to understand them better. The interpretative paradigm was selected because of my interest in understanding teachers' experiences, as well as their classroom practice when teaching mathematics in Upper Primary multigrade classrooms. The central endeavour of the interpretive paradigm is to understand the subjective world of human experience (Bell, 1999; Cohen, Manion & Morison, 2000). This paradigm allows a researcher to understand the situation of the phenomenon under scrutiny and to interpret meaning within the social and cultural context of its natural setting (Johnson & Christensen, 2004).

Mathematics teachers teaching in primary schools have been left on their own without proper guidance in teaching the subject. Since Namibia got its independence, the focus of the education training was more on Lower Primary, Junior and Senior Secondary phases. This training included the assistance on lesson planning and presentation, subject content as well as different

methods of teaching the subjects. It is against this background that this study aimed at finding out what is happening in multigrade classrooms in Namibian schools. This was also a qualitative study because it aimed to collect predominantly qualitative data such as words and pictures (Johnson & Christensen, 2004) and an interpretive analysis of this data was performed.

### **3.2.2 Sample**

Johnson & Christensen (2004) define sampling as “the procedure used to select a subset from the population” (p. 199). Purposeful and convenient sampling was used to select four schools with multigrade classes in the Khomas, Hardap and Omaheke regions. Convenience played a role in their selection because these regions were chosen due to their closeness to my work place. This would enable me chance to go back to my research participants to seek clarification if there was a need to. The selection of schools was also done purposely, looking at their location and type, to include an urban, semi-urban, rural and semi-rural school.

Obviously, the study participants were mathematics Upper Primary (grade 5-7) multigrade teachers (one teacher per school) with two or more years of experience. In order to find these teachers, the schools were contacted to confirm the teachers’ experience, and teachers with sufficient experience were included in the sample.

### **3.2.3 Method**

The research method followed in my research was the case study - “a form of qualitative research focused on providing a detailed account of one or more cases” (Johnson & Christensen 2004, p. 46). Stake cited in Punch (2005) also defines a case study as “a study of bounded system emphasizing the unity and wholeness of that system, but confining the attention to those aspects that are relevant to the research problem at the time” (p. 144). Also, Hitchcock & Hughes (1995) regard a case study as a suitable research approach that one can use to test theories or practices in an everyday environment. They regard the case study as a method used to develop new theories or improve and evaluate existing professional practices.

In order to compare and contrast the teaching of mathematics in multigrade classrooms, I conducted four case studies (one for each teacher) and I used multiple sources of data (Anderson, 2000) including interviews, document analysis and observations in the settings (Punch, 2005) of



the multigrade classrooms. The study has therefore provided me with information to allow an intensive and detailed examination of the observable facts.

### **3.2.4 Data collection methods**

#### ***3.2.4.1 Interviews***

Cohen et al., (2000) see interviews as emotionally engaged social interactions about people's real experiences in constructing their personal accounts on a particular topic. Cohen, Manion & Morison, (2007) sees interviews as a powerful implement for researchers, but expensive in time. Semi structured interviews were conducted with teachers, performed after class visits. The main aim of the interviews was to discover their views on mathematics teaching in multigrade classrooms.

In order to collect the data, the interview checklist was developed. I used a one page questionnaire to collect each participant's basic information which included: the region's name, name of the school, date of visit, and the participant's teaching experience in multigrade classrooms as well as their experience in teaching of mathematics. I also included the number of teaching groups or subjects taught, as well as the grade combinations which they teach.

An interview checklist with open-ended questions was refined after it was piloted in a multigrade school with the mathematics teacher. The refined checklist was then used to guide the interviews (Johnson & Christensen, 2004). It focused on teachers' experiences in areas such as classroom management, planning and instructional strategies, designing of instructional materials, involvement of whole school and community in multigrade teaching, as well as challenges and opportunities for multigrade teaching.

One individual interview was conducted with each participant. This interview took between 40 minutes and 1 hour. With the permission of the participants, the interviews were tape recorded and transcribed, in order to avoid writing during the interview. During these interviews I continuously probed to elicit more information (Johnson & Christensen, 2004) from the interview participants.

#### ***3.2.4.2 Piloting the Instrument***

I intended to pilot the instrument at two multigrade schools in Otjozondjupa region but the teacher at the second school with multigrade teaching was absent during the visit. The pilot took place during the time the teacher was doing the revision of the examination paper. As a result, I could not do much analysis on the observed data, but I used the information to modify and fine-tune the interview checklist. Through listening to the pilot data records, I also realised the need to have an observation checklist. The observation checklist for Multigrade Schools Evaluation (MUSE) plan was adapted with little modification to suit this study (Little & Pridmore, 2003). It is valid to mention that piloting the instruments gave me the opportunity to come up with the data collection checklist (see Appendix A).

#### ***3.2.4.3 Observation***

Johnson & Christensen (2004) define observations as “watching the behavioural patterns of people in certain situations, in order to obtain information about the phenomena of interest” (p. 186). Cohen et al. (2007) stated that classroom observations are done to collect data on physical, human interactional and programme settings. It is against this background that I noted the layout of the observed classrooms. According to Anderson & Burns (1989) the classroom layout includes the classroom physical environment, the organisation, interactions and the resources found in the classrooms. The type of seating arrangement was also observed and noted as well as the type of group in which the learners work or learned.

Class observations were conducted (one per participant) to obtain information regarding the mathematics teachers’ practices in multigrade classes. The lessons were videotaped in order to limit the amount of writing during the lesson observation. The videotaping allowed me to review and analyse the lessons in my own time. The focal area for observation was on teachers’ classroom practice such as management, arrangement, and handling of two or more grades, as well as instructional strategies. These were some of the key areas of multigrade practice (Berry, n.d). I was a non-participant observer, detached from the activities that were taking place during the lessons (Anderson, 2000; Cohen et al., 2007). I also avoided the generalisation of data due to small number of participants selected.

#### **3.2.4.4 Document analysis**

Documents were used in this study to supplement the data collected through interviews and lesson observations. These were: the teachers' preparation notes and the notes written on the chalkboard. These notes contained written comments about anything I thought might improve my insight into the teachers' practice. The analysis of these documents provided clarity on how the subject was dealt with by the teacher. All of these activities contribute to the teaching and learning of mathematics, which takes place in the specific multigrade classrooms. This document analysis data was triangulated with that from interviews and observations.

### **3.3 Data analysis**

As I mentioned earlier, this was a case study where qualitative data was collected through different methods. According to Cohen et al. (2007) there is no correct way of presenting and analysing qualitative data. But they defined data analysis as a process of grouping information to understand the participants. One can also create a data blueprint, grouping it and find regularities.

Both the interview tape recording and the videotaped lessons were transcribed. Then, based on the above definition, the data gathered through interviews, observations and document reviews were organised, categorised and analysed in order to discover the commonalities, differences and similarities. In order to report this data, a narrative description method was carried out in chronological order.

Two levels of analysis were conducted. In the first level of analysis, the data was presented individually across the instruments. The data was also contrasted in the second level of analysis to examine the applications of issues in order to identify possible good practice in multigrade teaching.

### **3.4 Research ethics**

Cohen, et al. (2000) mention that ethical issues such as informed consent, access and acceptance needs to be considered when one is conducting research. Ethical issues were considered during this study because they are fundamental to research.

Before the commencement of the study, I asked permission from the regions to conduct this study in their respective regions (see Appendix E). I also discussed this with the school principals so that they could explain to selected participants before I visited the school. This was done to describe the purpose of the study and to inform them on how the data would be collected. Before the commencement of interview, the participants gave me permission to videotape the lessons and also to tape record the interviews. The participants were also requested to complete the consent form attached to this report (see Appendix P).

### **3.5 Limitations**

Being an education officer, my position is in authority to teachers. This was the greatest limitation and teachers were not free in participating on the study. I tried by all means to overcome this, by giving the participants thorough explanations on the purpose of the study. This was done telephonically and physically by holding a meeting with teachers before the visit. Even so, these meetings could not convince one of the participants who withdrew because she felt I was going to check on how she was doing and report her to her supervisors. The participants who took part were also not at ease. One of them panicked, particularly at the beginning of the lesson. Another one was not at ease during the interview and she could not answer all the questions. Being a researcher and at the same time videotaping the lesson, it did not work well because I had little time for note taking. The results of this case study can also not be used for generalisation because the sample was too small and it does not represent all multigrade teachers.

### **3.6 Conclusion**

This chapter presented the research design where the sample, the approach and the methods used in data collection is described. It also describes the instruments used to collect data as well as the various methods used in analysis. The chapter also covered the limitations to this study and the ethical issues considered in the process of data collection, presentation and analysis. Anderson and Arsenault (1998) mentioned that a case study has limitations, as it cannot be generalised. I therefore avoided making generalisation of the observed cases. In the next chapter, I will present and analyse the data collected by using the instruments described in this chapter.

## **CHAPTER 4**

### **DATA PRESENTATION AND ANALYSIS**

Teaching in combined grade is done back and forth fashion – teaching one level while assigning individual work to the other level. Using this strategy, teachers may try to teach each level quickly, thereby failing to promote understanding or to motivate students adequately. As a result, students' individual work may be inefficient. As well, teaching by alternation may isolate students by level, failing to build on the benefits of interacting with individuals of various ages and levels of development. (Lataille-Démoré, 2007, p. 1)

#### **4.1 Introduction**

This chapter presents the analysis of data concerning the teaching of mathematics in Upper Primary multigrade classrooms in a sample of four teachers. The interviews, lesson observations and documents were analysed using both categories developed for the interviews and categories that emerged from the data. Thus, the categories used were as follows:

- Classroom arrangement and organisation
- Multigrade planning and teaching strategies
- The mathematics lesson presentation in a multigrade classroom
- Challenges and opportunities for multigrade teaching

Pseudonyms were used to protect the identity of the participants of the study as well as the schools where they are teaching. The pseudonyms used for participants are: Jatty, Janet, Shiwa and Bibi. The pseudonyms used for schools are: Mbushoye Primary School, Haitange Primary school, Nelao Primary School and Jacky Primary School.

#### **4.2 Description of four schools, teachers, their classes and their teaching approaches**

The back and forth fashion of teaching multigrade classes seemed to be a practice in most of multigrade classrooms, because the teacher cannot let the learners wait until the lesson of one grade is complete. Learners in another class group might disturb learning if they are not fully occupied.

## **4.2.1 The visited Primary Schools (P.S.)**

### ***4.2.1.1 Mbushoye Primary School***

Mbushoye Primary School is a farm school which is difficult to reach due to the lack of a proper road as well as the directory board which indicates where the school is. The school has about 150 learners, in Grades one through to seven. Grades three and four are combined in Lower Primary, while the Upper Primary Phase has a combination of Grades five and six. There are six female teachers in total at this school. Three of these are responsible for Lower Primary Phase (Grades one to four) and two for the Upper Primary phase (Grades five to seven). Most of learners at this school come from houses on the farm where the school is situated, but some of them come from nearby farms.

The school has an informal hostel, with a volunteer hostel matron who is a sister to two learners accommodated in the hostel. One female community member is also assisting the school. The ladies share the responsibility for cooking and cleaning the hostel environment.

The school has one female secretary, a female cleaner and a male institutional worker. The teachers, a school secretary and a cleaner commutes from neighbouring town; while the institutional worker stays in the house next to the school. The parents of learners at this school assist the school by paying the school development fees as well as paying the institutional worker.

### ***4.2.1.2 Haitange Primary School***

This is a farm school located in the outskirts of the region. The school has five teachers including the principal. There are one hundred and thirty learners in grades one through to seven. Grades three and four are combined in Lower Primary while the Grades six and seven are combined in Upper Primary Phase.

The school has an informal hostel which is run by community members. The institutional worker is accommodated in one of the houses on the school premises, and his wife plays a big role because she conducts the morning devotions. She also assists her husband to supervise the afternoon and evening studies. There is one secretary, one cleaner and one institutional worker.

The community members assist the school by contributing to the school development fund and also by taking care of the day scholars and learners in the hostel.

#### ***4.2.1.3 Nelao Primary School***

This is a privately owned school located in the centre of the town. The school has 260 learners in Grades one through to twelve. Grades three and four are combined in the Lower Primary Phase while the Upper Primary Phase combines Grades five and six. There are seven teachers in the Primary Phase. All of them are female. The school has two secretaries, three institutional workers and two cleaners.

Although some learners are day scholars, others are boarders who live in a school hostel which is not on the school premises. The community members assist the school in cross curriculum activities such as physical education, gardening, music and arts.

#### ***4.2.1.4 Jacky Primary School***

This is a village school which is located in the outskirts of the region. It runs from Grade one through ten. There are one hundred and twenty seven learners taught by eight teachers. The school has a hostel which accommodates some learners, but others commute from their homes.

The school has a secretary, two cleaners and two institutional workers. The community members assist at the school by contributing to the school development fund. They also volunteer to assist in school activities.

As indicated in the table below, the sample consisted of four teachers, one male and three females.

**Table 3: Profiles of Multigrade Upper Primary teachers**

<b>School</b>	<b>Teacher's name</b>	<b>Qualification</b>	<b>Gender</b>	<b>Multigrade Teaching experience</b>	<b>Mathematics teaching</b>	<b>Teaching experience</b>	<b>Home language</b>
Mbushoye P.S	Jatty	ECP (Upper Primary Subjects)	Female	6 Years	6 Years	29 Years	Afrikaans
Haitange P.S.	Shiwa	B. ED (General	Female	3 Years	13 Years	13 Years	English

School	Teacher's name	Qualification	Gender	Multigrade Teaching experience	Mathematics teaching	Teaching experience	Home language
		Elementary)					
Nelao P.S.	Janet	B.ED (Zoology)	Female	13 Years	20 Years	21 Years	English
Jacky P.S.	Bibi	B. ED (Technical Drawing, Geography)	Male	15 Years	15 Years	15 Years	Afrikaans

All participants were thirty-one years old and above. The teaching experiences of teaching mathematics in multigrade classes of these teachers ranged between three and fifteen years. This means that the multigrade mathematics classes at these schools are being taught by experienced teachers. However, Multigrade teaching at these schools exists due to the number of learners which did not qualify for additional teaching posts. Although in some cases three teachers are allocated to teach at Upper Primary level, the subject teaching was considered and teachers are teaching their area of specialisation.

#### **4.2.2 Jatty**

##### ***4.2.2.1 Jatty's profile***

Jatty is a female mathematics teacher at Mbushoye Primary School. Her age falls in the range of 51 to 60 years. She is a qualified Upper Primary teacher, who graduated from a local college of education where she majored in Upper Primary subjects. Jatty has been teaching for twenty-nine years, and has taught mathematics in multigrade classes for six years. In addition to mathematics, Jatty also teaches English, Natural Science and Health Education (NSHE), Home Ecology (HE) and Basic Information Science (BIS) at Upper Primary phase.






##### ***4.2.2.2 The arrangement and organisation in Jatty's class***

During the visit, Jatty was teaching mathematics to a combination of Grades five and six. She had a total of nineteen learners of which 12 learners were in Grade five and seven learners were in Grade six.



The floor plan of her classroom is shown in Figure 4 below. By looking at this floor plan, one can see that, Jatty had Grades five and six learners seated separately. The Grade five learners were on the left hand side of the classroom while the Grade six learners sat on the right hand side of the class. Learners in all grades sat around groups of tables. Among the seventeen learners in her class, only four Grade five learners were seated facing the chalkboard.

By looking at the seating arrangement in Jatty's class, each group of Grade fives has a pair of learners facing the chalkboard, which is not the case with the Grade six class group. Others are facing sideways and they have to turn their heads to see the chalkboard. Although the learners are sitting in groups, the teacher used pair work during the observed lesson.

**Key:** ☺ = a learner seated facing to the front;  
 G- = a Grade;  = a door  = a notice board  
 = a cupboard  = a writing board (chalkboard/ white board)  
 = a learning centre

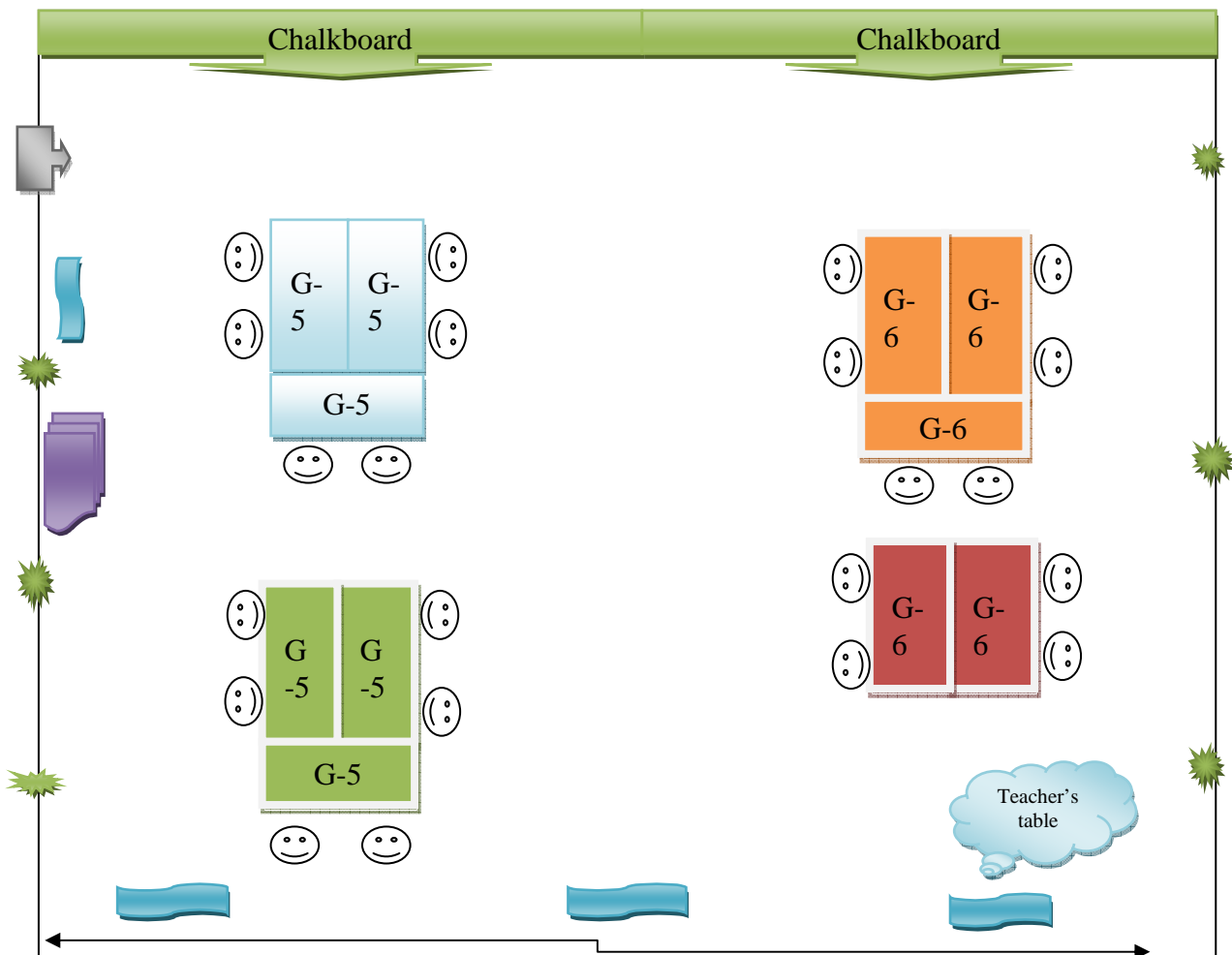


Figure 4: Floor plan of Jatty's class

#### 4.2.2.3 The resources in Jatty's class

Jatty has enough desks for the children to each have a desk and place of their own. The learners sit in pairs because the desks are designed for two learners. The unused desks in this class are used as learning centres where various books are displayed. The learners' projects are also found underneath the learning centre tables. Although there are tables serving as learning centres, Jatty did not use these during the observed lesson presentation. These learning centres could be the

valuable source of information in the absence of a school library. The teacher's chair and a table which is not well organised is located at the back of the classroom. Some resource books are also kept on this table.

Jatty's classroom is equipped with two chalkboards, mounted on the front wall. Each one is used for the grade seated in front of it. There are also two large display boards mounted on the back wall and two medium sized display boards mounted on the side wall of her class. The materials on the display boards were not grade specific, but they were displayed according to subject groups such as NSHE, Mathematics, and Social Studies. There is a section on the display board for mathematics where various items are displayed such as: the fraction wall which was used during the lesson, the clock with numbers which they use for multiplication practice, a circle, rectangle, square and a triangle. The most noticeable displays in other subject areas were the posters on the Lord's Prayer, various Maps of the World and the Alphabet poster.

There is one cupboard used to file educational materials such as question papers and other educational resources. This class appeared to have enough space for teaching and learning as well as enough materials which are not used due to the small number of learners in the class. Jatty had no pencils or rulers for her learners. The teacher facilitated the lending of resources amongst learners.

#### ***4.2.2.4 Planning for multigrade teaching***

During planning, Jatty says she consults the mathematics syllabus and other documents she has received from the regional office, such as annual plans and schemes of work. This is how she described her planning for multigrade teaching:

*First of all I have the Grade five syllabus and then I have the Grade six syllabus especially when the two grades are combined. And then I see what they have in common. You start with the, with the same information and then [with] the Grade six you just do the more advanced stage according to the syllabus.*

Jatty had been talking about planning, but she had not written out the planning for the observed lesson.

#### 4.2.2.5 The teaching of combined grades

Jatty delivered her lesson in English. She asked some questions in Afrikaans and also spoke a few Khoekhoegowab words, the mother tongue of most of the learners. According to her, the teaching and handling of two grades at the same time *depends on the lesson activity*. Teaching grades separately or together can happen incidentally, but it is also considered during the planning. Jatty described the teaching situation as moving between the two grades. Here she is describing the observed lesson:

*This morning, I have spent about ten minutes with the Grade six and ten minutes with the Grade five. Then I go back to see whether [I need] to consolidate then I come back and so go from one grade to another. The Grade six they are very fine and they handle sometimes things on their own and then I have to spend more time with the Grade five, because I have more slow learners in Grade five. It depends on the content of the lesson where I have to spend more of the time whether is in the Grade six or whether Grade five.*

Jatty was teaching equivalent fractions to all grades in this lesson. She described how she teaches some multigrade lessons. The description she gave above correlates with what was observed during the lesson. A summary of her lesson is shown in the following vignette.

#### 4.2.2.6 Vignette of Jatty's lesson

The lesson started with the teacher distributing the worksheets to the Grade six learners and told them to start with the activity. Jatty moved to grade five where she asked them about what was done previously. Upon getting the answer, she started with revision of the previous work which was already on the chalkboard. She quickly went to Grade six for few seconds and told them to look for the numerators and denominators on the given activity.

The Grade five learners continued with revision, emphasizing numerators and denominators. She read these definitions with learners. The lesson continued with her talking and distributing worksheets. She also took learners through the worksheet. Where they did not understand, she referred them to the teaching aid which was the same as the worksheet displayed on notice board. All of her instructions for this grade were verbal.

Jatty moved to Grade six and deleted the answers to the questions given on the chalkboard. She then requested learners to come read the phrases before they wrote the mathematical representations of fractions. This activity continued with her mostly reading for learners to write the answers till they were all given the opportunity to come to the board. By linking the lesson to the previous one, Jatty labelled the identified fractions as proper and improper. She also informed learners on how to convert common fractions to their equivalencies by using multiplication and division. The procedure was done step by step. Learners were told to write in their books because she needed worksheets for the following year.

Moving to Grade five, Jatty ask if learners were finished with the activity. She also assisted individual learners and told them to peer teach others in pairs. She kept on moving between the two groups of the same grade. She also attended to a Grade five learner who went to Grade six for few seconds to look for a pen. The learners were informed to write their observations in books. The whole class teaching started with her showing learners on how to find equivalent fractions but called learners by their names to draw their attention before she began. Learners were mostly looking at their neighbours' work, but she motivated them to coach each other. Jatty sorted out the remaining worksheet and took them to her table. She came back to find learners having found the correct answers which she was happy with.

Jatty went to Grade six to check their work, and then went back to Grade five to assist the struggling

learners. This was done by her standing behind the learners and writing answers for them. She noticed that there were only 10 minutes left and moved on with teaching the whole grade on the conversion of fractions to whole numbers. This was done through the question and answer method. Learners answered in unison and the voices became louder when they noticed the pattern. Upon completing the sections on the chart, Jatty extended the work by asking them to convert bigger fractions such as one hundred over one hundred. She also told her learners to paste their worksheets into their books and gave them homework with specifications on how to write it.

The lesson continued with her checking the Grade six works. Upon realising their mistakes, she informed them to make sure that they used the correct operation - multiplication or division. She assisted individual learners and also wrote the solutions on the chalkboard for further explanation. She went back to Grade five to distribute the scissors which she had received from the secretary. And then came back to Grade six to continue with the lesson. She also went to attend to the Grade five learners and clarified more on how to write the homework. She quickly went back to Grade six to return the ruler and came to Grade five where she spent time in helping individual learners, even writing for them.

Jatty went back to Grade six to continue with assisting learners. She went back to Grade five to give them additional homework, asking each of them to bring examples of a circle, a square and a rectangle. Upon completing this activity, Jatty came back to Grade six and told them to continue with what they were busy with in class at home. The lesson adjourned after one hour and ten minutes.

Jatty's lesson took 1 hour and 30 minutes, exceeding the allocated time. Most of the interaction with grade five took almost ten minutes and five minutes with grade six. The checking of learners work took a few seconds and more time was spent with the Grade five learners.

This vignette is also shown in figure 5 below.

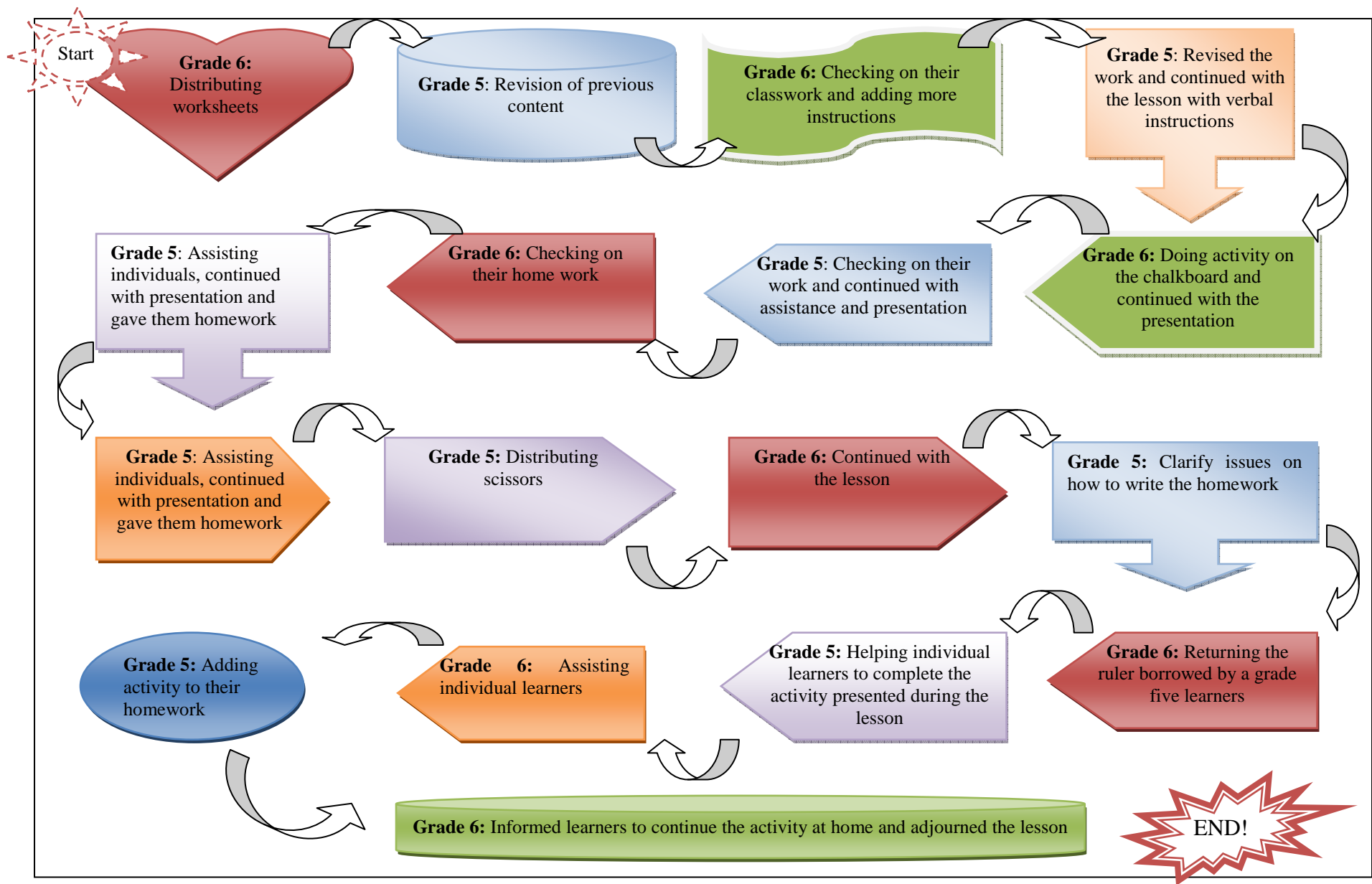


Figure 5: A map of lesson presentation for Jatty's lesson

As indicated in the Figure 5, Jatty's lesson content was presented by moving between the two grades she has in her class. All grades did mathematics although she had different basic competencies for each grade. More time was spent on the teaching of Grade five group which seemed not to understand the content taught on that day. The Grade six learners were doing revision of previous work.

Jatty claimed to divide the time equally amongst the grades during the interview, although actually in the observed lesson more time was spent teaching the Grade fives. She appeared to focus more on procedures than on helping learners to develop their conceptual understanding and letting them link the classroom mathematics to real life situations. She also played the role of an instructor and explainer throughout the lesson.




### **4.2.3 Janet**

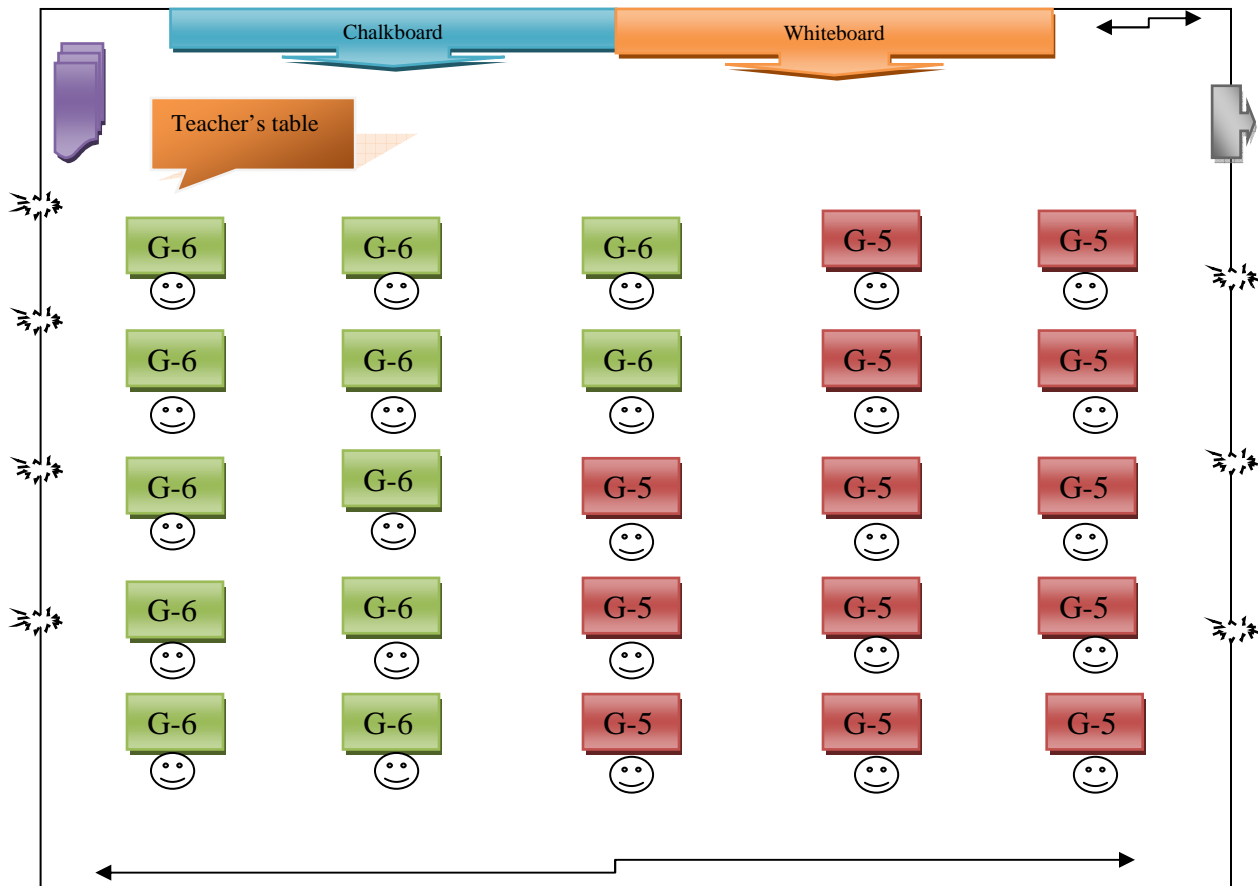
#### ***4.2.3.1 Janet's profile***

Janet is a female mathematics teacher at Nelao Secondary School. Her age fell in the range of 41 to 50 years. She is a qualified Upper Primary and Secondary teacher, graduated from the University where she majored in Zoology. Janet has been teaching for twenty-one years, and has taught mathematics in multigrade classrooms for thirteen years. In addition to Mathematics, Janet also teaches English, Social Studies, and Life Skills at Upper Primary phase.

#### ***4.2.3.2 The arrangement and organisation in Janet's class***

During the visit, Janet was teaching mathematics to a combination of Grades five and six. She had a total of twenty-five learners of which thirteen learners were in Grade five and twelve learners were in Grade six. The floor plan of her classroom is shown in Figure 6 below.

**Key:** ☺ = a learner seated facing to the front;  
 G- = a Grade;  = a door  
 = a cupboard  = a writing board (chalkboard/ white board)



**Figure 6: Floor plan of Janet's class**

As seen in Figure 6, Janet had Grade five and six learners seated separately. The Grade five learners were seated at the left of the teacher and they formed two full rows and three fifths of the third row. The Grade six learners sat on the right hand side of the teacher and they formed two full rows and two fifths of the third row. All learners sat facing the front of the classroom. Although the class is arranged this way, Janet indicated that her learners change their positions depending on their performance. Whoever performed poorly has to sit at the front. According to her, this motivates learners to improve their results.



#### ***4.2.3.3 The resources in Janet's class***

Janet had enough single desks which were not attached to chairs. All of them were used. There is no learning corner in this class. The teacher's table, which is well organised and covered with a table cloth, is located at the front of the classroom opposite the Grade six rows. Some resources such as worksheets, books, rulers, pencils and spoiled papers are piled on the teacher's table. The teacher distributes these materials to the learners when the need arises.

The classroom has two big notice boards fixed onto the back wall. A shorter notice board, smaller than those at the back, is fixed onto the front wall next to the door. There were a few displays on these notice boards such as the map of Africa, the map of Namibia, and pictures of flora and fauna. None of the displayed pictures was related to mathematics.

There is a whiteboard fixed in front of the Grade five rows and their work was written on that white board. The Grade six work was written on the chalkboard in the front of the classroom, opposite their rows. It is good to mention that all learners in this class have a full view of the chalkboard.

#### ***4.2.3.4 Planning for multigrade teaching***

When planning for the lesson, Janet photocopies the basic competencies from the Grade five and six syllabuses and pastes them onto one sheet to be able to compare basic competencies in the same topic or theme. Janet has a term planning document in her file, but she had no written lesson plan for the observed lesson.

#### ***4.2.3.5 Teaching of combined grades***

Janet taught in English, but in some cases she spoke in Afrikaans. She loves to be bilingual in order to help learners in various languages. But whatever language is used, she would like learners to be well prepared in the lower grades so that they can shift easily from one language to another. She therefore suggests that learners learn English from Grade one so that they are able to cope in the higher grades. She indicated that learners learn very quickly, but they also got confused when they have to speak the language which is not spoken in their community.

*You know we are in an Afrikaans speaking community, but I feel Grade 1 [should] start with English and go the whole way through. But it is a bit difficult to change that, [because] the playground language is Afrikaans. So the kids*

*picked up the Afrikaans [which] they speak to each other. But with your language with your terminology, with your vocabulary you know, everything that you do just started in grade 1.*

Janet was teaching decimal numbers to all grades, but had different basic competencies for each grade. The way she presented her lessons is shown in the vignette below.

#### **4.2.3.6 Vignette for Janet's lesson**

Janet started her lesson with the same introductory test for all grades, consisting of sixty questions. She counted the minutes and stopped when she reached her estimated three minutes. Learners exchanged test papers with their neighbours for marking purposes. Janet read the answers to them. Upon completing the memorandum and the marking, Janet read out their names so that learners could call out their marks. She kept on analysing the learners' results of the introductory tests. By doing so, Janet motivated and praised individual learners and reminded them to work hard. She then asked them to paste the papers in their books.

The lesson continued with her distributing the grade specific worksheets to the learners. She then asked both grades if they had finished the marking from the previous day. Janet informed her learners about the topic they were going to discuss: Decimal Fractions. She went on by telling the Grade fives that they are doing revision, and explaining to the Grade sixes that they would do multiplication and division of Decimal Numbers, but reminded them on how to start by making open number sentences.

Janet worked with the Grade fives, solving the problems on the worksheet, which was about writing the decimals in expanded notation. The question and answer method was used, but combined with the lecturing method. She also wrote the answers on the whiteboard she used for Grade fives.

Leaving the Grade fives to continue with the exercise, Janet moved to the Grade sixes where she read through the activities and assisted learners to analyse the given word problems through drawing pictures. They did the activity step by step and tried to contextualize the content where possible.

The Grade sixes continued with their calculations while the teacher shifted to Grade five. She checked their answers and corrected the wrong ones by giving hints like "The man is too heavy for the donkey", to explain improper fractions. She also corrected their pronunciation. The lesson continued with her asking learners to give the place values of decimal numbers, trying to develop expanded notation. She also informed them about another forms of writing decimal fractions - "the tenths, hundredths and thousandths.

Leaving the Grade fives completing the exercise, Janet went to check how the Grade sixes were doing. She reminded them to put commas in the right places. She went back to Grade five to check their individual work and sent a learner outside to wash his hands that were dirty due to a leaking pen. She assisted learners in doing their work and emphasized the way they should write answers, in order to avoid learners picking up mistakes from their peers.

She moved to Grade six to check their progress and then back to Grade five to check their individual work. The assistance was given by standing behind learners, and ask them questions which led to the answers. This was also done for the Grade sixes who indicated the need for assistance, but more time was spent in assisting the Grade five learners. Janet continued lecturing the Grade fives on how to write certain decimals in expanded notation. She also gave them chance to present their solutions on the white board.

While doing this, Janet went to the Grade sixes for few seconds. She came back to Grade five to check their answers and motivated one learner to explain how he solved the problem while writing on the board. She also assisted in correcting the spelling of numbers. Learners were free to ask questions, but in Afrikaans.

Janet came back to Grade six and assisted them in making sense of word problems. She also reminded learners to use units when writing open number sentences. Leaving the Grade sixes doing their exercise, she went back to Grade five to check individual work and ask them questions which led to answers. Those finished with the activity started playing and chatting due to the lack of enrichment activities. The Grade sixes went to ask for assistance. This prompted her to give them papers to draw pictures which would help them to solve the problems at hand.

Leaving the Grade sixes completing the task, Janet went back to Grade five to complete the marking. She wrote the answers on the board. She told these learners to prepare for the test and informed them that they were free from homework. The teacher continued with the Grade sixes, helping them to complete the exercise by drawing

pictures to analyse the questions. The lesson was concluded through emphasising the conversion of units and checking if all learners had done their work.

The lesson took fifty-eight minutes and most of the interaction with different grades took almost six minutes. The checking of learners' class work took a few seconds and more time was spent with the Grade five learners.

The vignette is represented in figure 7 below.

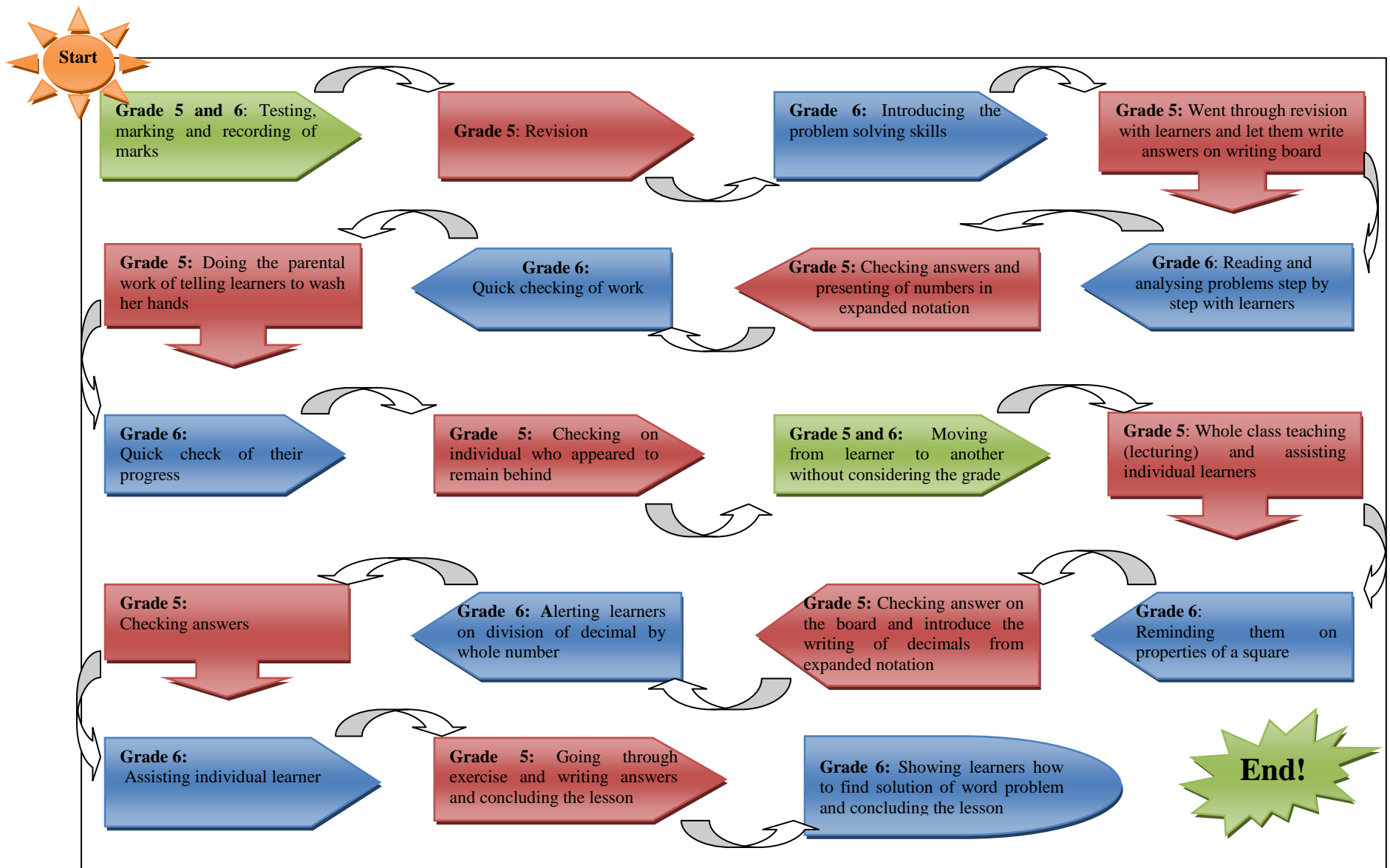


Figure 7: A map Janet's lesson presentation

Janet had the same introduction for all the grades when she gave them the test for few minutes. This test focused more on basic calculations such as addition, subtraction, multiplication and division. This activity aimed to develop the learners' number concept as well as their mental arithmetic strategies. Upon completing the activity, the lesson content was presented differently for each grade although they had the same theme: decimal fractions. She spent almost an equal amount of time for each grade. Janet claimed to assess learners differently, according to the basic competencies of the individual grades.

#### **4.2.4 Bibi**





##### ***4.2.4.1 Bibi's profile***

Bibi is a male mathematics teacher at Jacky Primary School. His age fell in the range of 41 to 50 years. He is a qualified Upper Primary and Secondary teacher, graduated from the university where he majored in Technical Drawing and Geography for Secondary Phase. Bibi has been teaching for twenty-five years and has taught mathematics in a multigrade class for fifteen years. In addition to Mathematics, Bibi also teaches Social Studies, Craft and Technology and Religious and Moral Education (RME) as well as Guidance or Life Skills at the Upper Primary Phase.

##### ***4.2.4.2 The arrangement and organisation in Bibi's class***

During the visit, Bibi was teaching mathematics to a combination of Grades five and six. He had eleven learners in Grade five and ten learners in Grade six. Figure 8 below indicates the floor plan as well as the seating arrangement of learners in his class.

As seen in diagram 8, Bibi's learners sat in single rows according to their grades. The Grade five learners sat at the entrance of the classroom, with two of them facing sideward but others face the front of the classroom. The Grade six learners sat toward the end of the classroom, forming one row of pairs with all of them facing the front of the classroom. During the instruction, learners moved into pairs with their grade mates still facing the front. In Bibi's class, some learners sat in pairs, and he motivated them to work with their partners. Groups were formed by the learners from the same grade groups and no mixing of different groups was observed.

**Key:** ☺ = a learner seated facing to the front;  
 G- = a Grade;  = a door  
 = a cupboard  = a writing board (chalkboard/ white board)  
 = a book shelf

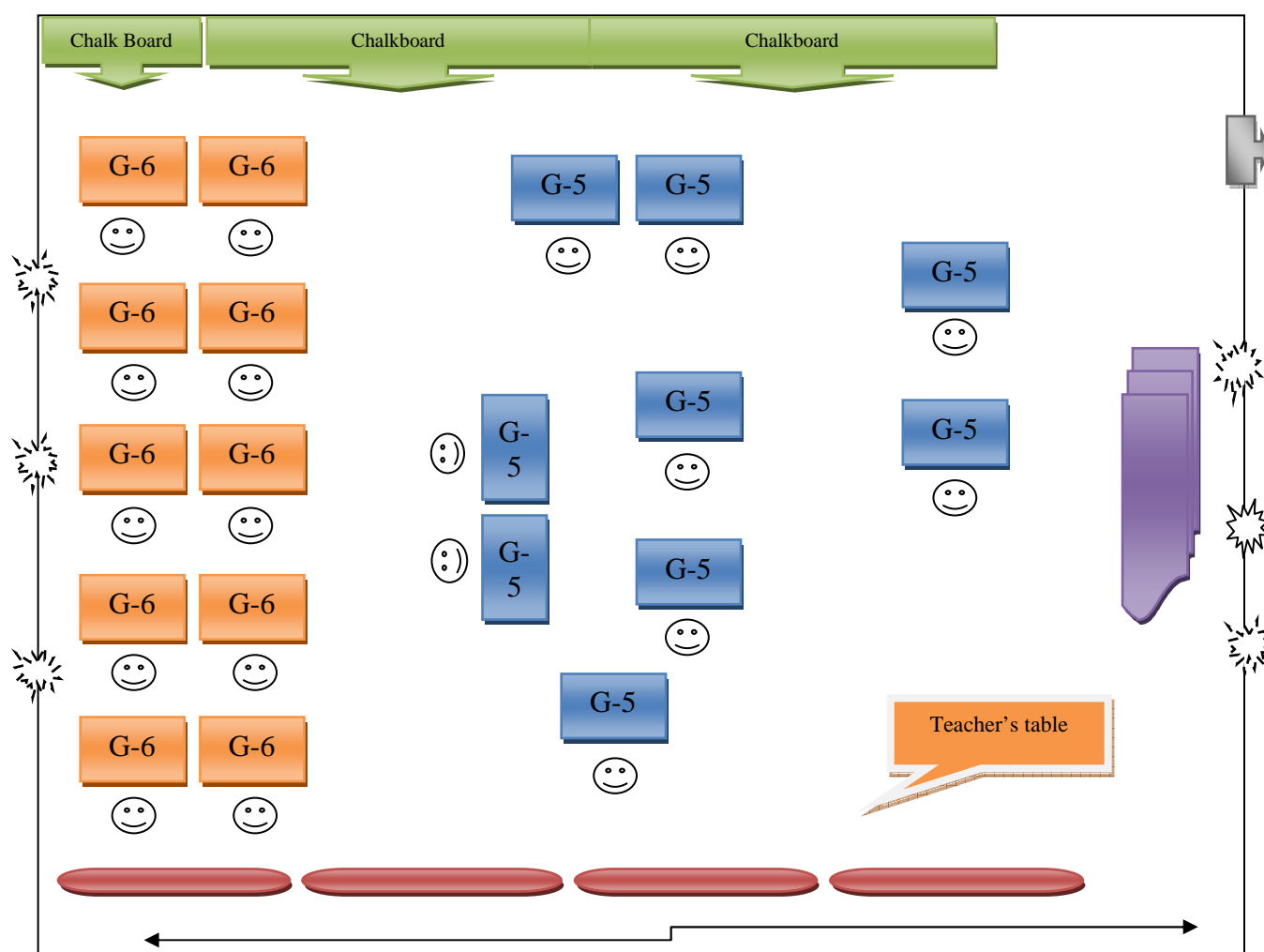


Figure 8: Floor plan of Bibi's class

#### 4.2.4.3 The resources in Bibi's class

The learners in this class have enough single desks and chairs. The teacher's table is covered with a table cloth and located at the back of the classroom behind the Grade five rows. Some resource materials and the learners' exercise books were neatly stacked on the table.

There are four chalkboards fixed on the front wall, and the fourth one can be folded to make a fifth board. There are two notice boards mounted at the back of the classroom and two small notice boards mounted on the side walls of this classroom. Bibi had more items displayed at the back, front and sides of his classroom. The most noticeable ones were the various maps of Namibia, the birds of Southern Africa, the calendar for 2008, a poster about the Namibian cabinet, and various maps of the world as well as a projecting screen fixed on top of the chalk board.

Bibi had no visible learning corners in his class, but there were cupboards and shelves packed with resources such as worksheets, books, rulers, pencils and spoiled papers. These were not used during the lesson. All learners had textbooks. The Grade five textbooks were in line with the basic competencies in the revised syllabus. Grade six learners used the outdated textbook based on the outdated syllabus.

#### ***4.2.4.4 Planning for multigrade teaching***

During planning, Bibi considers the mathematics syllabus, and national documents such as annual plans and schemes of work as well as the mathematics textbooks used by the learners. He also considers the type of learners he has in his class. This is how he explained the situation:

*What I take in consideration is my type of learners that are in front of me, the[ir] abilities. That makes my approach towards the syllabus different. If I have slower learners in the group, then my approach is different from the middle and fast learners.*

Bibi plans for the week, and his planning consists of individual daily lessons which include the pages of the textbook where the activities came from. A copy of his planning is found in Appendix Q.

#### ***4.2.4.5 The teaching of combined grades***

Bibi presented his lesson in English, but he also speaks Afrikaans with the learners during lessons. In addition, this is how Bibi explained the way he does things:

*First I have to decide of which group have to start now first. I do not start everyday say with the grade Give first or Grade six first. So, I change between the different tasks. But it depends on what type of work it is and the type of the*

*introduction I have with each group. Which group can in the shortest time be ready so that they work on their own and to start with another group? So, which group can I first let's say release with a project on their own? Give them a task and say listen, carry on and as soon as that group can carry on and I start with the new group discussing new work or discuss a problem area, so that influence my start with a group.*

Bibi also asks the learners who understand the subject in English to explain to others in their mother tongue in case they do not understand. Bibi taught mental arithmetic strategies on whole numbers. The content he presented to the Grade sixes and the activity he gave them was not in line with the basic competencies in the revised syllabus. The way he presented his lesson is shown in Figure 9 below.

#### **4.2.4.6 Vignette for Bibi's lesson**

Bibi started with the Grade five learners, briefly reminding them about what they had learned previously, while the Grade six learners were waiting. He left the Grade fives checking their previous work in their books, moved to the Grade sixes, and instructed them to work together checking their homework answers.

The lesson continued with the Grade fives, with Bibi revising division with single and double digit divisors, following the procedures step by step. The question and answer method was combined with lecturing. Learners mostly gave correct answers. They also answered "Yes Sir" in a chorus. When the wrong answers were given, Bibi rejected them right away by saying: "No! No! No! It can't be"! He confirmed correct answers by repeating after learners. He also recognized learners' knowledge when they shouted out the next step. "I'm glad to hear that".

After the presentation of different ways of dividing with double digit divisors, Bibi turned to the Grade sixes for few seconds, asking how they were doing. He turned back to the Grade fives and continued with more examples. He then gave them an exercise to do and went to the Grade sixes. With the Grade sixes, Bibi revised multiplication with powers of ten. A moment of silence occurred when he was writing the topic on the chalkboard. He presented multiplication by the power of ten and the multiplication by multiples of ten to learners. The emphasis was more on terminologies such as "multiplicand", "multiplier" and "product". He stopped learners from shouting the answers but motivated them to think before they answered. Although the bell rang at this time, the lesson continued until Bibi had finished asking different pairs to give their answers. When differences occurred among the pairs, the answers were revised.

Bibi went to assist individual Grade five learners for a very short time and went back to the Grade sixes where he continuously emphasized the multiplication terminologies and pronunciations of different numbers. Without his knowledge, the Grade fives started chatting with others after finishing their work. When he noticed this, Bibi went to check the Grade fives for few seconds and came back to Grade six where he started to relate the current lesson to the content learned the previous year. After completing the long procedures of multiplication with two digit multipliers, he labeled the multiplicand, the multiplier and the product. A grade six learner developed an interest in multiplying with three digit multipliers. He asked, "What if there are three numbers in a multiplier?" Bibi responded by promising to give an example. He then left learners doing the exercise, but reminded them to write the date, exercise, page and the item number.

The lesson continued with one Grade five learner being asked to write solutions on the chalkboard. Bibi also went through the solution, and provided them with different ways of getting answers to the same question. He pointed to another learner for the second solution and went back to Grade six for few minutes, telling them to check their answers. Coming back to Grade five to revise the solution written on the chalkboard, the bell rang and he ended off by giving homework to the Grade fives first and then to the Grade sixes.



Bibi's lesson took 45 minutes and most of the interaction with different grades took almost six minutes. The checking of learners' work took a few seconds and more time was spent with the grade where he is giving instructions to the learners, but mostly with the grade five groups.

Bibi's lesson is presented in figure 9 below.

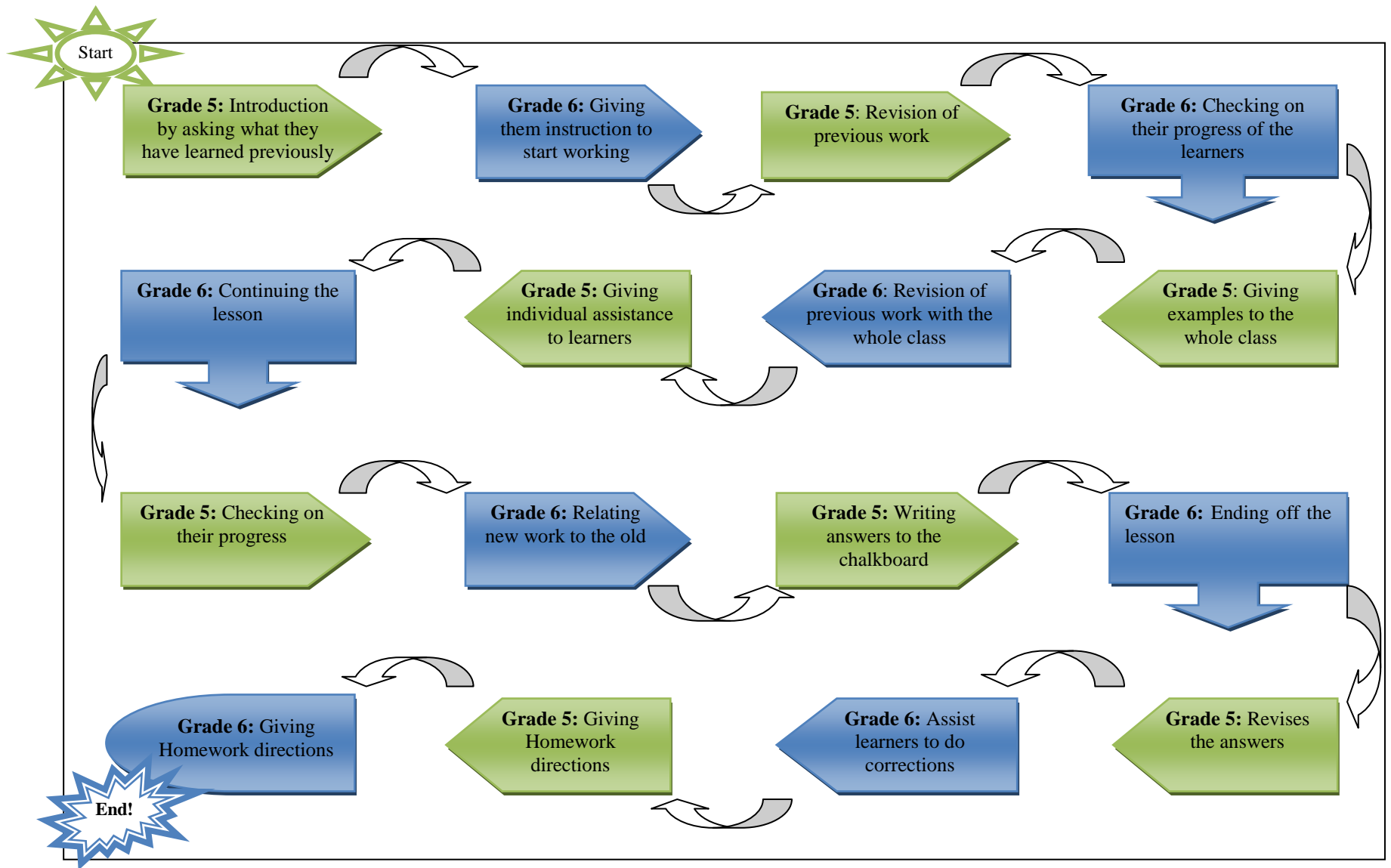


Figure 9: A map of Bibi's lesson presentation

The diagram above represents the vignette for Bibi's attained lesson. His lesson content was presented differently for the two grades that he teaches. He taught the mental arithmetic strategies to all grades but had different basic competencies for each grade. Therefore, the lessons for different classes varied from the introduction to the form of assessment he used for these grades.

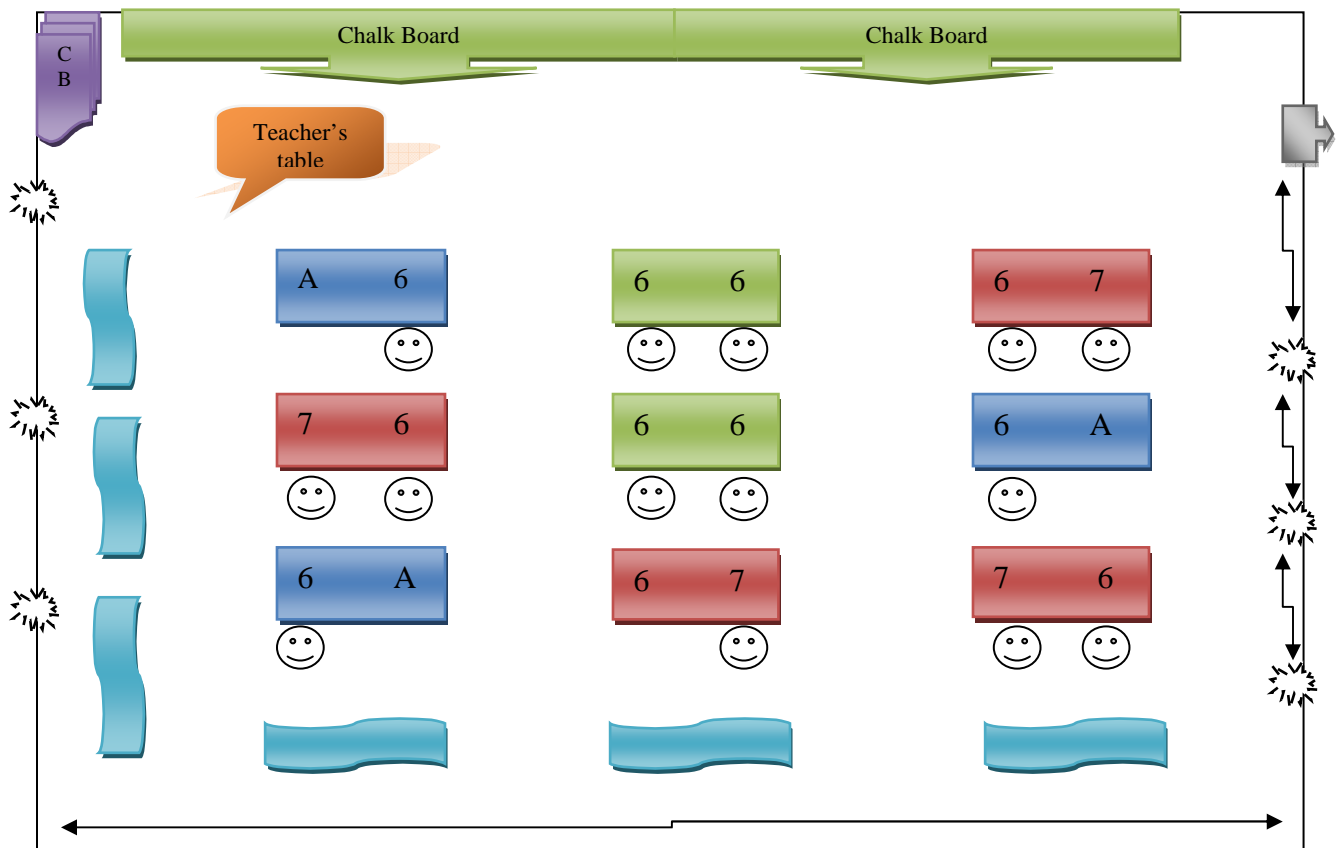
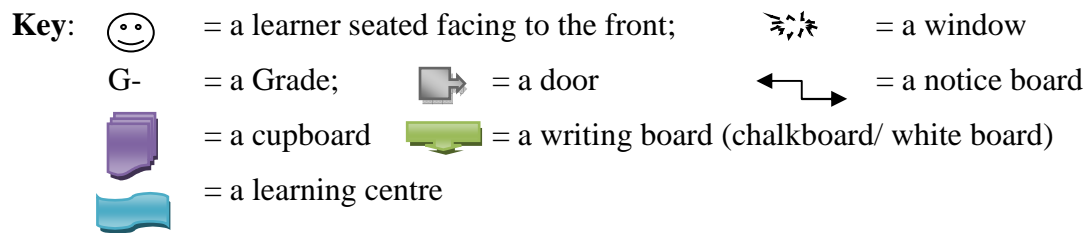
#### **4.2.5 Shiwa**

##### ***4.2.5.1 Shiwa's profile***

Shiwa is a female mathematics teacher at Haitange Primary School. Her age fell in the range of thirty-one to forty years. She is a qualified Upper Primary and Junior Secondary teacher, graduated from the university where she majored in Mathematics and English. Shiwa has been teaching for thirteen years and has taught mathematics in multigrade class for three years. In addition to mathematics, Shiwa also teaches English at Upper Primary and Junior Secondary Phases.

##### ***4.2.5.2 The arrangement and organisation in Shiwa's class***

Shiwa teaches mathematics to a combined class of Grade six and seven learners. In this group, there were eleven learners in Grade six and four learners in Grade seven. She teaches them as one group without considering their specific grades. She considers them as a group of learners with different abilities rather than a multigrade class. The floor plan of her class is shown in Figure 10 below.



**Figure 10: Floor plan of Shiwa's class**

As seen in figure 10, the learners in Shiwa's class are not seated according to their grades. In this classroom, one can see a seating arrangement whereby the Grade six and seven learners are sitting together. In some pairs, one finds only Grade six or Grade seven learners. The learners are seated in pairs due to the nature of the desks used in the classroom. It is significant to note that they all face the front of the room.

#### **4.2.5.3 The resources in Shiwa's class**

Shiwa has enough double desks attached to chairs. Her learners are seated in pairs because of these desks. Some desks are not used due to the small number of learners in her class and she

uses these to display the educational materials such as the sharpeners, projects and the books that are used as resources. The teacher has a well organised table, covered with a table cloth and located in the front of her class. Some resource books are also kept there.

Shiwa's class is equipped with two chalkboards mounted on the front wall. She uses these for both the grades. The classroom has notice boards mounted at the back, front and side door, covered with coloured paper. The materials on the notice board are not grade specific but they are displayed according to the subjects she teaches - English and Mathematics. The most notable ones are the mathematics posters for multiplication tables, the fraction wall, and the clock she uses for multiplication practice, as well as other learning materials which are not mathematically related. Among these is the environment picture used for story telling in English. She also displays the learners' behaviour chart, where their behaviour graph is made with scented stickers. If a learner changes their behaviour, the monthly sticker is removed and put aside.

The class has one cupboard which Shiwa uses to store containers with rulers, pencils and coloured pencils which the learners use. These are distributed to the learners upon arrival in the classroom. She also has plastic glasses displayed on the learners' desks. They used these to put the shavings when they are sharpening their pencils. The big sharpeners are fixed onto the unused desks on the sides of the classrooms. Learners can use these to sharpen their pencils. Her class appeared to be well equipped with sufficient materials.

#### ***4.2.5.4 Planning for multigrade teaching***

Shiwa uses the national documents such as the syllabus, annual plan and the scheme of work developed in the cluster she belongs to, to plan her work. She suggested that the syllabus be arranged so that the competencies of the same theme appear on the same page. On the day that I observed her, Shiwa had a written lesson preparation done according to the ministerial regulation.

#### ***4.2.5.5 The teaching of combined grades***

Shiwa's lesson was presented in English. She also spoke some Afrikaans during her presentation. If her learners do not understand, Shiwa asks other learners to explain in Afrikaans. She also has

another way of using Afrikaans words and illustrating them to help them understand what she really means.

*Well I really use visual for a drawing. I will also ask some students who have a better gram [vocabulary] from the English language to give me the Afrikaans word used to explain something. But I also have a dictionary here. So, now and then I look up for a word.*

Shiwa owns an English–Afrikaans dictionary to solve the problem of her language barrier. She then learns the common words and uses them when necessary. Her lesson was on how to find equivalent fractions, using the fraction wall and identity elements in equivalent fractions. The way she presented her lessons is shown in the following vignette.

#### ***4.2.5.6 Vignette for Shiwa's lesson***

After a common warm-up activity on multiples and the revision of fractions, the lesson started with an exercise of drawing pictures in the learners' books. Verbal instructions were given step by step but stopping to allow learners to complete the steps on time. At the end of the instruction, all learners had three rectangles with twelve, eight and four parts respectively, and but also shaded according to the teacher's instructions. She also drew these on the chalkboard. Shiwa does not consider her class multigrade, but rather calls it a group of learners with different abilities.

During this time, Shiwa walked around to check the needy learners. Once she came across the problem, she informed the whole class, but without mentioning names. "No, each rectangle should be of the same length", said Shiwa before she continued checking how others are doing. This was done without assisting individual learners.

The instruction continued with her going to the chalkboard to delete part of the second rectangle and then she redrew it. More explanation was also given to help learners re-draw their pictures and have them shaded accordingly. This was also done step by step with the teacher asking questions for learners to respond to. She also repeated the answers as she was carefully doing the exercise on the chalkboard for them to follow.

Shiwa taught her learners on how to find equivalent fractions on the fraction wall. The exercise given was taken from the Grade six text books. This was difficult for learners in Grade seven because they could not find the page mentioned. "No, it is not in your book", Shiwa alerted them but she allowed their peers to give more assistance. After some explanation on the content, the lesson adjourned for break but continued afterwards because she had a double period.

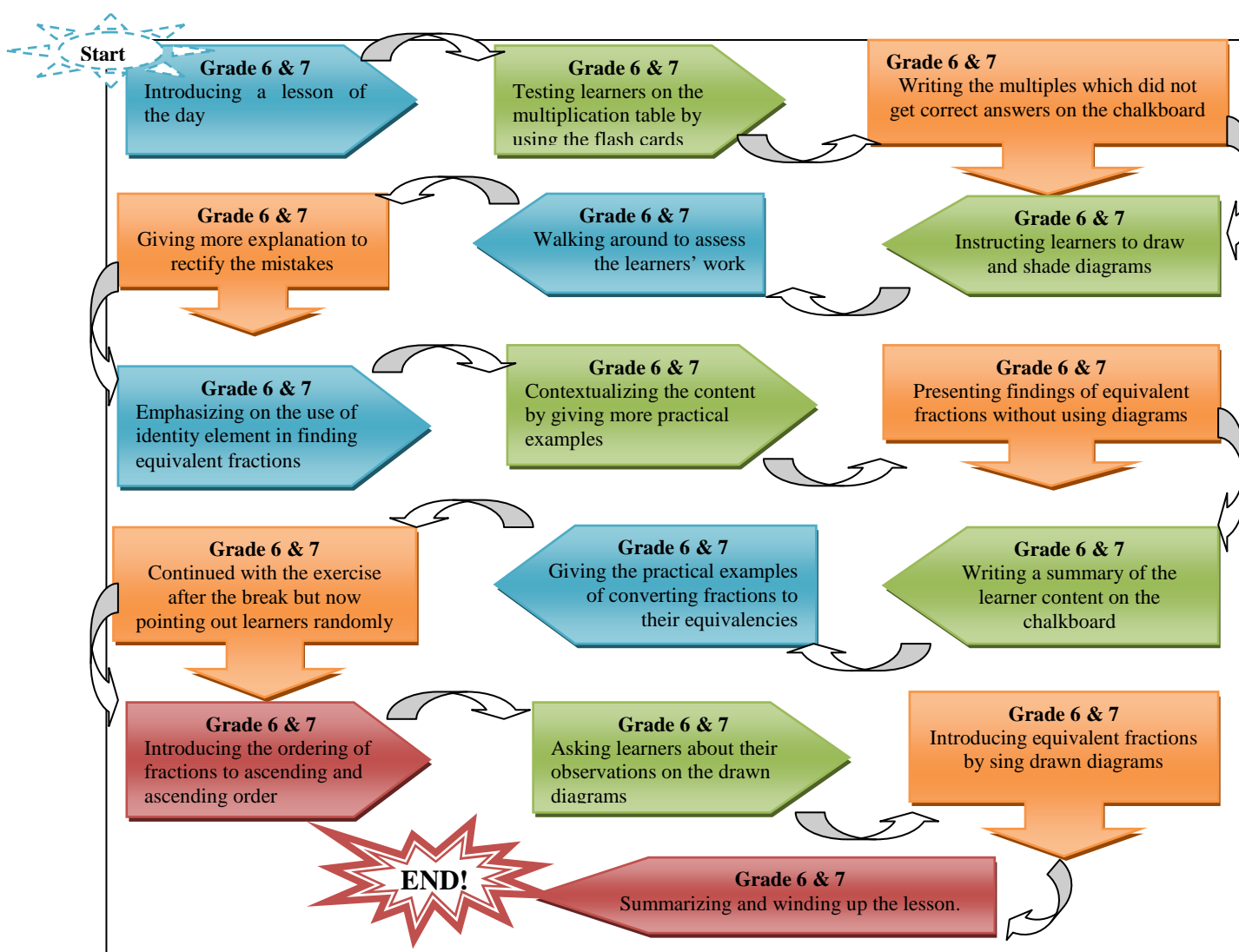
Upon starting the second session, a problem arose among the learners who were fighting over a pen. The lesson stopped while she intervened, and helped them to solve the problem amicably. The lesson continued with more activities on finding equivalent fractions. She also explained how they could use identity elements to find equivalent fractions. Shiwa also introduced the use of identity elements in finding the equivalent fractions. After getting the answer, she went back to the notice board where the multiples were displayed, and asked more questions by pointing to the multiple with her finger. In this way she informed the learners to memorise the fractions. Bearing in mind that she needed the time for the next period, Shiwa informed the learners about how much they would cover - that is putting fractions in ascending and descending order. She wrote the words and drew stairs going up and down to explain the terminologies.

The first example was the arrangement of fractions with the same denominators, but she told the learners to use the fraction chart or draw a little picture. Again, she contextualised the content. Upon giving the activity, Shiwa did not mention the grade from where the activity was taken, and learners kept on searching for it. But she indicated that the content was taken from the other textbook. "This is not in your book". Shiwa informed the Grade 7 learner who was wondering and could not find the work. Then she left her. "It must be in the Grade 6 book". A grade 6 learner assisted the Grade seven one.

The lesson was linked to the previous one when she emphasised the main points. She also assisted some of the learners who were doing the wrong calculations. The lesson continued with examples that were more abstract. When she ran out of space in the chalkboard, she deleted part of the summary before the learners had finished writing. The teacher started to sum up the lesson by writing down the homework. She also reminded learners to practice their multiplication tables. The teacher and the learners started preparing for the next lesson. The lesson adjourned and the same learners started with an English period.

As indicated in the vignette, Shiwa does not distinguish the content; she gives the same instruction to all groups despite their grade differences. She does not consider her class multigrade, but a class of learners with different abilities. Even so, she claimed to teach the content of two grades every year as well as extend the level of the work for Grade seven. This was not apparent from her presentation.

The following figure present Shiwa's lesson presentation.



**Figure 11: The diagrammatic presentation of Shiwa's lesson**

Figure 11 shows a diagrammatic presentation of Shiwa's her lesson presentation. As it is shown on the diagram, Shiwa concentrated more on the presentation of content to all the grades. She commented on the advantage of being with learners for two years, which is her opportunity to revise the content not learned in the following year. She has the same introduction and same lesson content for both grades, but claimed to have a grade specific assessment. Learners used their grade-specific textbook but she could not tell from which textbook the content was. Her learners had to discover for themselves which textbook the content was taken from.



### **4.3 Commonalities and differences**

In view of these observations, teachers have some common ways of teaching multigrade classes. They also differ in some areas. Their commonalities and differences will be contrasted and discussed in the following section. This contrasting of information will be used to identify possible good practices in teaching multigrade classrooms.

#### **4.3.1 Classroom arrangement and organisations**

This section deals with classroom arrangement and organisation, a core element of multigrade teaching. According to Papert (1971) the classroom forms part of the learning environment and it needs to be well arranged to fit the teaching and learning situation. It also needs to be well organised and structured in order to facilitate different types of teaching and learning.

All the teachers have modern classes constructed with bricks and roofed with iron sheets. All classes have lockable doors and windows. However, the arrangements and organisation varied from one teacher to another. The arrangements appeared to have been made considering the types of furniture, and the number of grades in a class as well as the teaching strategy which teachers were using during the specific lesson. Although some teachers have different ways of arranging and organising their classrooms, some of the classrooms agree very well with Papert (1971) because the arrangements allows learners to communicate with teachers as well as with other learners during the lessons.

#### **4.3.2 Seating arrangements**

When looking at the arrangement of the four multigrade classes, it was interesting to see that Bibi, Janet and Shiwa all seated learners facing the chalkboard and this agree very well with the teaching methods used during their lessons. In Jatty's class, only two pairs of Grade five learners were sitting facing the direct position of the chalkboard, while others were facing to the side. Considering the space in her class as well as the utilisation of group work, Jatty could have arranged her learners to sit in pair because she concentrated more on pair work than group work. The learners facing the chalkboard appeared to be advantaged because they could easily read from the chalkboard. These learners could follow any movement taking place on the chalkboard during the calculations and summary writing. The learners on the outsides of the groups could also read the chalkboard by turning their heads - compared to those that were sitting in the interior of the group. The learners sitting in the interior of the groups appeared to have a problem

during the traditional way of teaching because they were forced to turn sideways to be able to read and see the chalkboard. The seating arrangements in Jatty's class would have been suitable if learners were doing group work with less utilisation of the chalkboard and less presentation by the teacher, rather than the actual lesson presented where the chalkboard was used as a source of information.

The learners who directly face the chalkboard also have direct eye contact with the teacher during presentations. This enables learners to observe body language and develop interpretive skills in relation to the gestures and the signs which the teacher might use during the lesson presentation when instructions are given from the front side of the classroom. It also keeps the teacher in control of the whole class because he/she can see individual learners. The teacher maintains the learner's involvement (Kyriacou, 1991) in reading their facial expressions which might indicate how well they are following or how difficult it is for them to follow the lesson.

#### **4.3.3 The location of the teachers' tables**

The teachers' table for Janet and Shiwa were placed in-front of their classrooms. Bibi and Jatty placed their tables at the back of the class. The tables of Bibi, Janet and Shiwa were well organized and covered with table cloths. Jatty's table was not covered with a cloth and also not well organised. All teachers displayed few books on their tables.

The location of the teachers' tables at the back of Bibi's and Jatty's classes made it difficult for learners because they needed to turn around whenever the teacher was giving instructions from his/her table. Also, having the resources on these tables far from the chalkboard was time consuming because the teacher had to walk to the table if there was something needed for the presentation. Having the table in front of the classroom seemed a better option, because it reduced the walking distance for the teacher.

#### **4.3.4 Distribution of resources in multigrade classrooms**

In this section, the focus will be on the provision of the teaching and learning materials in the four visited multigrade classrooms. This section was not considered during the setting of the interview checklist, but through listening to the transcripts of the lesson observations, I realised the need to examine how teachers used the teaching and learning materials in the classes.

#### 4.3.5.1 Supply of facilities in multigrade schools

The visited schools are supplied with the buildings which accommodate learners and teachers. The classes are also equipped with various items as noted in the section on classroom arrangement and organisation. In addition to these, all visited schools have photocopy machines, a computer and a printer. Jatty keeps these materials at her house because her school does not have electricity. This makes her life difficult because the secretary works during school hours. If something needs to be photocopied, Jatty has to do it herself.

The farm schools have a low income return due to the parents who earn very little and cannot pay the required school development fund which supports the schools in purchasing photocopy paper. Hence, Bibi, Jatty and Shiwa have a serious need for paper. Jatty identified the lack of facilities as one of the problems that hamper the teaching and learning process in multigrade settings. Following is her wish:

*If I can have more, like the schools in town; there you have access to copy machine and the things that you can, things that you can do your work faster you can give more homework, you can. Ah I can, if I just have could have had the luxury. Shall I call it luxury or is it too much required from? If you do now I have to write on the stencils and we need just to roll it. If I just had the equipments you know. Even if you have a computer now we do not even have electricity, even if you have a copy machine, you do not have electricity. If I can have a solar panel, may be you can get someone to sponsor us a solar panel.*

The school where Jatty is teaching has few resources compared to the other three schools. If she had materials and if all parents could provide their children with the materials that are required in mathematics lessons, she would not have spent time lending and borrowing these materials between the learners. Learners are also forced to draw their attention to the teacher when they are asked to assist others even when they were busy with classroom activities. This contributed to the difficulty Jatty experienced in completing the lesson activities on time. Hence, she is of the opinion that multigrade classes must be equipped with resources. This qualifies the claim made by various researchers (Lungwangwa in Little, 1994; and Little, 2001) that teachers are concerned about the availability of human capital as well as the teaching and learning resources in their schools.

#### **4.3.5.2 Distribution of resources in teachers' classrooms**

The visited classrooms have sufficient teaching and learning materials. These included chalkboards, cupboards, shelves, desks and notice boards. They also have mathematics textbooks, files, worksheets and other teaching and learning materials in their classrooms. Jatty's, Bibi's and Shiwa's classes have enough space because there are only a few learners, but Janet's class has more learners and little space. There are also enough chairs and desks in all classes and all teachers are provided with a chair and a table.

The chalkboards were used during the lessons to write summaries of the discussed topics. Teachers also asked the learners to practice by writing answers on the chalkboard. At the end of the lesson, Bibi, Jatty and Shiwa had a well developed summary on their chalkboards. Janet had very few sentences as she only used the chalkboard when she was explaining, but did not write a summary on it. None of the teachers gave learners free time to be able to copy the summary. The summary might have helped learners to review the work during their free time. It would also have helped them to prepare for examinations.

The use of the chalkboard has a relationship with the seating arrangements because learners who have to turn to see the chalkboard may develop fatigue. This could hamper their involvement in the lesson. The use of a traditional seating arrangement thus may be suitable in a multigrade class and learners could form groups when necessary as was done in Bibi's class. Even so, teachers could find that they run out of teaching time, because changing seating arrangements and groups takes time.

The learning centres in Jatty's, Bibi's and Shiwa's classes have various resources displayed but they were not used during the observed lessons. Learners in all classes used textbooks to do their exercises during the lesson. Shiwa placed the sharpeners at nearby unused desks where they were accessible to all learners. Her use of glasses as bins helped learners to keep the classroom neat and also reduced learners' movements during the lesson. The distribution and collection of pencils and rulers which she lent to learners also reduced the lesson interruptions. Jatty, who had no stored pencils and rulers kept on borrowing these from the learners. Bibi's and Janet's learners had pencil cases with all the materials needed in class. The use of textbooks in Shiwa's

combined grades where the same content is presented to all grades, caused confusion to the learners. Learners were informed about the page without the teacher mentioning the grade from where the activity was taken. Bibi, Jatty and Janet who gave clear information on the use of textbooks, did not experience this problem.

#### **4.4 Teaching of combined grades**

##### **4.4.5 Introduction**

This section provides information on the teaching of mathematics in the four multigrade classrooms.

##### **4.4.6 Planning for multigrade teaching**

Planning is a core element in the teaching of multigrade classes. This gives direction as to what content is going to be taught, when it will be taught, how it will be taught, and the types of activities which will take place during the teaching and learning process. If planning is not done properly, teachers will not have proper direction on how to use the teaching and learning materials effectively. Poor planning may lead to incompleteness of the syllabus because there is nothing directing teachers on how to organise the subject content/activities. It may also lead to poor learning of what is being taught (Vincent, 1999 and Berry, 2006).

The teachers observed recognised the importance of planning in teaching multigrade classes. They all acknowledged the use of the mathematics syllabus to do their lesson planning. Most of the teachers were using the back and forth (Lataille-Démoré, 2007) method of moving between the two grades. They also appeared to use the basic competencies for the lowest grade and extended these to cater for the higher grade. If the topics to be taught were the same for the two grades, teachers appeared to compare the content of the grades to see if there were similarities or differences in the subject matter. If there was, they informed the learners in different grade groups. Their teaching of the same subjects with different basic competencies satisfied the common timetable approach identified by Lungwangwa (in Little, 2001). The teachers' planning to teach the same topic to combined grades also agrees with the Namibian curriculum which suggested the "simultaneous teaching" of the same topics in multigrade classes (Namibia. MBESC, 1996).

The observed teachers appeared to have no choice in modifying the monograde materials, following the curriculum model identified by Birch & Lally (1995) to suit their multigrade classes. This was done in the absence of a multigrade curriculum. However, Bibi and Shiwa were the only teachers who had a written lesson preparation. Jatty and Janet did not have written lesson plans. The absence of daily planning support Berry (2006) who regards planning for multigrade teaching as difficult than planning for monograde.

#### **4.4.7 Classroom management strategies**

The teachers' role in multigrade teaching did not appear to be different from that used in monogrades. In these classes, all the teachers played the role of planners and managers, controlling their classes in order to create a conducive learning environment. They also tried to make learners understand by giving them tasks based on the content taught. All teachers made learners feel comfortable during the lesson by making various jokes and speaking with caring voices. By walking around, teachers could see the learning progress of their learners. They also noticed the good examples and mistakes made by the learners. Where problems arose, they were handled very carefully by satisfying all parties and helping them understand why a certain decision was taken.

The teachers used very similar responses to the mistakes made by the learners. Once they noticed a problem amongst the learners, they corrected and assisted individual learners first before they informed and alerted the rest of the class about the same mistake. This was done to avoid the recurrence of similar problems. Even so, it was very rare for Shiwa to assist individual learners in the same ways as Bibi, Jatty and Janet.

Teachers also had different ways of managing their classes. Jatty, Bibi and Shiwa called learners' names when they realised that they were not following lesson instructions. Shiwa also stopped teaching at a time her learners were arguing over a pen, to assist them reach an agreement. If she noticed her learners making mistakes, she informed the whole class to prevent them from making the same mistake - without assisting the individual learner. Janet walked to a learner who looked as though he was not following the lesson and talked to him. She first assisted individual learners before she informed the whole group to avoid making the same mistake or to correct them if they had already made the mistake. Jatty and Bibi moved to individuals, pairs or groups to assist and

moved on without informing the rest of the class about the problems experienced by other individuals, groups or pairs.

However, the monitoring of discipline was not possible in all classes because when the teacher was giving individual assistance to one learner, there were always some learners who were chatting in Bibi's, Jatty's and Shiwa's classes where learners seated in groups or pairs. Learners in Janet's class were not chatting, but they were playing with their toys.

Despite all the above mentioned activities, the absence of enrichment activities in all classes caused some learners who had finished earlier to start playing around. Jatty, Bibi and Shiwa did not mention this, but the problem was observed in all visited classes. During the interview, Janet confirmed that she has a problem with setting up enrichment activities for learners at different levels. This is how she expressed her feelings:

*I got a lot of children in Grade six that works very quickly. And then I think ok, this is today's work that I am do[ing] and then after half an hour they all finished with the work already. I mean now I quickly rush off and get something extra to keep them busy. There are some that work much slower, but I need to keep everybody occupied all the time. [It] is quite difficult but they work, there is no problem but if they finish, and then they start chatting.*

Having learners spending much of their time doing the activities individually or in pairs during the presentation indicated that some learners in these multigrade classrooms became responsible for their own learning at an early age. Most learners do not make a noise during these activities; hence there were few disturbances during the lesson. This means that teachers were also "withitness" (Kyriacou, 1991) because they knew what was happening in their classrooms.

#### **4.4.8 How do teachers teach the two grades at the same time?**

Janet, Bibi and Jatty taught their combined grades separately. Bibi and Jatty started with their Grade fives. The Grade six learners were sitting quietly waiting for the teacher in case of Bibi and Jatty. Jatty's learners were not attended to for a long period because she spent much time giving information to the Grade five learners. Janet distributed worksheets to all grades at the same time. When she started with the Grade six learners, the Grade five learners were reading their worksheets. The waiting period for Janet was used very effectively because learners were

busy all the time. Shiwa taught the combined group as one; hence, she did not have learners waiting to be instructed because they were doing the same thing.

Teachers had different ways of introducing their lessons. Janet and Shiwa used a common activity for all grades during their introductions. Even so, Janet had a formal test with question papers and these were marked immediately to record the marks which she used to compare her learners' performance and also to motivate them. Shiwa had the multiples on the cards and used these to ask for answers. Her learners did not write anything during this activity and marks were recorded for this activity. Moreover, Janet's way of recording could be most suitable as it gave her the space to assist struggling learners if there should be one in her class. She would also know the competencies and the topics she could help them on, based on the topics which learner(s) failed in the speed tests.

All teachers revised their previous work before they started with new work. Shiwa and Janet started their lesson with learners doing drill exercises, done by all learners regardless of their specific grade. Shiwa gave the multiplication exercise before learners started with the daily lesson. Janet also had a written exercise on the four basic operations. Jatty and Bibi also revised their previous work during their introductions by reviewing previous work. Bibi's learners very quickly remembered what they had done previously. They could also identify the pages from where the exercise was taken. This was not the case in Jatty's class because her learners could not remember much from their previous lessons. She spent much time revising the previous work with them and ended up revising the whole lesson from the previous day before she continued with the new lesson.

The visited teachers all combined two grades in one classroom. Shiwa taught the same content to all learners without differentiating their grades. Jatty, Bibi and Janet shifted from grade to grade depending on the group which finished or which needed attention at that time. Hence they kept on reiterating the grade which they are giving instructions to. This was done based on the content the teacher was teaching as well as the group activities done during the lesson. Learners were therefore given time to complete their tasks while the teacher was involved in direct



communication with the other grade or group of learners. Following is an excerpt from how Bibi described his teaching:

*I say listen, this time for this group, this time for this group. Depends on what type of task can I also give to the other group. If I know this task that I give to the Grade five group will take about the whole period, then I know I do such planning also, this task will keep them busy for the whole period in individual or in pairs two or two together or in a group I gave more task for the Grade six for instance to do discussion and controlling to find the problem areas and discuss it again and give them a task to do. So, that is my approach towards it depends on what type of work I am busy with, with which group I need more time for discussion than I give the other group. That depends on the task that I give to other group. And as today I take I give them both to balance yes.*

All teachers considered the multiplication table as a core of mathematics. Bibi and Shiwa did not give multiplication activities, but they informed the learners to remember the multiplication tables during their study times. They kept on referring to it during their presentations. Jatty considered the multiples as a very sensitive area because to her, learners always struggle to learn and use them during their calculations. Bibi also reminded his learners to know their timetables.

The teachers all ensured that their learners understood the terminology during their presentations. They also paid much attention to procedures and strategies used to find the solutions to problems. Jatty's and Shiwa's learners were introduced to terminologies for fractions. A small element of vertical integration of reading (Simmons, 1993 and Namibia, MoE, 2006) was experienced when learners were required to read the definitions of some concepts written on the chalkboard. Janet's Grade five learners were also told to master the procedures for using the operation on expanded notation and the Grade six learners were taught to use drawing strategies to solve word problems. Bibi taught his Grade sixes the terms in multiplication and division, while his Grade five learners were taught to master division using one and two digit divisors. Learners in Bibi's and Janet's classes were quick to grasp the content taught and these teachers did not experience many problems in presenting their lessons because their learners could follow, and demonstrated progress in their work. The learners took part in the lessons and finished sentences with their teachers during the presentation. They also assisted and corrected their teachers when they left out some information during the presentation.

Shiwa and Jatty taught the same content during their lessons. By looking at learners' participation in these two classes, learners in Jatty's class took a long time to grasp the concept of equivalent fractions. The teacher was explaining again and again, but they could still not understand or follow and answer the questions. Shiwa's learners participated more than in Jatty's class. This related to Shiwa's slowness in completing her work. She may have been slow, but she made sure that the learners understood the pre-requisite lesson before she continued with another lesson; while Jatty was rushing to complete the syllabus but actually sense her learners did not understand the content well. During the observation, Jatty was forced to re-teach the content she had presented on the previous day because learners could not answer the questions which she posed during the revision of the work, even though the summary from the previous day's work was still on the chalkboard. As a result, she revised the content of the work which was already on the chalkboard and adapted her plan of how to continue with the work after this hiccup. This also shows the continuous planning on the teacher's side because Jatty was forced by the situation to deviate from the activities she had planned to do during that period.

Janet and Jatty had enough copies of their activities for all learners in each grade. These activities varied from grade to grade. The Grade five worksheets containing the fractional wall were distributed to Jatty's learners. She kept on explaining the diagram over and over, and also told them what they were required to do. Learners were listening to her, but it took them time to grasp the meaning of the diagram so that they could answer the verbal questions, despite the repetitions and reformulations of these questions. Her Grade six learners were given copies with instructions per question for them to answer in their books. The copies were returned to the teacher for future use. Jatty gave verbal instructions throughout her lesson. But Janet's activities for all grades had clear instructions and learners were told to read and respond to the questions. Janet walked around assisting learners who experienced problems in completing their work. Bibi and Shiwa had no worksheets. Their learners were referred to a page in their books from where the activity was taken. Shiwa also gave the instructions for her first activity verbally, but in various steps.

Janet, Bibi and Shiwa had very clear instructions for learners and the activities were done without hesitation. Obviously, the activities with written instructions were easy to supervise and

the teacher had time to assist the individual learners or groups. But the activities without written or clear instructions took time to be completed. The teachers also spent much time explaining over and over and less time assisting the rest of the groups. The unavailability of printed activities as well as the lack of written instructions can affect the visual learners who need to see in order to understand the instruction. In addition to this, the teacher-learner relationship can also play a big role in learning. It could have been the case that learners in Jatty's class were afraid of asking the teacher to repeat the questions. As a result, they kept quiet, waiting for her to repeat herself in order to respond to the questions. All of the above shows how equity and quality have been neglected as educational goals (Namibia. MEC, 1993). In all observed lessons, teachers tend to disagree with Berry (2006) because they had time to assist their struggling learners.

#### **4.4.9 Teaching strategies**

The participants in this study used various teaching strategies to teach mathematics in multigrade classrooms. They tried to guide and help learners to learn. They also practiced the lecturing method, when they were clarifying issues to the learners. This was then combined with various strategies such as group work, peer tutoring, and individualised learning. According to Little (1995) peer tutoring and individualised learning are the most effective teaching strategies in multigrade teaching.

The teaching approaches varied from one teacher to another. Despite the pair seating arrangement in Shiwa's class, the lesson was presented through individualised learning. Bibi and Jatty had pair or group teaching, based on the question and answer method. Janet used an activity based learning strategy with individual learners. Collaboration she used was during the time when learners were marking their scripts after the warm-up activity. The rest of the lesson was purely individual with learners doing individual exercises, and approaching the teacher when they had questions. She also used the discovery learning method especially with Grade six learners.

All teachers demonstrated part of the lesson during their instruction, by using chalkboards or notice boards in the cases where the teaching aid was already displayed. The relevant groups of learners were requested to look at the demonstration, for them to imitate. Jatty demonstrated how Grade five learners can find equivalent fractions by using the fraction wall. She also showed the

Grade sixes how to write the fractions in symbols when given expressions in words. Janet's demonstration indicated how to solve a word problem by drawing pictures to the Grade sixes, and the Grade five learners were shown the various steps in calculating expanded notation involving decimal numbers. Bibi demonstrated the procedure on division with two digit divisors using whole numbers to the Grade fives, and taught multiplication terminologies to the Grade six learners.

Multigrade teaching is believed to be successful if various methods such as peer teaching, group work, and individualised learning are taking place (Little, 2001). These teachers used various methods to teach their classes. Bibi and Jatty used group work and peer teaching in their lessons. Bibi motivated his learners to sit in pairs while Jatty had groups of five to six learners. Jatty grouped her learners in small groups so that she could go around instructing these small groups. She also used the learners in groups to explain to those who did not understand, while she was attending to the other grade. A little practice of peer group was found in these two classes. When interviewed, teachers explained why they had chosen to work with or without groups. Following is an excerpt from Jatty's interview.

*The group works at the certain group. There it is easiest to work with the groups so that now I explain to five to this group and I go to that group again. I think that is more suitable to work in groups with the Grade fives and the Grade six learners and then as a whole.*

The above-mentioned lessons seem to support Birch & Lally (1995) and Little (1995) who stressed that successful teaching in multigrade classes can be gained through the use of group work and peer teaching.

Shiwa preferred to do direct teaching because she does not have time to deal with groups. Following is her explanation of how she teaches her combined grades:

*I do mostly direct teaching; I don't do more individual explanation because I am already having a hard time covering the curricular. Mostly, I am at the front giving them examples, having them do their own, walking around seeing how they are doing and then moving on to the next topic.*

In addition to Shiwa, Janet also sees group work as time consuming. She gave the reasons why she does not use group work:

*I know it is probably against all the policies but I found group work is just a bit chaotic. The ideal group work is fine but critically I found it difficult because you normally get one person doing [all activities]. Even though you try to encourage everybody to take part, it is quite difficult.*

Although Shiwa and Janet did not use grouping in their lessons, their method of individual learning also seem to work in multigrade teaching. In my view, learning took place especially in Janet's class where learners indicated the satisfaction in solving the given problems.

Although Janet, Bibi and Jatty combined their teaching strategies, they kept on shifting between the grades, and gave the work to one grade before they left them to move to the other grade, depending on the content they were teaching. This agrees with Beukes (2006) who stated that the selection of teaching strategies depends on the subject to be taught as well as the environment where the learning is taking place.

In observing the multigrade lessons, one could see how teachers sometimes played the role of facilitators, which is an element of learner centred teaching. Learners were also willing to assist others. Bibi's learners helped each other during the lesson by calculating together. He also asked them to give their answer in pairs. Jatty's Grade five learners were motivated to show others how to find equivalent fractions on the fraction chart. However, during the interview Bibi and Janet felt that learner centred (LCE) teaching is not suitable for multigrade teaching. Their lessons appeared to be more learner centred than Shiwa and Jatty's lessons. But they claimed not to like and use the LCE approach. These teachers seem not to understand the learner centred approach which has an implication to their selection of methods of teaching or teaching strategies.

#### **4.4.10 The use of language in multigrade classroom**

The languages taught at all visited schools were Afrikaans and English (medium of instruction) even if the communities spoke African languages. As Afrikaans and/or English speaking teachers, this made it difficult for them to assist learners that do not understand the explanation in the medium of instruction. In some cases, learners have no choice because their parents

decided that they should attend Afrikaans or English schools. Following is how Jatty expressed her feelings about the parents' decision on the language selection:

*It is important [for teachers to] be able to communicate in [learners] mother tongue and the child begins to cope. Because that was the parents' decision; not to have a mother tongue here but to teach in Afrikaans. The two languages [are] Afrikaans and English. All the learners are Khoekhoegowab speaking.*

To her, learners have problems of reversibility because they do not learn the number concepts in their mother tongue. Most of time learners confused the numbers like 17 with 71 or 23 with 32. This is because in Afrikaans, the number is read from the units before you mention the tens which is not the case in English. Janet also noticed the learners' problem with reversibility of numbers, especially in learners from Afrikaans speaking schools. To her, the reversibility problem can be carried through up to higher grades.

*One of the boys that came from an Afrikaans school will say 56 but he writes 65. That [is] one of the most difficult things. Learners can't think in Afrikaans. They are not too bad with it. But there are some that muddle up with the given answers sometimes.*

All teachers asked some learners to explain the concepts which were not well understood in their mother tongue. In addition to this, Shiwa also uses the English – Afrikaans dictionary to look up words because she only speaks English. This appears to be a good practice because the teachers make it possible to communicate with learners in different ways. Bibi would like teachers to explain in the language which learners understand well, but it needs to be done with care because of the language policy. This how he feels:

*If you are bilingual then you can address problems areas better but with great care. You know that stick to the language policy but where it is really a problem or needed, change to another language to discuss, describe and back to English and then give them the correct vocabulary.*

However, Bibi questions the language policy which mandated English to be the medium of instruction at the level he teaches.

#### 4.4.11 Time management/ timetabling

All teachers had school timetables in their classes, and they confirmed that they follow the general school timetable. Teachers also deviate from the planned timetable to suit their needs. The observed lessons were longer than the usual time indicated in a timetable. Teachers also tried to balance the time equally between two grades within the allocated time of forty minutes per lesson.

The time of presentation varied from teacher to teacher. Janet's lesson took fifty-four minutes and nineteen seconds. Jatty's lesson took one hour and twenty minutes, Bibi taught for one hour and Shiwa's lesson took one hour and twenty minutes. Shiwa had a double period with a thirty minute break during the lesson. Bibi had one period but his lesson was extended unknowingly to suit the researcher, and this was not communicated before the lesson observation. Janet had also a single lesson but it exceeded the usual time because the teacher for the following period was not there.

The extension of lessons affected the next lessons because teachers could not finish on time for them to move to the next class. Janet's Grade fives had an Afrikaans assignment during the lesson which was affected drastically because learners were not released on time. Shiwa happened to finish almost on time, but much of her time was spend on the introductory activity as well as the revision of the previous work. As a result, she did not have enough time to teach the new content. Jatty had two periods for mathematics followed by a single period of English. She blocked her time and used the English period to complete her mathematics lesson. Following is her experience on how she deals with the timetable:

*In the morning when I look at the syllabus I am just gona do maths before break and then after break we gona do English. Tomorrow we gonna start with science and then we gonna do maths. We do it like that also. That is why I am trying to do it in one period because it is only 20 minutes for Grade six and 20 minutes for grade five. So, we have to plan to get in as much as you can in the 20 minutes and then we have to consolidate that.*

In the light of the above quote, Jatty justified why she taught mathematics in three periods as well as how she occasionally deviated from timetable. This is one of the approaches suggested by the Namibian mathematics syllabus for Upper Primary as well as the Namibian multigrade

grade teachers' manual. Even so, the teaching time allocated to the Mathematics syllabus was not honoured in this case because the teachers taught for twenty minutes instead of the forty minutes which the curriculum suggests. Therefore, the time these teachers spend on work depends on the capabilities of the learners, although it is difficult to decide what all the influencing factors are, due to many obstacles one can come across during lessons. Shiwa therefore suggested that careful time management is required for teachers to cover the classroom activities during their multigrade mathematics teaching.

Kyriacou (1991) noted variations in time management of new and experienced teachers. But a critical look at the time variations in these lessons, and the time allocation in the curriculum indicated the need for a revision to time allocation, so that multigrade teachers have a specified time allocation in the curriculum for basic education as for monogrades. This would reduce the amount of disparity and confusion among the multigrade teachers regarding time allocation.

#### **4.4.12 Learners' involvement in multigrade teaching**

Kyriacou (1991) suggests that activities be educationally effective and maintain learners' involvement. In all classes, learners were given activities which were related to the basic competencies selected for that day. They spent much of their time doing exercises, answering questions posed to them and responding to their teacher's instructions. Bibi's, Jatty's and Janet's learners were involved in writing some activities on the chalkboard. Janet and Bibi also requested that their Grade five learners explain how they solved the mathematical problems on the chalkboard, while Jatty instructed the Grade sixes to read the fractional word expressions loudly before they wrote it in fractional forms. Learners were also not just passive listeners; they took part in managing their classrooms. When they noticed a noise coming from their peers, they told the noise makers to keep quiet.

In Bibi's, Jatty's and Shiwa's classes, learners were tutoring their peers. Janet's learners were doing individual exercises. There was evidence of learners listening attentively especially in Bibi's and Shiwa's classes. At times, they finished the sentences with their teachers because they knew what would happen next. They also corrected the mistakes that their teachers had made during lesson presentations. In addition to the learning routines, learners in Shiwa's class took part in distributing pencils and rulers to their classmates while she was sorting out the learning



content. Those who had blunt pencils were busy sharpening their pencils during this time, preparing themselves for the lesson activities.

The multigrade learners are challenged by the problem of not receiving full attention from their teachers. These learners came from different backgrounds. Some have self-discipline while others need to be supervised all the time throughout the lessons. Sometimes they lose control and start talking to each other in the classroom. Therefore, learners in these classes need to be motivated to learn individually, to be on their own and to become responsible for their own learning at an early stage. They also need to be informed about the advantages of being in a classroom so that they can learn to discipline themselves during the lessons. Since there is no time left for general issues during the lessons due to trying to complete the prescribed work, the Life Skills and Guidance teachers need to play a big role in making learners realise the importance of education as well as the need to pay attention to school work throughout their schooling.

#### **4.4.13 Teachers' support from the regional or local school management**

The teachers indicated the need for Continuous Professional Development (CPD) in teaching multigrade classes. Although there are regional Advisory Teachers (AT's) for Lower Primary schools and for various subjects from Upper Primary to the Secondary Phase, these AT's rarely visit the multigrade schools to give assistance. Since independence, teacher support has played an important role in teaching and learning. However, none of the teachers knew about regional initiatives of training programmes for multigrade teaching. Teachers meet regularly in cluster meetings, but they hardly discuss issues pertaining to this model. In many cases, they feel isolated as there is no one to share with the multigrade problems at cluster, circuit or regional level.

Jatty is the only teacher in her cluster who teaches mathematics in a multigrade class at Upper Primary Phase. She knows some of her colleagues who have the same problems, but these teachers do not even belong to their cluster or to their region. Teachers in her region who have multigrade classes in the Upper Primary Phase are in other clusters. This makes it difficult for her to consult with these colleagues because they do not have common activities. In many cases, if the high officials come to visit the school, they do not define the purpose of their visit.

*As I told you the visitors were here but then I do not know what their mission was. I do not know what they have accomplished now. They did not come back to us. I think they were in the process of drafting something for multigrade as a whole.*

Even if the multigrade teaching is not prioritised by the regions, some teachers used to assist each other at school level, sharing their experiences and the difficulties of teaching in multigrade classrooms.

*Among each other, we are talking about [multigrade]. I have a problem we talk during intervals or come together and say how can I challenge that? What can I do? How can I solve this problem? Just internally. No activities going on at cluster, circuit or region. They came for a workshop and they do not mention multigrade teaching. They are handling us as if we are single grade.*

Teachers indicated different needs in the teaching of combined grades. They talked about issues relating to multigrade teaching with other teachers at their schools. At cluster level, teachers discuss mathematically related problems, but not in multigrade classes because many of them have no combined grades at their schools. Bibi is also lucky to have some principals in her cluster who have a multigrade school. If there is a problem, they share ideas and try to find a solution.

*I think we get support from, say here. Other colleagues, it is a, we know what it is. What effort it takes you to take care of such a class. From my inspector, there is a lot of support from his side and [what is the English of ["Begrappe"] Understanding for what happens in this class. I got a support from this side here also.*

Janet, being an experienced multigrade teacher who has taught in combined grades for a long time and has also taught multigrade classes in different communities, indicated her contentment in handling and teaching combined grades. This allows her to not seek support because she feels that she can do better on her own with the assistance of her principal. She also wonders if people would be able to help her. This is how she put it:

*I don't know but to actually look for support is perhaps a different. But I mean our principal has been involved with multigrade all the years so many years what I have been involved and so on, but I must say I haven't really look for support anywhere but no I don't know where one would ask for support. So I don't know*

*what type of support they will give you because something mathematics as well do you need to keep the children busy. You need to do your things really. I do not really need something like the work sheet or something like that, that can always help.*

The above-mentioned quote has revealed a little information about teacher support at Janet's school. Although Janet's school has no written policy document about teacher support at school level, once they realised that there was a need for it, they acted accordingly.

*The new teacher came in and after the first week we saw that she couldn't cope with the combination. It was just too difficult for her. Not the physical teaching, but working out, getting the syllabus to connect and you know to get all your bit and pieces together. We took the grade two back to grade one class because that teacher taught the combination for a long time the ones and twos. And then she actually sat and observed for three weeks only how it was done and hear when they gave lessons as well. But in the end we put the ones on their own, the two on their own and then we combined the three and the fours.*

Researchers (Kilpatrick et al., 2001; and Simmons, 1993) indicate the need for teachers to have good subject knowledge as well as knowledge of the curriculum for them to be able to teach well. Janet's school observed how new teachers suffer in multigrade teaching situations. In the same vein, Bibi and Jatty also suggested that content and syllabus knowledge could be very helpful when teaching combined grades. But teachers need to assist each other and share ideas in order to cope with the situation of teaching combined grades.

#### **4.5 The Namibian syllabus with multigrade teaching**

As mentioned previously, the mathematics syllabus is spirally arranged. Jatty found the revised syllabus suitable and manageable for multigrade teaching. She even has an annual plan where the content of all grades is displayed, showing the relationship within the same topics. This document ensures uniformity because if the child leaves the school, then he/she will find other schools doing almost the same content. She was also happy that the syllabus was simplified by removing some of the content. Shiwa has the same annual plan document, but Bibi and Janet are not even aware of its existence.

Bibi has no problem with the syllabus content as such, and has never experienced problems with it. To him it is well developed and they cope with it in multigrade situations. Shiwa also has no

problem with the content level, but she would like the document to be arranged in columns so that she can see all the grades at the same time. This is how she expressed her feelings:

*It will be alright if a document that shows the grades, side by side. The Grade six expectations, the Grade sevens, you do not have to flip from Grade six and then you go look for Grade seven. If you can see a side by side grade note and then you know ok, this is the Grade six expectations and this is the Grade seven instead of just having to search it for yourself. Even if it will be with the grade five, Grade six, Grade seven. These are the expectations, these are the expectation, instead of having all of the topics all of the topics grade five; all of the topics Grade six. Have the topic with the different grades together.*

However, teachers support the combination of Grades five and six which she is teaching, rather than the combination of Grades four and five, or six and seven.

#### **4.6 Teachers' experiences of teaching mathematics in multigrade classes**

The teachers were asked about what they had achieved in multigrade teaching. In an attempt to respond to this question, they indicated their happiness about the performance of some of learners who really understand the purpose of schooling and they show a love of mathematics. This made them feel positive about the teaching of mathematics in combined grades. This is how Jatty narrated the situation:

*There are learners that really understand what we are trying to do. And there are learners when you ask them which subject does they like, they like maths. I mean, that's really something to in the dark, to be proud of. I always tell them that if you understand something, then you will be able to do something. And then you have to practice and practice.*

Despite this, teachers measure their achievement through the performance of their learners and they would like seeing them progressing. This is how Bibi expressed his view:

*For me it is always good to see learner entered in Grade, grade five and how he or she develop towards Grade seven and when they live Grade seven on what standard they are. And on what standard they go with to grade 8 and from there develop again and it can take it back to develop its foundation that was laid in here in the lower primary, senior primary and those ones. That is my achievements.*

In addition to Bibi, Shiwa also feels motivated when she sees the learners say, “Ooh! I now got that!”. Moreover, all the teachers felt that learners need to have a well grounded foundation in

order for them to do well in multigrade mathematics lessons. If this is done, there will be good progress in learners' lives. This is how Janet feels about preparing learners for mathematics:

*We have a little boy that came from the primary school; he could not read and write. We really work with him and in the Grade seven; he got an A for his mathematics. Every year, we have an A average for the mathematics paper in the Grade sevens. So we work hard [and] the kids do well. They were actually lot of kids that have 90 plus whatever for the paper.*

This has indicated that the success of learners depends on him/ herself, as well as on the teacher who teaches that specific learner. Success is not only what Janet experienced, as she also had learners who battle with the subjects.

*If you build up properly with your with your primary school, that makes a big difference. If your teachers do everything in Grade 1, 2, 3 and 4; then you just go to keep building. It is not like you have to start a whole new house.*

In addition to that, teachers indicated the need for multigrade workshops where they can learn more on how to handle multigrade classes. Teachers also indicated that to be a good quality multigrade teacher, one has to be positive and determined in order to overcome the difficulties. They also indicated the importance of reading more about multigrade teaching approaches. This is how Bibi explained the situation:

*I try, I read about a lot of approach in multigrade. But then further I think it is together with the knowledge of that you have learned from others experience. My positive attitude about multigrade, good planning together with it and also my knowledge about the subject, I must know the subject.*

The teachers' positive attitudes and their willingness to teach mathematics in multigrade classroom support Vinjevold & Schindler (1997) because they noticed an increase in teachers' attitudes towards multigrade teaching. Teachers are also in need of workshops which I believe should train them on different methods of teaching and handling multigrade classrooms.

#### **4.7 Challenges facing the multigrade teachers**

The teaching of multigrade classes is a challenge to most of the teachers because not all of them were trained to teach in multigrade classes. Teachers tend to teach these grades by trial and error.

(Little, 2001). The teachers indicated their willingness to learn more about the subject, so that they could be able to assist the learners more effectively. Bibi articulated it this way:

*It is about new ideas. I always try to learn more with the multigrade teaching. We come together, talk to each other. In the cluster level, not really. That is only at subject level not in combined classes. Sometimes if it is really a problem then we discuss it and even discuss it with another principal with multi-grading.*

According to Vincent (1999b), Thomas & Shaw (1992), and Little (1995) there is a need for CPD activities such as workshops and support activities for multigrade teachers. Shiwa needs support on how to handle a class with learners of different abilities. She indicated her frustrations in this regard: *“It is frustrating because, the students are not at the level they should be and because you have to cover all this materials, you just feel like you are up against a mountain”*. She even suggested that multigrade teaching be abolished.

Being isolated, and not having anyone to share their experiences of teaching mathematics in combined grades, the multigrade teachers’ situations authenticated the observation done by Little (2001) in realising the need to form clubs where they can share their difficulties. In Namibia, these clubs could also be utilised to find solutions to some of the problems encountered in teaching combined grades.

Most of these teachers experience the problem of acquiring or purchasing teaching materials because the parents cannot afford to pay much in terms of the school development fund. Janet indicated that the former white administered schools are well equipped because of their history. This was supported by Amukugo (1993) who identified the disparities in funding schools before the Namibian independence. These problems were then carried over up until the present. In the schools where there are insufficient resources, the teachers spend too much time in management and the sharing of the resources between learners. This was mostly observed in Jatty's class.

#### **4.8 Conclusion**

This chapter has covered the data collection and analysis of the four lessons I observed. By doing so, I noticed that teachers have different ways of ensuring successful teaching in multigrade classes. This is done through proper planning, checking whether the learners have understood the previous work, through revision of previous work. If there are issues which were not grasped

captured well, teachers usually repeated the previous lesson before they started with the new lesson. In many cases, this led to the changing of the daily planning.

Learners in all classes might experience problems during the end of year examination if the annual work is not covered. Moreover, the preference of teachers for the Grades five and six combination seems to be well based because these learners will still be in single Grade seven classes where they will be given more individual attention to prepare for the mathematics external examination taking place at the end of the primary schooling. If this were not the case, it could lead to a poor performance in the national examination.

## **CHAPTER 5**

### **CONCLUSION AND RECOMMENDATIONS**

Finally, the concern for equity should be mentioned with the preference being for equity and not equality in the Multigrade context. In terms of equity, Multigrade Teaching deserves to be treated as a special form of education requiring more resources, particularly in teacher training, separate curriculum provisions and particular governmental and community support. If Multigrade schools are treated equally with other schools, they cannot be expected to achieve their educational goals (Birch & Lally, 1995, p. 10).

#### **5.1 Introduction**

The Namibian education system is aiming at reaching educational goals of “access, equity, equality and democracy” (Namibia. MEC. 1993). The multigrade teaching is taught by teachers which have less or no qualification in multigrade teaching. They also have various problems ranging from the combination of two or more grades to lack of resources. This therefore gives an indication that the fair treatment is not done in terms of multigrade teaching in Namibian education system.

In this chapter, I present the major results and achievements of the research. Firstly, the chapter deals with an overview of the key findings. Secondly, the chapter attempts to present the findings showing where both good practice and multigrade teaching challenges have emerged from the data, and also suggest areas of further research or investigations. Finally, the chapter deals with the potential value of the study, its limitations and the final conclusion.

#### **5.2 Overview of key findings**

In this section, I present a short summary of the key findings. The study has found that the observed multigrade teachers combined two grades in one class and their teaching is organised according to the planned school timetable for different grades. The multigrade teachers confirmed that they do not get assistance from other educational offices. However, some of them assist each other at school level. Teachers used their monograde pedagogical knowledge to handle multigrade classes and they are not receiving any assistance on using the grade specific syllabus to plan and teach multigrade classes. This was possibly because none of the observed teachers was trained to teach in a multigrade classroom. However, most of teachers were able to identify the common topics in the syllabus and teach them simultaneously.



Teachers adopted the common timetable as an approach of teaching multigrade classes. Jatty, Bibi and Janet presented the different content to the two grades while Shiwa taught the same content to all the grades. Shiwa seemed not to believe in multigrade, but seeing the class as consisted of learners with different abilities despite the grade differences. The syllabus analysis indicated that the same topics are spirally covered in all grades, with the exception of percentages, which is done in Grade seven only. For this reason, using a common timetable to teach multigrade classes was a relevant strategy. However, the syllabus also suggests that teachers use subject integration, or teach across the curriculum (Namibia. MoE, 2005). None of the observed teachers integrated mathematics with other subjects, although some cases of contextualisation were observed in Janet's class. The fact that they are not using other approaches; which can be used in teaching multigrade teaching, such as the Integrated Day (Namibia. MoE, 2007b), Subject Staggering and Subject Grouping, (Lungwangwa, in Little, 2001) has indicated that they seem not to know how effective cross-curricular teaching is in multigrade situations. Bibi claimed that he kept on reminding the learners about cross-curricular content, but if they had grouped the same content from different subjects and taught it in the same lesson, it could have helped to reduce teaching time.

This study has also revealed the need for CPD on the content of mathematics as a subject, as well as on teaching of this subject in multigrade classes. Teachers used strategies such as peer teaching, group work and individual learning, which seem to assist them in handling multigrade classes. But, the lack of knowledge and expertise in developing enrichment activities can also cause disciplinary problems such as noise, because learners who finish earlier, especially as was the case in Bibi's and Janet's classes, start chatting and playing with their toys while the teachers were assisting those who were not finished. Even though learners were not allowed to play with their toys during the lesson, they did this while checking that the teacher continued working with others. During the interview, Janet revealed the need to learn how to plan carefully and include enrichment activities for her learners who sometimes finish early during her lessons.

Although multigrade teaching exists as a result of the national response to the four educational goals of: access, quality, equity and democracy (Namibia. [MEC], 1993), the system seems to fail to provide equity and quality of education to all learners in schools and specifically in

multigrade classrooms which need special attention in terms of the supply of teaching and learning materials for them to excel (Birch & Lally, 1995). The mathematics syllabus is indeed suitable for multigrade teaching. The use of this monograde syllabus in multigrade teaching by the teachers in the study has indicated that learners have access to the same content despite their geographic locations although they do not have access to utilise the allocated teaching time as per curriculum. However, the lack of human resources to assist the multigrade teachers; the difficulty in reaching multigrade schools; as well as the lack of other teaching and learning materials has indicated that the quality of the content in multigrade classes may be inequitable. This quality also appeared to be further reduced due to the lack of multigrade teacher training activities. In many cases, this resulted in poor preparation as well as poor presentation of multigrade lessons.

### **5.2.1 Good practice in multigrade teaching**

Multigrade classroom is labour intensive and required more planning, collaboration, and professional development than the conventional graded classroom. Insufficient planning, staff development, materials, support, and assessment will have an impact on the success of multigrade teaching (Little, 2001, p. 11).

Although the teachers struggled to cope with mathematics multigrade lessons, some good practices were identified. During planning, the teachers started with the lower grade syllabus and used the higher grade in the same combination to see the similarities and differences between the two topics. This indicated to the teacher what is new to the entire grade and allowed the teacher to put more emphasis on it.

The study revealed that teachers have different ways of teaching mathematics in combined grades. Some teachers seem to have used “quasi-monograde”, (Little, 2004) because they alternate in teaching two grades. This strategy may be used very effectively if it is carefully planned with all learners occupied meaningfully all the time, and there are few disturbances. Some teachers used the “whole class approach” (Birch & Lally, 1995) while others used a combination of “quasi-monograde” and whole class approach to handle their multigrade classes.

Introducing lessons with a common activity for all grades seems to be a good practice because all learners are occupied. Learners are motivated to work in pairs, in groups or to teach each other. Through this process, they learn to speak softly without making noise and disturbing others. It also teaches them how to concentrate on a specific activity without being disturbed or distracted by someone in another group talking. This helps learners to have an opportunity to be assisted by those who understand the content as it was noted with some learners in Jatty's Grade five group. Also, teachers who teach specific grade content spend much of their time teaching the lower grades. This was evident from three of the lessons because most of the time was spent on teaching the lower grades. By doing so, teachers seem to build their relationship with learners in lower grades and prepare them to master the content. As a result, learners in higher grade became independent, because they are mostly left on their own and they can approach the teacher at any time without fearing him/her.

Innovation and improvisation plays a large role in multigrade teaching. With limited resources, teachers are able to find their way around using the little they have to enable teaching and learning to take place. They used the available classrooms to accommodate learners of different grades, which reduced the walking distance between two different classrooms especially in schools with sufficient infrastructure and less teachers.

Keeping the teacher's table at the back of the classroom provides the teacher with many opportunities to deal with and assist individuals and groups of learners without disturbing the rest of the class. Teachers also have a view of the whole class when they are monitoring learners doing their class work. Because the learners do not see the teacher, they are wary of moving around unnecessarily, because they do not know where the teacher is or where he/she is looking.

In general, recording formal and informal assessment marks gives a good understanding of how learners learn and perform. This indicates to teachers the type of content assistance they need to give to individual learners during the revision exercises. As a result, the revision of the topics in which specific learners performed poorly, need only be attended by those who need it instead of the whole class. In multigrade teaching, this is highly important because the teacher can single out learners with specific problems in order to assist them, and save time for other topics.

### **5.2.2 Challenges**

The study revealed that teachers have little knowledge of how to handle multigrade classes. This suggests the need for pre-service training on coping with multigrade classes. In-service teachers could also attend professional development courses on multigrade teaching. Teachers tend to rush to complete the grade specific syllabus and prepare learners for the common end of term tests or end of year examination. As a result, their presentation of content is shallow, which seems to hinder learners in becoming mathematically proficient. Among the observed teachers, Janet tried to link the content to the learners' real life situations, but others taught without linking the content to learners' real life experiences. This has an effect on the subject because learners will not know the purpose of doing mathematics as well as its importance in their lives.

The curriculum for Namibian schools is designed for monograde teaching, but used in multigrade teaching. This seems to be a challenge to the teachers and learners because teachers need to know the curriculum thoroughly to be able to use it in multigrade teaching. Lack of curriculum understanding will negatively affect the learners in their classes if the most important information is left out during the curriculum interpretation.

Although the visited classes have enough space for writing summaries for each grade, the time seems to be insufficient to allow the learners to copy down notes. This additional information is important to the learners in the absence of textbooks, because it would help in preparation for tests or examinations.

### **5.3 Recommendations**

As stated in chapter 3, the results of this study may not be generalisable due to the limited number of schools and teachers who participated in the study. In the light of this, the following are tentative recommendations on the issues which have emerged from the study:

- Curriculum developers should consider multigrade teaching during syllabus revision, in order to minimise the teachers' work load - by giving alternative ways of approaching the syllabus during planning for multigrade teaching.
- Multigrade teaching needs to be recognised as an option for teaching. It possibly even needs to be taught in teacher education courses as a compulsory subject because one never knows where these teachers are going to be employed. In-service courses also need

to adopt multigrade modules because even if practicing teachers are not teaching multigrade classes, they would be prepared to handle multigrade classes in the case of a colleague being absent, or their teaching situation changing.

- The mathematics syllabus which is used in schools is relevant to teaching multigrade classes. But further studies need to be conducted to see how best the syllabus document can be developed in order to simplify the planning work load of multigrade teachers without reducing the content which is currently included in the syllabus. Hence, the Upper Primary mathematics syllabus needs to be analysed further in order to assist multigrade teachers.
- Resourcing of multigrade schools needs to be improved. They also need to receive support from the regions to enable teachers to change their attitudes towards the teaching of these combined grades. In-service training can also be given throughout, so that teachers can adapt their multi-dimensional roles as multigrade teachers.
- Although the syllabus has emphasised teaching with understanding, not all teachers practiced that during their presentations. Many still teach mathematics following the old routine of presentation, modelling and assessment. It is then the responsibility of the curriculum developers and policy makers to ensure that the needs of multigrade teachers are met in full by the production of appropriate curricula that acknowledge the needs of pupils and teachers in multigrade classes. The system also needs to provide as much support and training as possible, which is lacking at the moment. Based on this, I would like to support (Little, 2001), in stating that “Policymakers need to be aware of the multigrade reality and then develop resource, planning, curriculum, materials, teacher preparation and assessment strategies, in collaboration with teachers” (p 13).
- Detailed information on how much learning was taking place was not obtained during this study. Research is thus needed on learners’ acquisition of knowledge in mathematics multigrade classrooms. In addition to this, the planning of multigrade teaching as well as the involvement of parents in multigrade classes needs to be researched.
- Assessment used in Upper Primary is based on the assessment criteria that are stated in the syllabus. As it was observed, the teachers used the assessment activities to promote learners to the next grade. I would therefore suggest that a study need to be conducted to assess the assessment practices in multigrade classes.

#### **5.4 Overview of the research process**

This section provides the research overview. It covers the lessons learnt on conducting research, presentation and analysing of data, as well as the realization of the importance of research in Namibian education.

As mentioned in chapter 3, the interpretive paradigm was used for this study. The importance of this was the provision to have a better understanding about the teaching of mathematics in multigrade classes. I observed and interviewed four teachers and used the data for analysis, mostly looking for patterns of similarities and differences. Although I had focal areas during the observation and interviews, the massive amount of data that was collected had to be treated very carefully in order to focus on my research question. My friendly way of approaching participants helped me to cooperate with them, but I also observed ethical principles. I therefore noted the importance of having a good relationship with the research participant, as this helps one to obtain more information to enable one to understand the investigated problem more thoroughly.

Upon completing the research process of data collection and analysis, I had a much better understanding of multigrade teaching, as well as the way teachers that used the syllabus in this situation. I also happened to see the importance of the linkage between the mathematics topics in the syllabus, and noted some unnecessary revision of topics in different grades. The fact that teachers do not know different multigrade teaching approaches emerged during the research process. They use the common timetable in their lessons, and claimed to mention cross-curricular issues during their teaching although this was not always the case.

Through this research process, my knowledge increased in many areas: on the process of proposal writing, planning research, searching for and choosing relevant documents to make up the literature review, as well as the decisions on the methods of data collection. I also learned how to conduct a classroom observation in general, as well as the different methods of analysing qualitative data. Although this was difficult for me, the knowledge I gained during this study will help me to continue with analysing more educationally related data which will hopefully result in the improvement of the Namibian education system.

### **5.5 Limitations of the study**

The first and most important limitation to this study was my position as a research education official and a mathematics curriculum developer. This proved to be a problem because teachers were not at ease in allowing me to enter their territory for data collection and this also led to the withdrawal of one participant who felt I was collecting data which would work against her. I also had problems during the analysis of the collected information because I found it difficult to disassociate myself from my role as a curriculum developer. This influenced my decision making on the identification of good practice as well as the recognition of other methods that teachers are using to teach mathematics in multigrade classes.

### **5.6 Conclusion**

In this chapter, I have presented an overview of the research findings, taking into consideration good practice as well as the challenges facing multigrade teachers and learners. Recommendations were made and I also presented the lessons learned during the research process as well as the limitations of the study. In Namibia, the removal of multigrade teaching might not be possible, but the ministry needs to find ways of assisting teachers to cope with the challenges of multigrade teaching in order to achieve the goals of education.

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## APPENDICES

### APPENDIX A: Checklist for multigrade classroom observation

Checklist for the required information for case study on the teaching of mathematics in multigrade setting

**1. School level**

- Name of the school
- Community characteristics
- Who is financing the school
- Number of teachers and learners
- Combination of grades
- The condition of school buildings

**2. Classroom level**

- Classroom layout (furniture, the learners, chalkboard/writing boards, notice boards, display areas, windows, doors)
- The type of group in which learners sit/work
- Timetable used

3. Teacher activities and his/her behaviour

4. Teachers' ability to teach mathematics in multigrade upper primary classes

5. Analysis of the lesson plans and the quality of activities

6. Classroom observation: organization and management (direct whole class teaching, direct one class with one class doing the holding activity, individual learning, group learning, time on task); classroom atmosphere (relationship between learners and their peer, relationship between learners and the teacher)

7. Semi – structured interviews: teachers' support; teachers' view for teaching mathematics in multigrade classes.

## APPENDIX B: Checklist for lesson observation

### Key:

- 1** = Strongly disagree
- 2** = Partially disagree
- 3** = Moderate
- 4** = Partly agree
- 5** = Strongly agree

Item No.	Description	Ratings				
		1	2	3	4	5
1.	Is the lesson teacher centered?					
2.	Is the lesson learner centered?					
3.	Does the teacher manage the time well?					
4.	The teacher talking loud?					
5.	The teacher talking to the whole class?					
6.	The teacher talking to individual learner?					
7.	The teacher talking to the individual group?					
8.	The teacher talking to the pair of learners?					
9.	The teacher prepare a lesson plan in advance?					
10.	Learners' independent?					
11.	Learners assist each other?					
12.	Learners behave respectfully to each other?					
13.	Learners behave respectfully to the teacher?					
14.	Does the lesson start on time?					
15.	Does the lesson finish on time?					
16.	The levels of talk acceptable to the teacher?					
17.	The levels of noise acceptable to the teacher?					



## **APPENDIX C: Interview checklist**

1. What teaching and learning strategies do you use in your mathematics multigrade classroom?
2. What are the main things that support your efforts to become a good quality multigrade teacher?
3. How do you organize your work (modules, topics, teaching, assessment, assisting lower performing learners, promoting learners)?
4. What do you like most or enjoy in teaching combined mathematics lessons?
5. Are there any good opportunities in teaching multigrade mathematics classes?
6. What do you consider as the biggest challenge in teaching mathematics in multigrade class?
7. What type of multigrade support do you receive with regard to multigrade teaching?
8. What support do you need to improve your skills in mathematics multigrade teaching?
9. Do you think it is important for multigrade teacher to be bilingual? Why?
10. Do you think the mathematics syllabus is suitable for multigrade classes? Why?
11. What achievement did you have since you started teaching mathematics multigrade classroom?

## APPENDIX D: Teachers' profile instrument

### The teaching of mathematics in a multigrade Upper Primary classroom

#### TEACHERS' PROFILE INSTRUMENT

Region:

School:

Date:

Time interview started:

finishing time

#### 1. Basic information about the teacher's background/preparation

1.1 Gender: Male \_\_\_\_ Female \_\_\_\_

1.2 Where (institution) did you graduate? .....

1.3 What was your area of specialization? .....

1.4 How long have you been teaching? .....

1.5 How long have you been teaching at this school? .....

1.6 Experience of teaching in multigrade class .....

1.7 Experience of teaching mathematics

1.8 Experience of teaching mathematics in a multigrade classroom: .....

1.9 Age range: 21 – 30 .....

31 – 40 .....

41 – 50 .....

51 – 60 .....

1.10 What are your present teaching duties, grades in which you teach, subjects you teach?

List main teaching duties	List grades in which you teach	List subjects you teach

Thank you very much for completing this form.

## APPENDIX E: Letter to the regions

Enquiries: Loide N. Kapenda

27 May 2008

**TO:** THE REGIONAL DIRECTOR

**SUBJECT:** Permission to conduct research in your Region

Dear Sir/ Madam

I am a part time student, registered with Rhodes University (student no. 605K5458). I have been studying for a half thesis master degree: **Mathematics Education** since February 2006. In order to complete this course, students are required to conduct a research in their field of specialization, as a continuation of the course work done through the year 2006. Being a second year student, I am therefore required to conduct a mini research which will involve multigrade schools in your region. The study is about the “**teaching of mathematics in a multigrade upper primary phase**”. This study aims to investigate teachers’ experiences of teaching mathematics in multigrade classrooms. Being a mathematics teacher, a researcher and a chairperson of the mathematics curriculum panel in the country, I am very much eager to learn how these teachers are coping with mathematics in combined grades in order to guide the development of the mathematics syllabuses in our education system.

I am therefore humbly requesting you to give me permission to use multigrade school(s) in your region as my research sites for report, which I must submit towards the end of this year. The research activity involves mathematics teachers teaching combined grades at upper primary phase. These teachers will be interviewed and class observed. There will also be an analysis of documents such as timetables, lesson preparations, and scheme of work, teachers’ annual plan and any other educational materials which are relevant to this study. During this data collection, the research ethics such as the teachers’ and school anonymity, informed consent as well as the participants’ privacy will be observed. Teachers will also be given chance to proof read the draft of the report for them to verify their original ideas.

An interest in multigrade was aroused by my participation in multigrade steering committee as well as the training of multigrade teachers which I conducted in few regions. Should you have any questions about this request, I can be contacted at (062) 509000 ext. 9023 during office hours or at 081 129 3101 after hours.

I am very much counting on your support and understanding.

Thanking you in anticipation,

.....  
Loide N. Kapenda  
EO: Research  
*Cc. The Principal:*

## APPENDIX F: Interview transcript for Jatty

<i>Interview transcript for Jatty</i>	
Loide	I tried to compile the the the the interview list with aa some of the issues which are mentioned by the textbook to be important for multigrade teaching. So like like the planning. The way you plan how how do you plan, how do nn you use the information from the syllabus to plan for multigrade. How do you that?
Jatty	<b>First of all I have the the Grade 5 syllabus and then I have the Grade 6 syllabus especially the the two grades which is combined. And then I see nnnn what what do they have in common. And then I start with that. So, then I do the Grade 5 and the Grade 6, the Grade 6 will be more advanced. But you start with the, with the same [pause] information. And then the Grade 6 you just do the more advanced stage according to the syllabus. That is why I am trying to do it in one period because it is only 20 minutes for Grade 6 and 20 minutes for Grade 5. So, we have to plan [pause] to get in as much as you can in the 20 minutes and then we have to consolidate that.</b>
Loide	Ok
Jatty	<b>That is the [pause] why I am doing this. In English also, and in science we have similarities like in science you have water and in, in Grade 5 and in Grade 6 you have electricity. You have all these things. So You put them together and see what has Grade 6 more that Grade 5 and I am trying to do it in one period. I am doing Grade 5 work and I am doing the Grade 6 work in that 40 minutes.</b>
Loide	Did you ever may be try to block a time like this morning you deviate from the time table nnn this morning you just do nn one of the morning you just do mathematics from nnn from nnn seven o'clock when you start up to the break, then the next day you do the other subject?
Jatty	<b>Yes, yes, yes, because the, these learners I observed that they are little bit slower than the usual classes. But what I can mention, they, they started to, to learn very early that they have to work on their own in the class. While I am busy with this grade, they must carry on with their work. And while I am busy with this grade, they must carry on with their work. But sometimes like you mentioned I, I do especially when like last trimester we nnnn for this term we should have started with decimals already. But because of the, the, the early.</b>
Loide	Rain
Jatty	<b>The rain and the staff we are starting this trimester with fractions only. So that, in the morning when I look at the syllabus I am just gona do maths like you mention before break and then after break we gona do English. Tomorrow we gonna start with science and then we gonna do maths. We, we, we do it like that also.</b>
Loide	Ok
Jatty	<b>Mhhuuu</b>
Loide	Nnnn. When you are planning, apart from planning from the syllabus when you design your scheme of work and your daily preparations are there any specific things which you take into consideration? For multigrade teaching?
Jatty	<b>I should think yes. Because I know my learners. And when I am planning I should think there is Alberta. Alberta is a slow learner. She is in Grade 5, she is a very</b>

<i>Interview transcript for Jatty</i>	
	slow learner and I have to accommodate her as well. I cannot leave her behind. So I have to do my planning to accommodate the slow learner as well as the middle one as well as the fast ones. So I have to put in certain things. Alberta for this morning, Alberta will just finish to, to, to paste the, the table and started to write the things down. She will not be finish, but that's fine, as long as she can do the basic, as long as she has grasped the basics.
Loide	Nn how how do you normally teach the... more than one classes at a time?
Jatty	I is depending that amount of, is depends on the lesson activity so this morning I have spend about ten minutes with the Grade 6 and ten minutes with the Grade 5. then I go back to see whether, to consolidate then I come back to see whether... and then so go from one grade to another all the time it depends on some times the Grade 6 they are very fine and they can handle sometimes things on their own and then I have to spend more time with the Grade 5. Because I have more slow learners in Grade 5. It depends on [pause] the the content of the lesson and the content of the fact where I have to spend more of the time whether is in the Grade 6 or whether I Grade 5. but I in the planning I will also know this morning I am gona busy with the Grade 6 work for ten minutes and for 30 minutes I am gona busy with the Grade 5. so in the next plan so then I I get more things to do
Loide	What teaching strategies or learning strategies do you normally use do you mostly use a teacher talk or group work or what do you normally use?
Jatty	Nnnn teachers talk, group work, nnn sometimes individuals that is not nnnn most common. The group works at the certain group. There it is easiest to work with the groups so that now I explain to five to this group and I go to that group again. I think that is more suitable to work in groups with the Grade 5s and the Grade 6 learners and then as a whole especially when it comes to reading, when it comes to English, when it comes to a language, we we we work as a as a whole group and not as a specific group.
Loide	Ok! But you you always. How do you ensure that there is successful teaching [ ] in your mathematics multigrade classroom?
Jatty	Mhh The next morning when they come in, then it is the first thing that we do to see whether you have understood yesterday's work. If not, then we start again that's why we, there it comes that's why we use the before break just for maths because we now we have to deal with yesterday's work and today's work. So it is a longer period of time. That's why [pause] and then we also gona look at the home work. To see whether it is done. If they do the homework then it is fine then we carry on.
Loide	What are the main things that support your effort to become a good quality multigrade teacher? Do you may be read a lot or you do a lot of observation?
Jatty	Determination, percivience. Because sometimes it is not [pause] it depend on the content of the theme. If it if it is an easier content it goes easier, it goes faster. But if it is a more difficult [pause] because one thing that I really struggles, struggle with is multiplication with a more than one digit. The the way they must write it, we are gonna spend more time with that, than the multiplication with one digit or division with one digit. It is a [pause] and and then we do it individually, sometimes, if one learner understand then I will ask him or her to help another one. Especially the

<i>Interview transcript for Jatty</i>	
	<b>Grade 6, come and help the Grade 5s may be they will understand you better than I do. Then they will try to explain. That is why we are trying to overcome with some difficulties here.</b>
Loide	Ok. Are you also monitoring your own teaching?
<b>Jatty</b>	<b>Yes, via the results that I get and how the learners respond [pause] aand [pause] something else that I must watch. Sometimes the teachers.</b>
Loide	Ok. Nn you know [pause] You mentioned something about the planning by looking at, by looking [ ] at same topics. Did you also may be try to use to teach mathematics with nnn the other subjects at the same time? While this group is teaching is doing mathematics, the other group is doing social study or other subject which you are teaching at the same period?
<b>Jatty</b>	<b>At the beginning when I came here, I tried that, but it didn't work that good. I have tried I have tried that. So whi While I am busy with the Grade 5 say work, because then we did not do Grade nnn 7 yet, only Grade 5 and 6 so I have to do Afrikaans, English, mathematics, Science, social studies, all the subjects.</b>
Loide	Mhhh
<b>Jatty</b>	<b>And I tried that, but it didn't work. Sometimes they get confused, while this grade is busy with Social study and I am doing science here, sometimes they mix-up the information and the facts. So, I am trying to have maths at the same time so, if if the Grade 5 got stuck, then the Grade 6 can help them. Or if the Grade 6 got stuck then the Grade 5s can help them and that makes the work load much ok.</b>
Loide	If if there is something? Nnn Which subjects do you teach, apart from mathematics?
<b>Jatty</b>	<b>English and Science, natural science and health education.</b>
Loide	If if there is something in natural science and health education which is the same as almost the same as mathematics content, how do you handle such situation?
<b>Jatty</b>	<b>The cross-curricular?</b>
Loide	Ya, the cross curricular issues.
<b>Jatty</b>	<b>The cross curricular issues I implement, like nnn the other day nnnn.</b>
Loide	Let me say like graphs that appear in all subject
<b>Jatty</b>	<b>Ya, graphs, graphs we do more in social studies. The rainfall and the weather and it just [pause] I was just thinking about something in science, especially the the the when it comes to calculations. Calculations you will get that all over but but when it comes to English and Science that matches a lot. English and Science the the the, sometimes we have a topic about water. Then in science, we we are doing water as a as a as a theme. So that is more easier to combine the two of them. But in maths, [pause] I cann't think more about that.</b>
Loide	May be measuring water?
<b>Jatty</b>	<b>Me Measuring, that's right measuring, [pause], I will I will try to to to find that out now that you mentioned I will think about that.</b>
Loide	Ok. How do you assess them?
<b>Jatty</b>	<b>By g[pause] sitting next to them. See if they wrote down because then I go to the [pause] Then I went to Grade 6 instead of writing over 8 they wrote over 6. To see whether the they write down things, go to the individually, go to them as group, go to them as a whole and see whether they are on track.</b>

<i>Interview transcript for Jatty</i>	
Loide	Mhhh So youuuu [pause]
<b>Jatty</b>	<b>And then mark their work as I go as I go around.</b>
Loide	And the low performing one, how do you assist them in your mathematics class?
<b>Jatty</b>	<b>Like in [pause] nnn the the boy that I sat next to [pause] Berma, very slow. He is Actually, he was trans he must be transferred every time, he must be transferred every time. So then I go to him and sit next to him try to write something from the now you write this now you write this. I am trying to have this [pause].</b>
Loide	Table
<b>Jatty</b>	<b>Trying to explain to him, why is a half equal to 5 over ten. So that he can see it himself there is the half line and there is the 5 equal parts that makes it 5 out of ten. Trying to make them see themselves. So mmm when they [pause] when they sort of finding out themselves they will remember it longer. Instead of me telling them everything.</b>
Loide	Mhhh. So you also do automatic promotion in nn in multigrade situation?
<b>Jatty</b>	<b>Ohh pardon I do?</b>
Loide	Mult hhh Automatic promotion, this transfer? The learners are also transferred?
<b>Jatty</b>	<b>Ya, the, the, they must be transferred from one grade to another. So they are not doing the Grade 5 work anymore they must do Grade 6 work. They could not even master the Grade 5 work. So even in Grade 6 you are having a bigger problem.</b>
Loide	Is it not causing so many problems?
<b>Jatty</b>	<b>For the, for the learners definitely, for the learners definitely. Because, they are not, they cannot even handle the previous grade work how will they be able to handle and for the teacher [pause] definitely also because that, that slow down the process of teaching and learning because I must now he did not master last year's work then I must start explaining to him this year's work. So It is, is a real problem but now is a reality and I do not know how, how we are going may be if we find a conclusion or we can find out something that is working please let me know.</b>
Loide	Ok [laugh] mhh ho how do you record the learners' mark or behaviours or difficulties? You have been mentioning that some learners nn have difficulties in learning do you [pause]?
<b>Jatty</b>	<b>The continuous assessment, you can see that, the continuous assessment</b>
Loide	Mhhh
<b>Jatty</b>	<b>And then I also have a book nn for Grade 5 I have a book where I have the names there on top, I do not just write the behaviour but I also trying to [pause] just for myself. Bernard, about Bernard and his [pause] short comings when it is coming to learning the things behavior. I am writing about his behaviour as well and the short coming in the academic part as well to, to, to see but this now, he was in my class last year Grade 5 Bernard, so he failed say so he must be transferred at the end of the year to Grade 6. And then we have a cumulative wooo.</b>
1.	<b>The interview stopped a bit</b>
Loide	Just continue, we were talking about [pause] we were talking about the administration where you mention that you have a book where you record all their behaviours. Ok. So But the next thing is the advantages or the special opportunities for multigrade teaching. What do you enjoy most in teaching combined mathematics class?

<i>Interview transcript for Jatty</i>	
<b>Jatty</b>	The, the, the, the, the, the advantages of, of, of, of multigrade is [pause] learners, is the learners learn easier to work independently. Because they do not have a choice there. They have to. It teach them to work independently and I think for the, for the future they will, they will definitely benefit. And what I enjoy is [pause] or the only thing that, that hamper me is the time. I have to divide the one period of 40 minutes into two twenty minute period. But sometimes I do
<b>Loide</b>	Deviate?
<b>Jatty</b>	Deviate from the time schedule, but I am most of the time I am trying to stick to it and to see these learners. I want them to enjoy school. I want them to, to see the importance of education. I told them the other day these are the things that I would like you to do. Then if I accomplish my mission, they you can bury me. I want you to know that Jesus is lived and I want academic results. So, I want you to, to, to get out of your situation and see there is more than just Mbushoye. If I can accomplish that for them to get into that, to make them learn and learn and learn and read and write. That will be very much satisfy me.
<b>Loide</b>	Mhhhhh
<b>Jatty</b>	And when it comes to the [pause] to: there are norms in life that do not change. It from right from the beginning of mankind it will be until the end. Those norms that you have to respect people. To respect each other. Those things if I have to accomplish my mission again to live.
<b>Loide</b>	Ok. Do you think you can you can do better [pause] than what you are doing now?
<b>Jatty</b>	Yes, definitely, definitely because each year is a challenge because you do not know what is coming to you. And each year, like what I mentioned in the preparation, you cannot have the same preparation of last year for this year. Because if every, every, every period or every day is definitely end from the periods there. Like today, I was lucky that they knew the fractions the denominator and those things then I didn't have to spend much time on that. But when it comes to the difficult ones I think nnn nn four main operations plus minus multiplication and division it will take more time. So, it differs from day to day and it is a challenge to sit and think how will I challenge the today? What will I do today? Like last night I was lying in bed and say: Ok, we are busy with fractions Grade 5, and there with Grade 6 and there with Grade 5. What am I gonna do next? How am I going to do it? So it is a challenge.
<b>Loide</b>	Ok. What other challenge do you think are facing nnn mathematics teaching or teachers who are teaching mathematics in a multigrade?
<b>Jatty</b>	What?
<b>Loide</b>	Other challenges?
<b>Jatty</b>	Challenge? Challenges? Challenge?
<b>Loide</b>	Mmmhh
<b>Jatty</b>	To keep the learners interest in mathematics. Mathematics is a problem area. Right from Grade 1 up to whatever grade. Nnn if you can succeed in getting learners interest in mathematics, the small level or the small aspect if they are accomplished. With the time aspect against us, it is more difficult than the usual functioning of a period.
<b>Loide</b>	Mmmhh



<i>Interview transcript for Jatty</i>	
<b>Jatty</b>	<b>But we are trying by all means to do. Really, we are trying to do that. And as I am I know, I know because I know mathematics is a problem area. And it is challenge to... And I, I also know the areas that they have since I primary level. The areas.</b>
Loide	Mhhhh
<b>Jatty</b>	<b>So I told them. If you can do maths, if you can read and write and do maths, the way forward will be open. So I am trying, these problem areas: the multiplication with more than one digit, division with more than one digit and things that really a problem. But they do not know the tables. They do not know the tables.</b>
Loide	Ok. Do you give them exercise to practice the table?
<b>Jatty</b>	<b>Ya, ya, in the morning. So I draw that clock on the board. I have times eight or times nine so whatever and so we do quickly revision on it.</b>
Loide	Do you receive any support from any one?
<b>Jatty</b>	<b>No, no.</b>
Loide	Not even from the: what is it? From the Inspector?
<b>Jatty</b>	<b>As I told you Mr. X (the Inspector of education) was here with Mr. Y. but then I, I do not know what their mission was. I do not know what they have accomplished now. They did not come back to us. I think they were in the process of drafting something for multigrade as a whole.</b>
Loide	When was that?
<b>Jatty</b>	<b>Two years ago. Were you at NIED at that time?</b>
Loide	So and in terms of mathematics, what support do you need to improve your skills in mathematics multigrade teaching?
<b>Jatty</b>	<b>If I can have more, like the schools in town: Windhoek, Rehoboth, there you have access to copy machine and the things that you can, things that you can do your work faster you can give more homework, you can, Ah I can, if I just have could have had the luxury. Shall I call it luxury or is it too much required from [pause]</b>
Loide	[Laugh] Ok.
<b>Jatty</b>	<b>If you do now I have to write on the stencils and we need just to roll it. If I just had the equipments you know. Even if you have a computer now we do not even have electricity, even if you have a copy machine, you do not have electricity. If I can have a solar panel, may be you can get someone to sponsor us a solar panel.</b>
Loide	Ok. Do you have a multigrade teaching in-service programme for teachers may be at school level?
<b>Jatty</b>	<b>Among each other, we are talking about how to may be if I have a problem we talk during intervals or come together and say how can I challenge that? How can I? What can I do? How can I solve this problem? Just internally. Just internally.</b>
Loide	At cluster level?
<b>Jatty</b>	<b>No.</b>
Loide	Regional level?
<b>Jatty</b>	<b>No.</b>
Loide	No activities going on?
<b>Jatty</b>	<b>No activities going on. They came for a workshop and they do not mention multigrade teaching. They, they, they are handling us as if we are single grade.</b>
Loide	Ok. If you happen to go to the cluster management meeting? Are you the only principal

<i>Interview transcript for Jatty</i>	
	who is having the multigrade school?
<b>Jatty</b>	<b>There is Mr [pause] here at (School) and Mrs [pause] (she is the acting principal of the multigrade school) she is the acting principal since this trimester. And then there is Mr [pause] I think he has now multigrade. Ya, mmmmm now it is Mr [pause] and Mrs [pause] at a different school.</b>
Loide	And they do not bring up the multigrade issues at the meeting?
<b>Jatty</b>	<b>No we are not in the same cluster. I am (cluster name) and I do not know the, what is their. I do not know what they are using, but we are not in the same cluster.</b>
Loide	Ok. Nnnn. The language issues, do you think it is important for multigrade teachers to be bilingual?
<b>Jatty</b>	<b>It is important because Mrs.[pause] she, she can communicate in Khoekhoe. So, especially those learners that are coming for Grade 1 coming from their house, they just stare at you. And now she, she is able to communicates in their mother tongue and the child begins to cope. Because that was the parents' decision; not to have a mother tongue here but to teach in Afrikaans. The two languages is Afrikaans and English. All the learners are Khoekhoe speaking.</b>
Loide	Do you also experience nnn like learners when they shift from lower primary to upper primary in terms of reversibility or 23 and 32? When they write it out in their in English?
<b>Jatty</b>	<b>Ya ya ya. That boy in Grade 6 you see, instead of writing seventeen, he wrote seventy one. It is actually a problem. Because the one you write first you say seventy one eighty one. That is the problem. In English is actually easy because what you say first.</b>
Loide	Because of the language barrier?
<b>Jatty</b>	<b>Ya because of the language problem.</b>
Loide	If you happen to find yourself in the situation where learners cannot understand at all. Not in English, neither in Afrikaans. How do you handle that?
<b>Jatty</b>	<b>I will call Mrs [pause] to explain. Or nnn are you talking about the whole class?</b>
Loide	No some like if there is one learner who can, you try to explain but she cannot or he can not follow in English or in Afrikaans.
<b>Jatty</b>	<b>Then I ask some of the learners in the same grade to explain it in their language. That is what I did.</b>
Loide	Ok.
<b>Jatty</b>	<b>And I am still doing that.</b>
Loide	Ok. Nnnn.
<b>Jatty</b>	<b>Mhuuuu.</b>
Loide	And nnnn When you look at the syllabus of nn mathematics, do you think [pause] the upper primary syllabus now for Grade 5, for Grade 6 or for Grade five to 7 do you think it is suitable for multigrade?
<b>Jatty</b>	<b>Syllabus?</b>
Loide	Mhhhhh.
<b>Jatty</b>	<b>Ya, ya, ya. Nnnn nnnn they have divided it into [pause] where is the things. I would like to show you to make it easier. (Speaking while searching for the documents in one of the envelopes). There I have Grade 5 and Grade 6 and then we have Grade</b>

<i>Interview transcript for Jatty</i>	
	<b>7. So, this is how we are trying to make it easier for us. We, we got it in the mathematics workshop.</b>
Loide	Mhuuu.
<b>Jatty</b>	<b>To just also to get uniformity.</b>
Loide	Mhuuu.
<b>Jatty</b>	<b>So if the child leaves Mbushoye and then join the school then they are and when you, when you look at this, it is easier than the previous one this syllabus because they took away things and they have really simplified the syllabus.</b>
Loide	So, you have no problem with the, with the topics?
<b>Jatty</b>	<b>No, no.</b>
Loide	Which we had in Grade five and six?
<b>Jatty</b>	<b>No, no. I think that's fine.</b>
Loide	Mhhh.
<b>Jatty</b>	<b>We can cope with it.</b>
Loide	Ok. In the multigrade situation now?
<b>Jatty</b>	<b>In the multigrade situation.</b>
Loide	Ok. Is, is there may be any achievement in multigrade mathematics class which you experience, your own achievement?
<b>Jatty</b>	<b>There are learners that really understand what, what, what we are trying to do.</b>
Loide	Ok.
<b>Jatty</b>	<b>And there are learners when you ask them which subject do they like, they, we have one kid, one two three then, I like maths. I like maths, I like maths. I mean, that's really something to in the dark, to be proud of.</b>
Loide	Ok.
<b>Jatty</b>	<b>I, I always tell them that if you understand something, then you will be able to do something. And then you have to practice and practice. And that's mathematics; you have to practice every day. What mathematics all about.</b>
Loide	Ok. That was the end of the interview. Unless if you have got may be something that is not covered in the, in the questionnaire and you would like to raise it.
<b>Jatty</b>	<b>Like, like you mentioned this morning, I would like to see really these workshops.</b>
Loide	Ok. Mhhhh.
<b>Jatty</b>	<b>To visualize came so that we can exactly know. Although, to have some guidelines, to have some guidelines or something that you can work on.</b>
Loide	Ok, this is the end of the interview. Thank you very much for your contribution.
<b>Jatty</b>	<b>Ok.</b>
<b><i>THE END.</i></b>	

# APPENDIX G: Interview transcript for Janet

<i>Janet: Nelao Primary School</i>	
Loide	Which language do your learners speak most?
<b>Janet</b>	<b>What we do with the language is: I do have the [pause] Subject meetings because I am in charge of the primary school.</b>
Loide	I was at Jacky Primary School yesterday and I felt pity for the principal.
<b>Janet</b>	<b>Where?</b>
Loide	Jacky Primary School
<b>Janet</b>	<b>Yes Ooh Jacky Primary School yaa.</b>
Loide	He has to teach Grade 5, 6 and 7 at the same time himself. [laugh]
<b>Janet</b>	<b>I have do, I have done that for many years. It is not a difficult task to do.</b>
Loide	Is it? Ya, you you look to be enjoying.
<b>Janet</b>	<p><b>Ya the thing is if you or I think if I mean ok because of the teaching there for a long time but I mean you nnn even with the new syllabus is not that much change from the [pause] from the old syllabus. So some of my preparations social studies, I have to change a bit because they they change nnn.</b></p> <p><b>With the math there are one or two thinks that are left out but I must admit, I do a bit more with my Grade 5s because I am in the syllabus with the maths nnnn with the decimal fractions now that they have done. The ne new syllabus they don't do like adding and subtracting of decimal fractions in Grade 5. But I actually do it with them because I mean I just feel the first part of the year than I do whole numbers they do adding and subtracting. The only thing that you add is the comma the the the principle stays exactly the same.</b></p> <p><b>So I actually do it with them, so they do a bit, [pause] nnn they do a bit more in Grade 5 with me. But I find that when they get to Grade 6 they [pause] is just that much easier if they [pause] if they do it again. Nnnn, There are some sections I mean, that I leave out that the Grade 5s don't do. Also perhaps use smaller numbers and and then sort of things but nnn. The old syllabus they can't do that so, I teach a bit and do a bit of extra with the Grade 5s. But because of the situation accommodation in classrooms actually, it works quite well because you know they can see it on the board [pause] I can say the whole syllabus they cope for it so, They cope for this.</b></p>
Loide	Ya. You think [pause] Do you think there are some changes which need to be done in the syllabus in order to fit the multi [pause]. The combination of classes?
<b>Janet</b>	<b>I don't know. The Grade 5 and 6 combination is really an easy combination because they are pretty much [pause] nnn is not that much difference between what they do in 5 and 6. But is very small with the [pause] like area and perimeter which they do not really do in Grade 5. You know but it is perhaps one week where we are going to have all big (these) difference. But most of the time beginning of the year when I do whole numbers nnn. If you do expanded notation all of those you can do is exactly in Grade 5 and 6. Pretty much work all each one of the time in their books but a lot of the time I give them exercise that both classes do, do the same exercise. I mean if you dividing by [pause] nnnn if you just doing long division, I mean both of them have to divide with a two digit number. So, you know, I can do the same work with both of</b>

***Janet: Nelao Primary School***

	<p>them.</p> <p>And and the nnnn the basically even lot of chapters in the syllabus or in the textbook, but they go, [ ] they go really nicely together. Is not as if you [pause] You know, like in social studies where you doing nnn totally different things. You can do it nnn. In the morning you can just take 5 minutes longer to to mark nnn because there are a lot of Grade 5 first mark their homework if they have got different work. And then they while they are doing their correction then I mark nnnn then I mark nnnn then I quickly mark the Grade 6s. But and then I must nnnn or than in ...</p>
Loide	Mhhhh
Janet	<p>Most of the children are [pause] they are ok with the maths. So, Most of the time I gonna jus tread the answers they they have. I do not need to do every single sum on the board which nnnn, which I mean it does not always work like that. It does not always take a bit longer. So, you need to kind of [pause] Nnnn sometimes you get to squash things all the time together in one hour.</p>
Loide	What do you think nnn the teaching strategies that you use? Do you always have like a learner teacher communication or sometimes you use the learners to to teach others?
Janet	<p>Not very often, I know it is probably against all the policies but I found group work [pause] is just a bit chaotic. The ideal group work is fine but critically I found it difficult because you normally get one person doing everything than others. Even though you try to encourage everybody to take part, it is quite, it is quite difficult.</p>
Loide	Was there any time may be when you were forced, nnn when you were forced to involve the the the community members the parents may be to come help you with the class while you are dealing with the other one?
Janet	<p>No, I have never done that, I must admit nnn I think the parents are too frightened to understand. The only time I have used then nnn like when my dad pass away then when we go for the funeral then the parents you know, stood in and the gave them a work to do and they nnnn, they do it for us.</p>
Loide	Ya, ok. It can either be the colleague which you, which you have invited to assist you with the class while you are busy with the other?
Janet	<p>So I am actually never done that. I am quite happy to [pause] what I have done, I have done that once or twice before but not with the mathematics, it was for social studies is nn not very often but I did it the other day. It is nnn for Grade 5 and 4. That help quite a lot to to do that.</p>
Loide	Do you also do automatic promotion? Do you promote the learners who fail like nnnn may be they fail Grade 5 then you promote them to [pause]?
Janet	<p>Ya we follows theee mmmm government, the the promotion requirements. At this stage, so far we haven't had any failures in the primary school. But I do think this year, we might, we might have one. Mhh in the class where nn I was now this one boy that works really really bad, but he he failed Grade 1 but at another school. He did Grade 1 twice, at different schools and he is a lot older, so and he is already 13 in Grade 5 I do not know if he gonna make it this year but no, we do follow, the normal, the normal procedure.</p>
Loide	Ok. And I I I also observed something which is very good, when, when you were giving them answers then no you ask them how much they got in the , in the quiz which you gave them, which is which is quite nice.

***Janet: Nelao Primary School***

<b>Janet</b>	<b>Ya we always ask that because they, they are supposed to get more than 50 out of sixty and nnnnn two weeks ago, those who did not get 50 has to come and sit here for and we did tables in the afternoon. But also I didn't say we learn the table we did another exercise with them and we have to do a bit of extra. But tables is just learning. We did extra a bit of extra work with them.</b>
<b>Loide</b>	<b>But that is good because you are keeping track of how they perform.</b>
<b>Janet</b>	<b>They compete with each other as well. They like to get sixtys. And there is some that always get sixty. But some as I said like we have got 30 and I have got forty so I keep say that even if you go up by one, you must go better, you mustn't get less.</b>
<b>Loide</b>	<b>Ok. So, what what what do you like most? Or what do you enjoy when you are teaching these combined classes?</b>
<b>Janet</b>	<b>You know, I found that you are just busy all the time. Mmm the last two years when I was teaching Grade 5, 6 and 7 together, I never sat down for one minute because also I have to work everything I want group work on a worksheet and I am teaching this one and I the other one is busy. You go to keep everybody busy. And this year have been quite, I am actually have a free period which I never had before. But I found with the Grade 7s because I haven't three classes together, I can actually do a bit of marking and do things and you know, while the kids are busy which I never could do before. But I like being busy, you know.</b>
<b>Loide</b>	<b>Is it? Ok, what are the good things about multigrade mathematics classroom?</b>
<b>Janet</b>	<b>For the children or for the teacher?</b>
<b>Loide</b>	<b>Both.</b>
<b>Janet</b>	<b>For the children, definitely they pick up a lot. Mmmm like for Grade 5, if I am explaining something prescribed only for the Grade 6, I found those kids that they are little bit in Grade 5 that are a little bit, they actually listen and watch, even if they do not have to. But they want to know what [pause] be knowledge a bit. But because there is a lot of repetition, both grades are almost doing the same thing I you are [pause] "Op die Afrikaans word vaasligging" [pause] you are [pause] Everybody by doing it over and over they know it better as well. And because the work is quite similar, Grade 5 up to 6 the degree of difficulty is not so bad, I found out when they get to Grade 6. They found the work so much easier because they are doing the same think over again. And with any children the more you do it the better they know it. And you can't say it once; you got to say it over and over and over again.</b>
<b>Loide</b>	<b>Ok. Do you think you can do better than what you are doing now?</b>
<b>Janet</b>	<b>There is always room for improvement. Always, always, always.</b>
<b>Loide</b>	<b>Ok.</b>
<b>Janet</b>	<b>I think my biggest nnn that might be what you are asking me. One of the biggest problems is nnn I got a lot of the children say in the Grade 6 class that works very quickly. Nnnnm And then nnnn you know and then I think ok, this is today's work that I am gonna do and then after half an hour they all finished with the work already. I mean now I gonna quickly rush off nnn and get something extra to keep them busy. But then again there are some that work nn much slower, but I need to keep, to keep everybody occupied all the time as as as quiet difficult but the thing is [pause] the thing is they work, there is no problem but if they finish, then they start</b>

<b><i>Janet: Nelao Primary School</i></b>	
	<b>chatting. Which is normal for kids as a a nn but I can't overload because there are those that are behind. Nnnn you never it is too much for them. That is the one that is difficult problem sometimes to those who finish quickly, nnnn to keep them occupied all the time.</b>
Loide	What other challenge do you notice? Apart from having learners from [pause] for at different level of understanding?
Janet	<b>I must say in the beginning when Grade 5 comes basically from Grade 4, they are very slow in your combination class the Grade 5 works much much faster. Because, that's where there is a bit difference. But as the year progresses, I find everybody starts working almost at the same rate. And I am bit in hurry, I find with the Grade 4 or because they have just came from Grade 4 then I have to force myself to slow down a bit in the beginning with the Grade 5s and take it slowly until they cope and until they get into the pace.</b>
Loide	Ok. Do you receive any support in teaching mathematics in multigrade class from the management? From the school management or from the [ ] regional office?
Janet	<b>I don't know but to actually look for support is perhaps a different. But I mean our principal I mean he has been involved with multigrade all the years so many years what I have been involved and so on, nnn but I must say I haven't really look for support anywhere but [ ] no.</b>
Loide	Ok. Nnnn What support do you think you need to improve the your skills in mathematics multigrade teaching?
Janet	<b>I don't know where one would ask for support? [laugh]. Nnnn.</b>
Loide	May be if if if you have got some suggestion on on on on what type of support which either the government or the institution.
Janet	<b>So I don't know what type of support they will give you because something mathematics as well do you need to keep the children busy. You need do your things really know how much the outsider will influence. I do not really need something like the work sheet or something like that, that can always help nnnn. I am not sure, ya now I am not sure.</b>
Loide	Ok, ya you don't need training on it or a workshop?
Janet	<b>[Laugh] you know, I am quite happy with what I can. [laugh]</b>
Loide	Ok. You are confident on what you are doing? Do you have in-service program? At school level or cluster?
Janet	<b>We don't have nnnn shall I say a written think. But what I did to let's say beginning of the year when the new teacher came in. what actually happen nn this year is because of the Grade 4 class ah the Grade 2 that are small four learners, we had the two and three as a combination. With one on its own and four on its own. But it is her first year of teaching. And after the first week we saw that she couldn't, she couldn't cope with the combination that was just, nnn it was just too difficult for her. Not not the physical teaching, but working out, getting the syllabus to connect and you know to get all your bit and pieces together. What we actually did for her because almost for three weeks is that we took the Grade 2 back to Grade one class because that teacher taught the combination for a long time the ones and twos. And then she actually sat and observed for three weeks only how it was done and hear when they gave lessons as well. But in the end we put the ones on their own, the two</b>

<b><i>Janet: Nelao Primary School</i></b>	
	on their own and then we combined the three and the fours. Because she was with us at (school name). Actually she also taught the combination classroom ten years or so. So she was familiar with that as well. So we joined the three and the four.
Loide	Which is quite heavy because of the different language of communication?
Janet	It is, ya. It is. But I think there is more advantages to [pause] to that as well because often seeing before, if you grade [pause] if you have done Grade 1, 2 and 3 in Afrikaans and then they came to Grade 4 and then they are exposed to the English, for the first time and you are just say add and subtract, you know is a new word but it should be basic words but it is fine because they have been in the same class, mmm and you know, they will do addition at the same time, but they hear the words and they [pause] they will do quickly math even though they know it or they have to know it theoretically for the test or the but if they hear it in Grade 4 actually they heard it before. So that is actually how it. But it is for the teacher is quite nnn difficult because you got to do it double, you got to do in English and in Afrikaans, whereas in this [pause] I can give them the same worksheet often I do not always have to give them separate things.
Loide	The, the language issue may be you are good because you can speak Afrikaans and [pause] and English. Do you do you think it is important for a multigrade teacher to be bilingual?
Janet	I think it is more important that you are speaking English than being bilingual. I think it is more heavy here because all the children are speaking in Afrikaans but luckily I am an English speaking. The [pause] the language is not [pause] not a problem nnn you need to be bilingual but it quite funny because the children are fine always because it is Afrikaans speaking children. They all know the English vocabulary then like now saying: hoe moet ek decimal fraction na common fraction verander? You know they start now use the English vocabulary, even if they don't if the question might be in Afrikaans [laugh]. They [pause] they are quite small; they cope well with nnnnnn [pause] The honestly we don't have a language problem really. So it is [pause]
Loide	So like if you happen to have nn like a Vambo speaking child or a Herero speaking child?
Janet	That is much more difficult.
Loide	So it is much more difficult?
Janet	We saw it at (School name), there we started with Grade 1 in English. We do we changed that along the way because there were also Afrikaans, and then the children has to change to English and that is what we felt a lot of the children that came in were Herero or Tswana or whatever speaking. And then they could not speak English or Afrikaans. Now you make them speak Afrikaans and in Grade 4 you have got to switch to English and we just felt, I mean I still feel that personally here. You know we are in an Afrikaans speaking community, but I feel Grade 1 start with English and [pause] and the go the whole way through. But I mean it is a bit difficult to change that. But what we found there and here as well at the playground language is Afrikaans. So the kids picked up the Afrikaans because they speak to each other in Afrikaans. But with your language with your terminology, with your vocabulary you know, everything that you do just started in Grade 1. That is actually better. That is what we experienced over there. For those that don't



<b><i>Janet: Nelao Primary School</i></b>	
	<b>that aren't competent in English or Afrikaans nnnn to start with one language and [pause] Because they still take Afrikaans as their second language, which they picked up any way because kids talk to each other. Yaa to start with one language. I mean that is what we felt. A lot of children nnn [pause]</b>
Loide	Did you notice anything with like this number 23 and 32 when you ask them to write it out in words? The kids who do not understand anything and you have to [pause]
<b>Janet</b>	<b>When in English and in Afrikaans?</b>
Loide	With the English and in Afrikaans?
<b>Janet</b>	<b>I found sometimes they [pause] some of the children muddle up with the tables as well. Nnn one of the boys that came, he came this year but he came from an Afrikaans school, and then he will say 56 but he writes 65. Ya, that's the one of the most difficult things is this I had to teach matric in Afrikaans, and the numbers in Afrikaans make me. They I can't think in Afrikaans, they they, no they are not too bad with it. But there are some that muddle up with the if they are given answers sometimes then they [pause] they give them wrong way out. Ya.</b>
Loide	What what do you think one can do if you happen to have the child who is not speaking the language one of the language which you cannot speak? Like if the speaking the local languages like Tswana's and other? How do you help that that learner?
<b>Janet</b>	<b>Grade 5 and 6 generally, you know because the language should be new, but I know this little boy in Grade 1 mnnn he can understand English and Afrikaans but it [pause] it was quite a battle for the teacher and for certain instruction which he couldn't follow. But I don't know, the picked it up and they learn. The kids learn very quickly. They they do.</b>
Loide	Ya. The gap between the syllabus and and and the classroom situation? You spoke about it briefly.
<b>Janet</b>	<b>Ya I am quite happy with the syllabus. Mnnn I must say some of the things that they have left out are [pause] Are things that worked before, you know but it there is not such big changes that it makes a difference. Sometimes the Grade 6ses in the previous syllabus had ratio which is not in any more. It is not a major [pause] A major change. But good to see that adding and subtracting that the Grade 5 don't do. I feel they can do it and I actually [pause] add a little bit more. But it is not it is not such a major change.</b>
Loide	You do not have any suggestions which you would like to [pause] Which you would like to improve the syllabus so that we can teach the multigrade class effectively. What comment can you make on the change made on the syllabus?
<b>Janet</b>	<b>I think no with your 5 and 6 combinations it works really easily. If you had for example 4 and 5 or even 6 and 7 you have a big problems because like 6 and 7, with the 7 do percentages were you know where they totally do different work. You have a problem I think because that will be like teaching two separate classes total because you have two different streams. But the 5 and 6 is a very easy combination because of the syllabus. The 5 and 6 syllabuses are so close to each other. And the content they do is not really like that difficult, ya.</b>
Loide	The achievement you [pause] you had, since you started teaching mathematics in the combined classrooms?
	<b>I do not know, we are always been lucky [pause] and the children have done well.</b>

***Janet: Nelao Primary School***

	<p>We have children that do very very well. Mnnn actually we haven't had anybody that failed. But I always believe that if you [pause] from Grade 1 to 3 if they are taught properly there, if you get them in Grade 5 and 6, then you are already half way there. Which is what we always work really harder. Nnnn at (school name) luckily my husband did the he did part 6 and 7 actually he did the Maths 5 and 6 and in the 7s. I was doing the 4s at this stage. And we had children that did very good. We have a little boy from that came from [pause] from the primary school; he gotten when he comes back he, he could not read and write. I mean really and true. And we really work with him and in nnn in the Grade 7, he got an A for his mathematics. We always had [pause] Every year we had an A average for the mathematics paper for the Grade 7s. So no we work hard so no we had the kids do well. They were actually lot of kids that have nn 90 plus whatever for the paper. And so on. But I think what one knows is I got one that really battling. But he battles with all the subjects and the language as well. He is Afrikaans the English is just beyond them. Nnnn and it is the first time but I think.</p> <p>The lowest mark, say in the 50s and so. You know we luckily we haven't got learners that are really [pause] 10 %, 20 % learner that don't have any idea of what is going on. Which makes which helps a lot in the class because as I said I can read answers you can do things you can probably start faster, you don't have to go [pause] you know baby steps I can jump quite easily. But I mean I know also not every [pause] not every school and not every situation gonna be there. But that's why I am saying you need to have [pause]</p> <p>If you build up properly with your with your primary school, nnnn that makes a big big difference. If your teachers do everything in Grade 1, 2, 3 and 4; then you [pause] you just go to keep building. It is not like you have to start a whole new house. I had that at at trimioxix at (school name); I had the matrices for mathematics and the one said to me [but] he failed mathematics since for Grade 4 and he is in matric. You know you got no foundation then it then it is really difficult to do things. A nominate was made to the other teacher for the year but I mean there are also some circumstances that makes it difficult. But if your basics are there and done properly it makes it a lot easier for for as you go along. And the same applies for those teaching in the high school as well if you are a high school teachers. I mean you you got no foundation.</p>
Loide	Is (school name) a private school or is it the government?
<b>Janet</b>	<b>No no it is the government.</b>
Loide	Is it?
<b>Janet</b>	<b>ya</b>
Loide	But how did you cope? Did you have had enough materials to work with?
<b>Janet</b>	<b>Ya there were a lot of things there. There is mmm look all of these schools that [pause] I know it will sound very colonial but all these schools that have the old white admin for white school had everything.</b>
Loide	Mhh. Ok.
<b>Janet</b>	<b>Mmm so, I mean they have got a a wonderful library they have got everything that that they need.</b>
Loide	Ok.

<b><i>Janet: Nelao Primary School</i></b>	
<b>Janet</b>	<b>Ya they have got everything that they need. Where your five [pause] before we left the 5 year plan they rebuild the whole school.</b>
<b>Loide</b>	<b>Ok.</b>
<b>Janet</b>	<b>Ya before we left they rebuild the whole school. The whole school was falling apart. The school was 70 years old already 75 years old is one of the older schools. These are just physically the buildings. So they have got brand new school buildings and [pause] facilities. The hostels a bit old I mean just from the age I mean is not from the vandalism or staff like that. Is just the buildings that start to crack and so on. No they have got everything that they need there.</b>
<b>Loide</b>	<b>Ok.</b>
<b>Janet</b>	<b>They have got everything that they need there.</b>
<b>The end</b>	

## APPENDIX H: Interview transcript for Bibi's lesson

<b><i>Bibi: Jacky Primary School</i></b>	
Loide	I would like to know the teaching strategies and the learning strategies which you use in your multigrade mathematics class. Which ones? Do you normally [pause] which one do you use most? Is it grouping learners? Is it learners teaching themselves by using those who knows better to teach others? Or which teaching strategies do you normally use?
<b>Bibi</b>	<b>Mixed, mixed strategies, from time to time I use grouping. High time I use a stronger learners.</b>
Loide	Mixed?
<b>Bibi</b>	<b>Mixed strategies, from time to time I use group and grouping. High time I use a stronger learners to help the weaker learners, sometimes I am teaching, explaining from my side a topic or the areas and then send them with the topic or to complete the task</b>
Loide	Was there any time when you were using maybe project approach by using local environment?
<b>Bibi</b>	<b>Local environment I never use. Sometimes I invited sometimes local people to help with the subject but it is sometimes.</b>
Loide	How do you ensure successful teaching in mathematics multigrade teaching?
<b>Bibi</b>	<b>Good planning, you have to plan properly. Each one per each Grade what I am going to do. And I try to teach the same topic as much as possible. They hear each other. If we go to upper grade you just add.</b>
Loide	What are the main things that support your effort to become a good quality multigrade teacher? Do you read maybe a lot about multigrade? Do you read a lot about mathematics do you do research or what really support you to be a good multigrade teacher?
<b>Bibi</b>	<b>Ooo..(laugh) is I can't say mm, I try, I read about a lot of approach in multigrade. But then further I think it is together with the knowledge of that you have learned from others experience. My own positive attitude about it. Good planning together with it and also my knowledge about the subject, I must know the subject.</b>
Loide	About the organisational approach or the timetabling, how do you organise your work? The do you organise it according to modules maybe or do you organise it according to topics and how do you teach the same or Do you teach the same or different topics to different grades? It is more on planning?
<b>Bibi</b>	<b>Yes it more planning, you have to look to different modules and topics, organise, shift and see if you can bring it together where possible and so you come back to planning in a multigrade.</b>
Loide	Ok. Was there any time when you were teaching mathematics to one grade and the other grade you are teaching social study?
<b>Bibi</b>	<b>No. no nono not in the same time</b>
Loide	Mhh
<b>Bibi</b>	<b>Do you ask in the same period?</b>
Loide	Ya, the same period.
<b>Bibi</b>	<b>I try to teach mathematics to all. All the Grades I am busy with mathematics.</b>
Loide	You did not check whether there are some aspects in the syllabus which are linked to the social study maybe?

<i>Bibi: Jacky Primary School</i>	
<b>Bibi</b>	If it comes to that, when I come to social study then I say remember what we were doing in mathematics. Or remember, this part that we are doing now we talk about it in social study or so. I bring it in here, but not that I am. Especial in my case that I have to teach social study and mathematics, I am responsible for both in Grade 5, 6 and 7.
Loide	How do you plan your annual work or scheme of work or weekly planning? Do you plan having three syllabuses for three grades or you plan for one grade first then you plan for another? Let's start with the annual one.
<b>Bibi</b>	<b>For 5 and 6 I do I look at both and try my planning. Grade 7, it is on its own and I plan for it also. Then there sometimes it is the same that it compare with each other, the same topic or what, but butaa, the Grade 7 is alone.</b>
Loide	Are there any specific issue which you take into consideration when you plan for multigrade teaching?
<b>Bibi</b>	<b>What I take in consideration is is my type of learners that are in front of me. The abilities of them. That makes another my approach towards the syllabus different. If I have more slower learners in the group, then my approach is different from the middle and f are fast learners. But I also have to operate take in that one that work in different.</b>
Loide	When it comes to annual planning or scheme of work what do you consider most?
<b>Bibi</b>	<b>To finish the syllabi. To to to finish the syllabi in time and have time for revision.</b>
Loide	Well, this is the teaching now. How how do you teach more than one class at a time?
<b>Bibi</b>	<b>[laugh] iyaa, To start I say, [pause] when I enter the class, first I have to decide of which group have to start now first. [Laugh] I do not start everyday say with the Grade 5 first or Grade 6 first. So, I mhhhm change between the different task. But it depends on what type of work it is. Is the nnnn can I nnn and the type of the introduction I have with each group. Can I now mm. which group can I in the shortest time be ready to that they work on their own? And to start with another group. So that is my approach when I start with the [pause] milti mmm teaching to do multigroup teaching. So, which group can I first let's say release with a project on their own? Give them a task and say listen, carry on and as soon as I the that group can carry on and I start with the new group discussing new work or discuss a problem area, nhhh so that influence my start with a group.</b> <b>And then from that I say listen this, nnn this time for this group, this time for this group. Depends on what type of task can I also give to to the multig nnn with the other group. If I know this task that I give for instance to the Grade 5 group will take about the whole period, then I know I do such planning also, this task will keep them busy for the whole period in individual or in pairs two or two together or in a group nnn. I gave more task for the Grade 6 for instance to do planning ah not planning to do discussion and controllig to find the problem areas and discuss it again and give them a task to do. So, so, so, so, that is my approach towards it depends on what type of work I am busy with, with which group I need more time for discussion than I give the other group [pause] that depends on the task that I give to other group. And as today I take I give them both to balance yes.</b>
Loide	Assessment and remedial teaching, how often do you assess learners in mathematics multigrade classroom?

<b><i>Bibi: Jacky Primary School</i></b>	
<b>Bibi</b>	<b>If it is possible, in class during the teaching hours, school d ah school day I have sometimes for that. But if it is really, it is a bigger group not a whole group but only some learners, I make appointment with them during the afternoon. I say listen this afternoon we meet each other in the class and discuss this area.</b>
Loide	So, that is how you assist the low performing ones?
<b>Bibi</b>	<b>mmm.</b>
Loide	Ok. But having two class now Grade 5 and Grade 6, in one class and we are thinking about the system which we have for, a graded system where you have to promote learners and if they are not, if fail then you do automatic promotion sometimes. Do you also do automatic promotion in multigrade?
<b>Bibi</b>	<b>Yes, we are it is also for that [laugh] the same promotion requirement and but we try to solve it and see if the person is if he is automatically performed and some cases that happened in the past the age or already is the second time it fail or a learner failed the second time. We discuss it with the parents to say listen, we have to think of another options now. Nnnn Whatever the option is the age as it is the person on the practical teaching or practical courses that is most in the interest of the child or ahh or special teaching.</b>
Loide	But automatic promotion: is it not causing any problems in multigrade teaching?
<b>Bibi</b>	<b>Yes it cause problems. It cause problems because when you [pause] the child is behind for the phase that he is now, the grades that in mathematics is a never pick up. That is my experience over the years. If he miss a year that he is automatically nnnnn transferred to the next grade and mathematics is one of the subject that he failed, has a failure, he or she never catch you up.</b>
Loide	Do you have a system of recording learners with difficulties during the lesson presentation?
<b>Bibi</b>	<b>Aaa write down we have a problem we do not have many children but so nnn I remember listen this child has a problem, I say listen, this is a problem. There is a problem somewhere we make note of it and listen there is a problem. And we try to address that problem if we can and nnn we try to find somebody who can help us with it if is possible.</b>
Loide	And the assessment, did you ever try to record assessment during when you are teaching did you ever try to record the assessment?
<b>Bibi</b>	<b>No. no.</b>
Loide	Ok. What do you think you like most or enjoying in teaching combined mathematics lessons?
<b>Bibi</b>	<b>Where the child understand and you see the progress that they start (nodding his head and smiling) and you see their face light up and they say heei and [pause]</b>
Loide	So it let you most enjoying your teaching?
<b>Bibi</b>	<b>Yes.</b>
Loide	Are there any good opportunities do you think in teaching mathematics multigrade classes?
<b>Bibi</b>	<b>I think one think that I can say that multigrade teaching and the child learn, is for sure is to work independently. Is forced to independently. While you are busy, while I am busy with say the Grade 5s, Grade 6 has to work on independent, pay concentration on his work and try to solve it by himself with no problems. Give him a hint and he, and try to solve the rest Work independently I think is one of the most positive values in multigrade.</b>

<b><i>Bibi: Jacky Primary School</i></b>	
Loide	If you have a single grade and you have multigrade, which one do you think is supporting learner centred?
Bibi	<b>Even the based one, the one I think the best one, the one that we can prefer is the single grade. You have maximum time for the ... That is also they come from multigrade then they know how to work independently. But now you have more time to carry out with work and to discuss the think and to get an effort with them.</b>
Loide	What do you consider as the biggest challenge in teaching mathematics multigrade class?
Bibi	<b>[laugh]</b>
Loide	Is there some disadvantages something that challenging
Bibi	<b>I think the size of the class may make a big role; too big class in a multigrade is a problem. Children definitely got disappear, annnn and but I think the the problem is to get all that specific groups attention to you. To keep the attention and while you are busy with this group that other group can carry on nnn independently without feeling disturbed by this group.</b>
Loide	So, what type of multigrade support do you receive from the management? Now that you are a principal, may be is the support that you receive from the regional office? Or from other colleagues also.
Bibi	<b>I think for my school we get a support from, say here. Other colleagues, it is a, we know what it is. What effort it takes you to take care of such a class. Nnnn from my inspector, there is a lot of support from his side and what is the English of “Begrappe”. Understanding for what happens in this class. I got a support from this side here also.</b>
Loide	What support do you think you need to improve your skills in mathematics multigrade teaching?
Bibi	<b>Is about new ideas. I think that is. Always try to lean more.</b>
Loide	Do you have assistance at school level, cluster level or circuit level?
Bibi	<b>With the multigrade teaching; we come together, talk to each other. In the cluster level, not really. That is only at subject level not in combined classes.</b>
Loide	And at regional level?
Bibi	<b>No.</b>
Loide	Being a principal, when you attend the cluster management, do you discuss issues pertaining multigrade?
Bibi	<b>Sometimes if it is really a problem then we discuss it and even discuss it with nnnn with another principal with multi-grading.</b>
Loide	Ok. Well, the language issues in multigrade, do you think it is important for multigrade teacher to be bilingual or
Bibi	<b>I think it is it help you. If you are bilingual then you can address problems areas better but with great care. You know that nnnn stick to the poo language policy nnnn but where it is really a problem or needed, change to another language to nnnnn discuss, describe and nn back to the the the language to English and then to give them the correct nnn what do you call it? Nnnm Vocabularly.</b>
Loide	If you happen to find yourself in a class where you have a mixed language group, how do you handle such situation, how do you help learners from the language or which are speaking the language which you do not speak?
Bibi	<b>I ask somebody, who are understand the topic to explain it to [pause] another person</b>

<b><i>Bibi: Jacky Primary School</i></b>	
	<b>who do not understand English in the language that he or she understand.</b>
Loide	The next group of question is dealing with the [pause] are dealing with the syllabus, nnn the gap between the syllabus content and the mathematics multigrade class. Do you think the way the syllabus is designed is it well designed?
<b>Bibi</b>	<b>Can talk more about learner centred approach and that is not always be possible. It is not possible in multigrade. Sometimes yes but it is because the time is not is limited and also the disturbances. If you talk about learner centred nnnnn So we have, I think there are certain places that we have. Myself have another approach to the syllabi.</b>
Loide	The topic that we have in the syllabus, you know that we have whole numbers? Now that we have combined the Grades 5 and 6, the Whole Numbers the Common Fractions and Decimal Fractions, do you think they are well developed for multigrade or?
<b>Bibi</b>	<b>I think, I do not experience the problems I think they are well developed and we are cope with this.</b>
Loide	What achievement do you have since you started teaching mathematics in a multigrade classroom? Ya, what have you achieved?
<b>Bibi</b>	<b>Ya, yaa, through the, through the learners for me it is always good to see nnnn lae aaa learner entered in grade, Grade 5 and how he or she develop towards Grade 7 and when they leave Grade 7 on what standard they are? And on what standard they go with to Grade 8 and from there develop again and it can take it back to develop its foundation that was laid in nnnn that was formed here in the lower primary, senior primary and those ones. That is my achievements.</b>
Loide	Thank you very much for your contributions; this was the end of the interview.
<b>The end</b>	



## APPENDIX I: Interview transcript for Shiwa

<i>Interview transcripts for Shiwa: Grade 6 &amp; 7.</i>	
Loide	I would like to know the teaching strategies or learning strategies that you use in your mathematics multigrade classroom.
Shiwa	<b>Ok, I nnn I do mostly nn direct teaching, nnn I do not do more about individual explanation nnn part of that is because I am already having a hard time covering the curricular, and so nnn we do a lot of nnnn what we are covering today I am at the front giving them examples, having them do their own, walking around seeing how they are doing nnnn and then moving on to the next topic.</b>
Loide	Ok. So was there any time when you use peer teaching or present lesson by using the local environment by hiring a local person to come and help you with the teaching?
Shiwa	<b>No no.</b>
Loide	Ok. And learners are not are not helping each other during the class?
Shiwa	<b>During class time we are usually nnn all, working together and then the homework is done independently, so you know whether they are seeking of help I do not know. But using in the class I am using the whole class time with the students with the most part.</b>
Loide	Ok. And how do you ensure that there is successful teaching in your mathematics combined class?
Shiwa	<b>Well, is really not a problem because mathematics covers the same topic year after year. And you always start with the basics even if you are nnn starting another year. You still gonna start with the lower level and you're your way up. So, mathematics with mathematics is not a problem. Nnn you you start at nnnn at a ... at a more basic level and nnn work your way out.</b>
Loide	What do you think are the main thinks that support your to become a good quality multigrade teacher? Are you reading a lot or you are doing research about multigrade teaching or you are visiting another schools to learn?
Shiwa	<b>No, I am just taking the material and go along with that.</b>
Loide	You are on your own.
Shiwa	<b>Mhuuu.</b>
Loide	So, and when you receive the syllabus, how did you organise work for two grades?
Shiwa	<b>For my week or my year?</b>
Loide	The year?
Shiwa	<b>The year. Well I nnn [ ] overview the document, to know what is covered in the department or the region actually has already set up in cluster groups, nnn what topic you are suppose to cover first term second term third term. Nnn however, I should have looked at that more carefully because at this point, nnn I am behind where we should be at. And I am finding that nnn there is just too much to cover, in one year. Nnnn but what I am trying to do is is look at the term see the topics that I need to do and trying look at how many weeks I have and give myself accordingly. But it is hard to do because when you get to the classroom you only get so and so far one day and and it usually taking more time than what you have.</b>
Loide	Ok. And the weekly?

<i>Interview transcripts for Shiwa: Grade 6 &amp; 7.</i>	
Shiwa	The weekly, mmm that flows into where I am where I am at. Depends where I am at at the end of one week determines the topics I will cover the next week. So, is is not so much weekly as [ ] what should I say? Either the things that I still need to cover in this particular topics for example fractions that I still need to cover this and this, and this and so when I think of the week, it is more like I need to cover this within one or two weeks so I go from there. I do not know if I have very clear cut.
Loide	Ok. So, do you have any specific issues that you take into consideration when you are planning?
Shiwa	<b>Specific issue?</b>
Loide	Mhh
Shiwa	<b>Explain what you mean.</b>
Loide	Like nnn may be consideration of nnn the level of your learners, or the environment where you are teaching.
Shiwa	<b>Well I, Like I say, the students are [pause] ah they are at nnnn, I will say many of them are at the weak level. Academically in maths and so [pause] its always nnn starting from the basic and working up from there. Which means I can't assume that they will be able to you know complete something too quickly.</b>
Loide	Ok, and nn. How do you teach them having the two classes? Do you always teach them the same content or sometimes you teach nnn one nn a content may be like percentages may be in this grade and you are teaching another topic in that nn the other grade?
Shiwa	<b>No, no, I cover the same topic at the same time?</b>
Loide	Ok. And you are teaching them all as one group?
Shiwa	<b>Mhuuu</b>
Loide	Ok. How, how do you assess them?
Shiwa	<b>Well, after finishing certain topic like fraction, nnn I will give them a quiz nnnn in operation, ya basically after each topics I will I will assess them with a quiz nnn or or story problems to see if they learn what we talked about.</b>
Loide	And the level of difficulties in terms of questions for different grades?
Shiwa	<b>Because I am teaching them the same materials and because really is not that different, nnn it is all very much the same except, I will have different questions for the Grade sevens that are working with the high number value.</b>
Loide	Ok. And, how do you assist the low performing ones? Being teaching here and you are staying in town?
Shiwa	<b>Mhuuu.</b>
Loide	Do you may be arrange some afternoon classes with them or?
Shiwa	<b>Oh, That's the problem. That is something that I need to do, nnn not having a vehicle however makes that difficult, and the other staff like I said we leave right away. So, that is one huge, huge concern. So working hard in finding the time to work with the weaker students. Nnn Being the breaks as they are such short breaks, there is no way you can adequately meet with kids during those breaks to to provide the help they need. Ok why don't you call it off</b>
Loide	But now the next question is: do you or do the school also do automatic promotion

<i>Interview transcripts for Shiwa: Grade 6 &amp; 7.</i>	
	when the system which nn like promoting learners transferring them to another class if they did not pass grade?
<b>Shiwa</b>	<b>Nnnn, they do in the sense that there are only will to fail a student once, from Grade 1 to 4, I think it is, and once from Grade 5 to 7. And so ya, even if they are not really capable of moving on, they will pass them on if they only fail once.</b>
Loide	Ok.
<b>Shiwa</b>	<b>Not what they want to, but because that is what the system is all about.</b>
Loide	Mhuuu. Is that not causing a problem to multi, ah the teaching of mathematics at the multigrade? If the child failed the previous grade and the child has to be promoted and start doing the work in the different grade?
<b>Shiwa</b>	<b>Absolutely, absolutely ya. I can speak of the students who do not even know how to add properly. And you are wondering how do they get to Grade 6?</b>
Loide	How often do you record the learners' marks or behaviours and difficulties just like this?
<b>Shiwa</b>	<b>Well their marks I record depending on when I am assessing them. I record once I assess. So, with topics is you know, depends how long the topics last. Nnnn if we like couple of weeks may be after two weeks or take longer after three weeks nnn something like daily math drills like more often. But generally, and I am assessing them also once I walk around in the classroom during my instruction to see if they are nnn writing down the work correctly.</b>
Loide	Mhuu. Ok. So, do you think there is nnn any advantages in teaching combined mathematics classes?
<b>Shiwa</b>	<b>Truly speaking. To me is not a problem, it is not a problem nnn except for those that are really struggling and just cannot do the work. Either, either grade really because they really should be doing lower level work. That is where my struggle is. Because nnn where do I have the time to work with them. You know, in the regular class day there is no time.</b>
Loide	Are you enjoying?
<b>Shiwa</b>	<b>Yes, I am, I am enjoying. The students and teaching but I do get frustrated with with the lack of nnn reasoning skills that the students seems to have. Basic thinks that I feel they should be able to know by now and yet, are not capable of doing it.</b>
Loide	Mhuu. Do you think you can [pause] what what you are doing now; do you think you can do better than than that?
<b>Shiwa</b>	<b>Well, I tell you I should feel like I am not. So, it is necessarily getting them at the place I want them, but at the same time I am thinking, I have this class again next year. And I am thinking the ground work I did this year will be one think I know they have covered and because we are going through it I think fairly, fairly I am hoping that I am providing a little basic for next year. So ya, I I feel like I am doing a thorough job, but I feel like I am failing the ones that are struggling and just can like really low level learners that I feel like I am failing them.</b>
Loide	You you mentioned about some frustrations which I think they are challenges.
<b>Shiwa</b>	<b>Mhuuu.</b>
Loide	So, is there any other biggest challenges in teaching mathematics in combined grades?
<b>Shiwa</b>	<b>Nnnn to me is not a combined grades of that factor is just some students are not cable capable of the work whether it is Grade 6 or whether it is Grade 7 is just</b>

<i>Interview transcripts for Shiwa: Grade 6 &amp; 7.</i>	
	<b>they they are at lower level and they need extra support.</b>
Loide	What support do you normally get from the management?
<b>Shiwa</b>	<b>In what way?</b>
Loide	Support in the co.. in coping with nnn combined mathematics classes? It can either be in mathematics or it can either be in coping with combined classes.
<b>Shiwa</b>	<b>Well, really, there is nothing nnn I do not know what they will do in terms of support except may be nnnn if we could get in some some help to work in one and one really need that.</b>
Loide	Do you think you need some skills to improve your mathematics teaching?
<b>Shiwa</b>	<b>Oh I think I can always improve in variety of ways. Nnn exactly, ya.</b>
Loide	And, Nnnn, do you have multigrade in-service program? It can either be at school, when you sit and discuss about multigrade issues, problems and advantages or cluster level or regional level?
<b>Shiwa</b>	<b>I haven't, I haven't heard of one. Nnnn</b>
Loide	If you meet in cluster meeting, do you discuss issues pertaining mathematics ma... teaching in multigrade?
<b>Shiwa</b>	<b>Not really, no. not really. And may be is just because many of the classroom in town, will not necessarily be combined. I mean if I have a problem will they be able to do it? I [pause] but to me the combined classes is not a problem.</b>
Loide	Do you think you need support?
<b>Shiwa</b>	<b>I think I need support yes. I need support in terms of not because of multigrade, but in terms of working with struggling students. Here yes. And nnn it is frustrating because, the students are not at the level they should be and because you have to cover all this materials, you just feel like you are up against a mountain.</b>
Loide	Ok. Nnn Being an English speaker, do you think it is important for multigrade teacher to be bilingual?
<b>Shiwa</b>	<b>Well I do not think it has any think to do with multigrade, its with the adaptation for me to know their mother tongue, just to clarify thinks for them, absolutely. Ya.</b>
Loide	And if, if you happen to find yourself in the situation by whereby you are explaining things and they do not understand, how do you do it to convince them or to convey the message to them?
<b>Shiwa</b>	<b>Well I really use visual for a drawing. I will also ask some students who are have a better gram from the English language to may be explain to the other students or give me the Afrikaans word used to explain something. But I also have a dictionary here so, now and then I look up for a word, but nn ya basically, using illustrations, nn getting students to help me translate the word into Afrikaans that I do not know.</b>
Loide	So, what do you think about the mathematics syllabus. Do you think it is suitable for multigrade or you think we need an extra document for it? For multigrade teaching?
<b>Shiwa</b>	<b>Nnnn, not really I think I mean I guess in some way it will be alright if a document that shows the grades you know, side by side the Grade 6 expectations, the Grade 7s, you do not have to flip from Grade 6 and then you go look for Grade 7. If you can see a side by side grade note and then you know ok, this is the</b>

<i>Interview transcripts for Shiwa: Grade 6 &amp; 7.</i>	
	<b>Grade 6 expectation and this is the Grade 7 instead of just having to search it for yourself it is kind of layout there for you. Even if it will be with the Grade 5, Grade 6 , Grade 7. These are the expectations, these are the expectation, instead of having all of the topics all of the topics Grade 5, all of the topics Grade 6. Have the topic with the different grades together. Do you know what I mean?</b>
Loide	Ya. Having them arranged in in columns, in parallel column?
<b>Shiwa</b>	<b>Yes. Five, six and seven on the top.</b>
Loide	Since you started teaching, what achievement did you have?
<b>Shiwa</b>	<b>Say it again?</b>
Loide	What achievement did you have since you started teaching mathematics in this combined class?
<b>Shiwa</b>	<b>In this class?</b>
Loide	Mhuuu?
<b>Shiwa</b>	<b>What achievement? Oh, I wish I knew, I wish I knew. I might not know that answer.</b>
Loide	Ok. Didn't they improve may be in communication?
<b>Shiwa</b>	<b>Yes, yes it is hard to really know what the improvement done it has been. I mean it is always good to hear students say ooh now I got that.</b>
Loide	Ok.
<b>Shiwa</b>	<b>But nnn [ ] honestly I I will have to see. May be next year when I teach again and see how much they actually learn from the year before.</b>
Loide	Oh, that's fine. We are done.
<b>Shiwa</b>	<b>Oookaaay.</b>
<b><i>THE END!</i></b>	

## APPENDIX J: Classroom observation transcript for Jatty

Teacher (T)	Learners (L)
Grade five, what did you do yesterday in maths?	<b>Fractions</b>
Nnnnnn	<b>Fractions</b>
Fractions, fractions. Oh sorry, she could not get the one. That's three. How should we do this one? Let's see. Let's see. Nnn, give me a ruler. Give me a ruler quickly. A ruler, who has the ruler? Who has the ruler? Gra Grade six while I am busy With the Grade fives I want you to look at those things. Those things. What is the numerator, what is the denominator and how you change it to ne? To be equal the and then you you look at that while I am busy with the Grade five. Grade fives yesterday we have common fractions ne? And, and the fraction we have ne what do you call this? What do you call this? numerator	<b>Numerator</b>
Numerator	<b>Numerator</b>
Grade five – numerator	<b>Numerator</b>
Numerator	<b>Numerator</b>
Grate. And what do you call this?	<b>Denominator</b>
Denominator	<b>Denominator</b>
Denominator	<b>Denominator</b>
Now what does the numerator tell you? That's the number of equal parts taken.	<b>Equal part taken</b>
The numerator: the number of equal parts taken.	<b>Number of equal parts taken</b>
And the denominator: the number of equal parts into which the whole is divided	<b>Number of equal parts into which the whole is divided</b>
So, what what did we have yesterday? What, what did we have here that was cut into pieces?	<b>An apple</b>
We had an apple. So first of all we [pause] in how many nnnn parts did I cut that apple? In how many part did I cut it first?	<b>Two parts.</b>
In two parts. So How many equal parts did I have	<b>Two</b>
Two. So what was my denominator that time? Two.	<b>Two</b>
Then I cut it in how many parts then?	<b>Four</b>
Four. So what was my denominator there? Four.	<b>Four</b>
So, I cut it in how many parts there? Eight.	<b>Eight</b>
So eight, what was my denominator?	<b>Eight</b>
Eight. And then I cut it even smaller to have sixteen parts and my denominator was sixteen	<b>Sixteen</b>
So, Then let's look at these shapes here. This is just a revision Ms. Kapenda ne? In how many equal part are these shapes?	<b>Four</b>
In four equal parts. What is this shape called?	<b>Circle</b>
Circle? What is this one?	<b>Square</b>
Square! And this one? A rectangle.	<b>Rectangle</b>

So, what is your denominator here? So, the demonator what does the demonator the denominator tells us? Into how many equal parts? The whole yes Anelli? So, when I put all of those sixteen pieces parts of the apple together, how many apples did I have?	<b>Only one.</b>
Only one. So then sixteen over sixteen is equal to? Sixteen over sixteen is equal to?	<b>One</b>
One. So, four over is equal to? One	<b>One</b>
Eight over eight is equal to? One	<b>One</b>
Ok. Those are the [pause] what we did yesterday. You look at your [pause] So I am going to give you [pause] there we have a whole and this whole has been divided [pause] the first whole into [pause] I want you to look at this. So you can tell me into how many parts those things have been divided? Ok. Listen just send those scribbles daar ( <i>there</i> ). Send it out, send it out, send it out. Send it out, send it out, send it out. Send it out, send it out, send it out. In how many equal parts each line have been divided? When you get your, your sheet I want you to look at this. I want you to look at the picture.	<b>Tuako.</b>
Is it tuako?	<b>Yes mem</b>
Is only two here. Maximo, must you still get one?	<b>No.</b>
Do you have one? Benny? Ok. And there is one. So, and there is yours. Look at that. Look at the piece of paper I gave you. What do you see there? What do you see there? This is what you gonna do this morning. We are going to see, when you have a whole, there at the back also have the fractions. There a whole and then the second line, in how many part it has been divided? And then you also look here. Then you have one whole. How many parts do you have on the second line?	<b>Two</b>
Two. And then?	<b>Three</b>
Three. And then	<b>Four</b>
And then	<b>Five</b>
And then	<b>Six</b>
And then	<b>Seven</b>
Then	<b>Eight</b>
Then	<b>Nine</b>
And then	<b>Ten</b>
Ok, ten. Very good very good. I want you to look at this. When you look at the half, where does the half line stops? Look here. You see. It stops there. That is the whole Nakakule, Mbushe; there is the whole. Ok. And then you have, that is the next line, which have been divided into two parts. And you see, there it stops. Then we have the line look at the line that have been divided into four equal parts. Do you see that?	<b>Yes</b>
Where is it? Which line has been divided into four equal parts?	<b>Showing the lines in their papers</b>
That one. One two three four, so my denominator will be four. Now I want you to look at [pause] Where does the first half stops?	
There. Where does the first? Do you see where the where the half stops? Do you see there? The half, there you have the whole. And there you have	

[pause] in the middle, so this is one half. And this is one half. So I am gonna skip the the the line where you have three parts ne?	
I am gonna take another line where it has been divided into four parts.	
So here I have a quarter. There I have a quarter. There I have a quarter and There I have a quarter.	
Four parts, so, I want you to look at this. Do you see where these half stops? Do you see that? And you see this is a quarter? So here you have one half. Is that so? And how many quarters do you have here? There you have one half. So how many quarters do you have there?	<b>Two</b>
Two quarters. That means, one half is equal to two over four.	<b>Two over four.</b>
Can you see that?	<b>Yes</b>
One half is equal to two over four. Can you see that?	<b>Two over four.</b>
So I want you to.. nnn just quickly while I am going to the Grade six. There you see the the half. How many I want you to look at this. One half, is equal to two over four. It is also equal to? I want you to have a look. One half there you stop. So you draw the line down. So you you are going to look for me, one half is also equal to two quarters. It is, it is also equal to another fraction. It is also equal to another fraction. And I want you to find out yourself while I am going to the Grade six ne? Look, write, write. Just write it next ne? Just write it here. It does not matter. It does not matter. As long as you so. Here you write one half is equal to two over four. It is also equal to what? It is also equal to what? It is also equal to what? Because we are going to look at another fractions as well. Just at the half quickly. Now Grade six, where is the duster? Grade six this is what we did yesterday ne? this is what did we did yesterday, Grade six? This is what we did yesterday ne? This is what we did yesterday. So, Kangala, just come and write this answer quickly. Quickly, come quickly. First, number one and then you write number one. Read it Kangala.	<b>Three sevenths</b>
Three sevenths. Ok. Write three sevenths for me please. Three, very good. Come, come, come Ndilinawa. First read it and then you write it. Quickly, Quickly, Quickly, we still have a lot of work to do. Read, Read it Ndilinawa.	<b>Four ninths</b>
Four ninths. Come, Inga, read, read, read Inga read, read.	<b>Seven elevenths</b>
Seven elevenths, elevenths. Seven elevenths. Nine ten eleven. That's eleven. Yes, come Hamutenya. Quickly, Quickly, Hamutenya read.	<b>Five sixths</b>
Five, five sixths. Aaaaah! You are busy with your own things. You are busy with your own things. Come Sydney, read. Twelve twelfths. Twelve, twelfths	<b>Twelve twelfths</b>
Woooo, Ms. Kapenda, they are very clever this morning. May be [pause] Come, Kandoloma. Eight seventh. Aaaai bigger man, bigger, eight. Aaa. No you must look here. Eight seven. Ok. Come Endelesa. His name is Endelesa. His real name is Endelesa. Twenty seventeenth. Twenty plus again seven. Twenty Seventeenth ne? Seventeen boy, seventeen, one seven. No not seven one. One seven, one seven. Come, Kangala quickly. Come Ndilinawa quickly. Read, read.	<b>Fifteen tenths.</b>



Fifteen tenths. Nnn Ndilinawa.	<b>One hundred and one hundred.</b>
One hundred and one hundredths. One hundred and one. Aaa aaa Ndilinawa. One hundred and one. Nee maaan. You have one hundred and one over one hundred and one hundredths. Like that Ndilinawa. Use the duster.	
Now Landeni the last one, the last one. Read Landeni.	<b>Forty seven twelfths</b>
Forty seven twelfths. Forty seven, Four seven twelfths. Forty seven twelfths. Wuuuuuu. Do you see something that I am seeing now? What kind of? What, what kind of fractions is this? What, what, what kind of fraction is this? Ok. When you look at the numerator and denominator? What type of fraction is this? Is a proper fraction. And Because my numerator is smaller than my denominator is a proper fraction. This one? Proper fraction. This one?	<b>Proper fraction</b>
Proper fraction. And this one?	<b>Improper fraction</b>
Improper, improper fraction. Improper fraction. Now when you look at that worksheet that I gave you. There we have a numerator and denominator. Three over four is equal to say what, what do we have there? Twenty-four is equal to what over twenty-four? That is what we are going to do today. What over twenty-four? No, now I must find out. How was it possible for the four to become a twenty-four? Now I must know my tables. Is that so? So four. Three over four is equal to four times gave me twenty-four? And again if I multiply the the same number I multiply it by denominator I must use the numerator ne? So four times what gives me twenty four? Wuuuu Ms. Kapenda this is a very sensitive area ne? The tables. Four, times what is twenty-four?	<b>Six.</b>
Four times six. Is that so? So, Now I must do the same with my numerator. Three times six. And that will give me, four times six is twenty-four and three times six? Yaaa. Three times six is eighteen. So what I did with my numerator, my denominator I must do with my numerator ne? I have.. in fact three quarters is equal to eighteen over twenty four. Let's do another one. Let's do another one. Let's do the first one. Three quarters, (A) three quarters is equal to what? So what, what is there? What is there? Is it the eight or six?	<b>Eight</b>
Benny, what do you want? Is it there eight?	<b>Yes</b>
Eight. So four times what give me eight? Four times?	<b>Two</b>
Two. So, I must multiply my numerator with the two as well. So, three times two gives me?	<b>Six</b>
Six. So, the three quarters is equal to six over eight. And you can also change. Shikoko you are not looking at me. From eighteen over twenty-four to three over four. Here I have multiplied. Here I have multiplied. The four the four, multiplied with is equal to? Here I am going to multiply it and here I am also going to multiply it. With: was it six? Six, six and then you get from there. Now to get from that answer to this answer. Say 18 over twenty-four, now I am going to do what? What do you do? Is equal to.	<b>Five</b>

Now I must do another operation. I must divide with six. Six. Eighteen divide by six is three and twenty-four divide by six is 4. do you see there? Now. Look at that number there. Let's see, let's see the first one. We did. Let me just see. There you have two. Look at this one, fifteen, fifteen over twenty is equal to three over and now you must give that number. So you are going to divide. Fifteen divide by what gives you three? Fifteen divide by?	
Five gives you three. So, I must also divide. Twenty divide by five gives you?	<b>Four</b>
Four. That is the answer. Now you have to do. Do you have all the books here?	<b>Yes</b>
You are gonna do number one. Not on the pages ne? I must take the pages again. So that I can use it next year in the. In your books. In your books. You just have to mark now. With your pencil and do your corrections. What is the date today? What is the date today?	<b>The tenths.</b>
The tenths. And the month?	<b>June</b>
June 2008. So nnn. First mark, mark your work. First mark your work. First mark your work. With a pencil. Ok! Grade five, I am coming back to you. Did you find anything? Did you find anything Grade five? A half is equal to two over four. It is also equal to what? Is also equal to? What did you write? It is also equal to what Benny? What did you write? Mandume what did you write? Ne man, there you have a half. Three over four. One two three. You must stop there. All the lines there. Stop. A half is also equal to one two over four. It is also equal to one two three over six. It is also equal to one, two, three, four over eight. It is also equal to nnnnn. Let me give you another one. Sorry. Sorry boys sorry, sorry, sorry. Look here. Here look here. There you have a half line ne? Can you see Elise? So now you go down that line. There is another so a half is is? Is equal to one two over four. It is also equal to one two three over six. It is also equal to one two three four over eight. It is also equal to one two three four five over ten.	<b>Five over ten</b>
Do you see that?	<b>Yes</b>
So write it down, write it down. Write it down now. Write it down. Write it down. It is here. There you have the half line stops there. So that half is equal to one two over four. Ngeteya, Look here. Look here. Look here. Get up look here. And It is also equal to one two three over six. It is also equal to one two three four over eight. It is also equal to one two three four five over ten. Do you see that? So, write it down, write it down quickly. We must find out another fraction as well. Write it down quickly. Write it down quickly. A half is equal to? Kahadashala what do you want?	<b>A pen.</b>
A pen?	<b>Ya.</b>
So why does Endelesa have your pen? Where is yours? So come and sit. Come and sit. So it has one one two three four. One two three and then another one quickly. Are you writing it down? Mbushe? Ok. Let me see. A half, is equal to two over four it is also equal to one, two.	<b>Over six.</b>
Is also equal to one, two, three, four over eight. It is also equal to one, two, three, four, five over ten. Do you see that? Benny! Whose pen is that? Haa!	<b>Aah!</b>

<p>Give me. Give me your pen. Are you using your, your pen? So, write it down quickly. So that you can go to the next fraction. So that you can go to the next fraction.</p> <p>So that you can go to the next fraction. So, that is a half. Aaai. That is a half. Ok. Do you finish? Ok. Now look at one third, look at one third. Grade fives. Nakakule, there you have, it is the third line ne? Mandume, Mandume Mandume watch here. One over three. Look at me Kahafo. Mweenda, look at me. There you have [pause] ... Now you have to go down the line so that one third, that one over three. It is also equal to what? And what? So, there you have two fractions. One over three, it is also equal to what? It is also equal to what? Write, write that one also quickly. One over three. Ok. Can somebody help Benny with the pencil please? Is there somebody with an extra pencil? Kangala! Bring that pencil. We will just give it to Benny here. Ok? Quick quickly, so what, what must I write here? Kahafo. That one over three is equal to what? Also equal to what?</p>	
<p>Kahafo, that half, that's on the board. It is equal. Do you see that there is a half ne? So there the, so that half is also equal to two over four ne? Use your ruler. Where is the ruler? Give me a ruler. Ok. Ok. You see there the line stops. You can even use your ruler. Or you can use your pen. Do you see where the half stops? So, you use your ruler or you can use your pen, or you can use the page. Already, where all other fraction stop in that, it is equal to that one. Ya, dis reg, so then you have. No do this one. Let's take the second one. Ok. A Half. So that one. Two over four. Ne? so it is one, two, three over six and then you have one, two, three, four over eight and then you have one, two, three, four, five over ten. So Anelli, one third. There is one third, one third. There is one third. So it is equal to what? How are you gonna write that one? Two over, two over what?</p>	<b>Six</b>
<p>Two over six. And then? Is also equal to what is this one? This one, this one, one, two, three over what? What is this?</p>	<b>Three over nine</b>
<p>Three over nine! Dis reg! Three over nine. Anelli you can. Ok come, come. Tell Nakakule what to do. Tell Nakakule what to do. Tell Nakakule what to do. You are not gonna erase that one. A half. There you have a half. There the line stops. There the line stops. You see. There the line stops. There the line stops. You see, so, that is a half. Is also equal to one, two over four. Is also equal to one, two, three over six. Do you see that? And that is also equal to one, two, three, four over eight. And then it is also equal to it also have a half one. Give me that ruler. So it is also equal to one, two, three, four, five over ten. Now you have one over three. Where does it stops? There is there it stops ne? One over three. There is the line one, two, three. Where does it stops? There! So which, which fraction is also equal to one over three? Let's start here. One, two is equal to two over what?</p>	<b>Six</b>
<p>Over six. That is right. It is also equal to over what here? One, two, three over what?</p>	<b>Over nine.</b>
<p>Over nine. All right. Just write this one. Just write it here. Whose ruler is this?</p>	<b>Mbushe</b>
<p>Who?</p>	<b>Mbushe</b>

Mbushe? Do you understand? Nnn Hasho? Give me your pen. I just want to show you. How can I make these copies? So, there you have a half ne? Where does the line stops? It stops there and there you have another line stopping there, there, there. So all those fraction stopping at that line they are equal. So there I have a half. What is wrong with your pen? There I have a half, so that half is equal to: this one. Also there the line stops. One two over what?	<b>Four</b>
Over four. Is also equal to one two three over what?	<b>Six</b>
Three over six. It is also equal to equal to one two three, what is that?	<b>Eight</b>
Four over eight. And it is also equal to one, two, three, four, five over what?	<b>Over ten</b>
Over ten. Now do the third. There is a third. One over three. A third is equal to what? Is equal to what? Now you must find. There is a line, there is a line and there is a line. So. You are going to write down, a third is equal to what? A third is equal to what? Shinkende, what are you writing? What are you writing? Whose ruler is this?	<b>Mbushe.</b>
Mbushe. Ok . Did you find? So one over three, what did you find? It is equal to what? Hasho, is equal to what? One over three? What did you find? Is equal to?	<b>Two over six</b>
Two over six and it is equal to? Three over nine.	<b>Three over nine.</b>
Three over nine. Good, very good! Let me see Kahafo. Good! Good. Ok are you still trying to find? Ok. Let me, let me see. Ok. You are still busy with the half ne? You can also. Ok. Let's do another one.	<b>Yes ma'am</b>
Ok. Are you done for the half one? Let me just give you another one. I do not what happen to this? Just rewrite that, that again and then you do this. Whose pen is this?	<b>Hasho</b>
So it is Hasho's pen. No, you must start with that A, B, C, D. First part, first part. Are you finish with the first part? Are you finish with the first part?	<b>No</b>
Ok. Three over four. Where is three over four? Come I want to see I want to see the first five now. I want to see the first five. This is how we can split the forty minutes between the two grades. Twenty, twenty, twenty. So. Mandume. One over three. Where is one over three here? Nee man. Where is your pen? Look at this one. Look Mandume. There you have the half mark. Ne? Do you see? That is a half. Then... no. this one also. Stop there. That one stop there. That one stop there and that. So, all those fractions stopping there they are equal. Do you see? So a half is equal to what, what, what can I write there? One two over what? Ha Mandume? What is this?	<b>Four</b>
Four. It is also equal to one two three over what?	<b>Six</b>
Six. It is also equal to one two three four over what?	<b>Eight</b>
Eight. It is also equal to one two three four five over what?	<b>Ten</b>
Five over ten. Now Mandume, look at the third. There you have a third. One over three. So it is also equal to? There you have a third. It is equal to that one and it is equal to that one. What must I write there? One third is equal to? What must I write here? What over six?	<b>Two</b>
Two over six. Is equal to? What?	<b>Three over nine.</b>

Three over nine. So. Ok. Now look at this one. Look at this one Mandume. One two three four five over six. One two three, three over four. Three over four. Three over four. There it stops. One two three over four ne? So. There is another line where it stops. So, that three over four is equal to what? One two three four five six over what?	<b>Over eight.</b>
Six over eight? That is how you do that Mandume. Do you see that? Do you see that?	<b>Yes.</b>
Five over ten. So one over three. There is one over three. Mandume, you do, you do a half. You do one over three. What is the next one? Look at four over five. Four over five. Nakakule, Kahafo, Hasho, Penduka, look at that one. That is that one is equal to what? Quickly, quickly, quickly. Kom Mandume. Ha! What over ten?	<b>four</b>
That four over five, where does it stops? One two three four over five. So you go down the line is equal to what over ten?	<b>Four over ten</b>
Look there and count, and count. Look at that think. Four over five, where is four over five Mandume? Where is the the line that has been divided into five equal parts? One two three four. Four, Four over five. Take your ruler, four over five take your ruler, is equal to what over ten come Mandume? Quickly, quickly, quickly. Where is the ten line? What over ten?	<b>Eight over ten</b>
Eight over ten. Eight over ten. So, four over five is equal to eight over ten. Ok, look at the next one. Look at the next one. Now you have to do it very quickly ne. Soo, two over three. Two over three. Now you go to the line which has been divided into three equal parts and then you count. One, two over three. Then you keep your pen or your ruler or whatever you have, two over three, is equal to? Quickly Mandume. Kahafo, Nakakule, Hasho, Mweenda, two over three is equal to what over six? Is equal to what over six? Count the things Mandume. Is equal to what over six?	<b>Four</b>
Four over six. And it is equal to what over nine? And it is equal to what over nine?	<b>Six</b>
Six. So write it down, write it down, write it down. A half is equal to that and that and that. What, what must I write here? A half is equal to two over four, it is equal to what is the next fraction here?	<b>Six</b>
Six over? What must I write here? Six over? It is not six. Three over six here, there must be three over six. And then we have here four over eight. And then we have five over ten. These other half fractions. And then we have one third is equal to two over six. It is also equal to what must I write here? What over nine?	<b>Three over nine</b>
Three over nine. Four over five is equal to eight over ten. Now two over three is equal to what? Two over three? Two thirds is equal to? We look at it just now. Where does the two over three stop? One, two, so it goes...How many over six? How many over six and it is also equal to how many over nine? How many over six and how many over nine?	<b>Four</b>
Excuse me?	<b>Four</b>
Oooooh. Come, come, come. Two over three, one two three four over six. Four over six, sorry. There you were right. Four over six. And how many over nine?	<b>Six</b>

Six over nine. Six over nine. Write it down. Write it down. So that you can practice in writing fraction Ngeteya. You don't have to clo keep your work close it is fine. Write, write it down write it down so that you can have a practice on how to write a fraction. A Fraction you have a numerator and the denominator. That is the fraction ne? If I can ask you, what fraction of the seventh is coloured? You must give me a fraction. Three over four as a fraction. Three, is only a number and four, is only a number. But three over four is a fraction, fraction. We have ten minutes all of the time. What is the time now? Ok. The last one. The last one then the rest I will give you for homework. The last one, the very very last one. Look here. Ok this one it will be the very last. Ten over ten. Ten over ten. Where, where is the line which is divided ten into equal parts? The last one there. One two three four five six seven eight nine ten. So ten over ten is equal to what? Ten over ten is equal to what? Look here, look here. Look here look here. Four over four us equal to? Eight over eight is equal to? Sixteen over sixteen is equal to what? We did this yesterday. What is there? So ten over ten is equal to what? Mweenda.	<b>One</b>
It is equal to one. It is also equal to what? Look here Grade fives. This ten over ten; that is the last one. Look here Nakakule. Look here You must look here Nakakule. Where does that line stop? That ten over ten line? Where, where does it stop? There. And Which other fractions stops there as well? Ten over ten stops there. And which other one? There it stops. So this one also stops there. This one also. And this one also, And this one? Up to the top. So what what am I gonna to write next? Ten over ten is equal to?	<b>one</b>
Is one. Yes, the top one, but what are those between the ten and the one? How I am going to how am I going to write there? Ten over ten is equal to? Hasho, Look here, Kahafu, look here, look here, look here. So all the there you have the [pause] ... There you have the one. So this one is equal to this one. It is equal to this one. And this one? And this one? Is equal to that one. Is equal to that one. Is equal to that one. Is equal to that one. But how are you going to write that one, that one, that one? So that one is equal to what? How are you going to? How are you going to write the fraction in this?	<b>Two</b>
Two, two is not a fraction. Two is a number. So, that one, is equal to? I want a fraction. So that one is equal to? How are you writing a fraction of this one.	<b>Two over two.</b>
Two over two. How do you write this fraction? Is also equal to this fraction here. How are you going to write this?	<b>Three over three</b>
Excuse me!	<b>Three over three</b>
Three over three. How are you gonna to write this fraction?	<b>Four over four</b>
And how are you gonna write this one?	<b>Five over five</b>
And this one?	<b>Six over six</b>
And this one?	<b>Seven over seven</b>
And this one?	<b>Eight over eight</b>
So, let's come back. So, that ten over ten, is equal to what? It is equal to one there on top. Good. But it is also equal to?	<b>One over one</b>

Please that one. One over one. But it is also equal to? How am I going to write this one? Excuse me? This ten over ten it is also equal to is equal to one. Then you have ten over ten which is equal to one. But it is also equal to these here. In the middle. So how am I going to write it? Nakakule. You just told me there at the back. Grade six, help them. Ten over ten is equal to one, it is also equal to? When you look at the the the thing there. Some underneath the one. Is equal to?	<b>Two over two.</b>
Two over two. And it is also equal to?	<b>Three over three</b>
Three over three. It is also equal to?	<b>Four over four</b>
Four over four. It is also equal to?	<b>Five over five</b>
Five over five is also equal to	<b>Six over six</b>
Six over six. Is also equal to?	<b>seven over seven</b>
Seven over seven. Is also equal to?	<b>eight over eight</b>
Oh Eight over eight. And is also equal to? Nine over nine.	<b>Nine over nine</b>
And all those things, they are equal to? One.	<b>One</b>
Hundred. This is also equal to hundred over a hundred. Hundred over a one hundred gives you one. It gives you a one.	<b>One</b>
Woooo Ms. Kapenda, the mathematics. Now you cut it out nicely, nicely, nicely and then you paste it there, and then you turn to page [pause] you see there you also have. You see, it is also there with you. You are going to do two point one: a, b, c, d, e, f, g, h, I, you look at. So, a half is equal to two over four. Ne? Four over six is equal to two over what? You must look at the wall. At this thing and it is also there. So you do it quickly. 2.1 a, b, you turn to page sixty-five. Are you on page sixty-five? Sixty five? Six, five. What are you going to write on top? Look here. Kahafo, ordering and comparing fractions. What is the date today?	<b>Ninth. Tenth</b>
Tenth of June two thousand and eight and then you paste that piece of paper. And then you answer two point one: a, b, c, d, e, f, g, h, i quickly.	<b>g, h, i.</b>
Nnnnnn ask scissors and glue this in, scissors and glue this in. Yes Shikoko. What can I do for you? So you have, you have your denominator there. So you cannot change your denominator. You must only write in the numerator. Four times what gives you six? Four times what gives you eight? Four times two gives you eight. So, now you are going to multiply with that two again. So three times two it gives you six. So your answer is six. Look here. Where is the eight over twelve? Is equal to two over what? Eight divided by four gives you two. Now you must divide it by four. Nine divided by four ai Twelve divide by four gives you three. Like that one, like that one, like that one. Two over what? So eight divide by four gives you two. So twelve divide by four gives you three. Four over four. Then you must multiply. Four times four is sixteen. So, five times this gives you? You must just check out whether you must multiply or whether you must divide. Check out whether you must multiply or whether you must divide ne? You must sort that out. Hamutenya, you must just sort that out. Give me that pencil. Three over.. e e Hamutenya, Hamutenya. Two over four. Eight divide by four gives you two. And twelve divide by four gives you three.	<b>Yes ma'am</b>

Hamutenya. Here you must do four times four is sixteen and five times four is twenty. I think you must try this on the chalk board. Look at the the next one. What is the first one? Three, three over four is equal to what over eight? That one you multiply by two. So you are going to multiply by two here. Four times two is equal to eight. So three times two is six. Ok. Was there. Was that was that yours? Ngeteya, was that yours? That you show me?	
That was a. give me b. give me b. I want you to do it like this. I want to see whether you have multiplied or whether you have divide. I want to see whether you multiply or whether you have to divide. Eight over twelve is equal to two over what? So obviously they have divided. Eight divide by four is two and twelve divide by four is three. Do the next one so that I can see whether you have divide or whether you multiply. I want to see whether you have divided or whether you have multiplied. There there is a clue on how you must do it. There: multiply and then divide. So het jy nou KhoeKhoe class? Het jy nou Khoekhoe class?	<b>Yes</b>
What are you going to write on top? There are the fractions. Ok write there. Compare and order fractions and then you paste in that thing. Did you give that glue as well? Do you have all the three glues here? Do you have glue here? How many glues do you have here? Only one?	<b>Yes</b>
Where is your glue? You must cut it down and paste it here. Cut it down and paste it there. Where is where is your textbook? Your mathematics textbooks? Where is your text textbook? You are going to write. Whose pen is this? Ok. Grade six, Grade six look at me. Look at me. What you do with the numerator, you must do with the denominator and what you do with the denominator, you must do with the numerator. Ne? And again, you must find out whether you must multiply, or whether you must divide. Whether you must multiply or whether you must divide. If I am going to multiply the numerator with six then you must do with the denominator with six. And then if I am going to divide the numerator with six then you must also divide the denominator with six. What you do with the numerator you must do with the denominator and what you do with the denominator, you must do with the numerator. Ok. Anelli, What is the problem? Where is B? Four over six where is four over six? Where is six? That line has been divided into six equal parts. One, one two three four. There it stops. That four over six there is equal to two over what? Is equal to two over what? Is equal to two over four. There is a lot of mistakes in this textbook Ms. Kapenda. In this textbook. Sometimes you have to [pause] All yours and the date, the date, the date. Don't forget the date. Don't forget the date. Don't forget the date. Aa ah. You are gonna squeeze it in here. B, C. So Grade five tomorrow for tomorrow Grade five, for tomorrow, you are going to bring me a circle, so you are going to bring me a circle which is divided into two equal parts. Ne? You are going to bring me a square, which is divided into four equal parts. And number three you are going to bring me a rectangle which is divided into eight equal parts. You do not have to tear it just cut it out and on that piece of paper, you divide it into	



those equal parts. Circle divided into two equal parts and you have a square which is divided into four equal parts and have a rectangle which is divided into eight equal parts. That's for tomorrow. That's for tomorrow. That's for tomorrow. Ok. From K to P. that is what you are going to do as a homework. From page I want you to do [pause] a,b,c,d,e.	
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<i><b>The lesson ended here.</b></i>
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## APPENDIX K: Classroom observation transcript for Janet

TEACHER	LEARNERS
30 seconds. One minute. One and half. Two minutes.	
Alright, stop. Swap with your neighbour. Ok write it down.	
88, 25, 50, 120, 11, 32, 14, 24, 16, 46, 35, 19, 14, 54, 24, 15 81, 0, 24, 10, 48, 16, 48, 63, 21, 16, 28, 14, 63, 150, 30, 32, 26, 56, 0, 45, 100, 100, 72, 16, 18, 18, 40, 35, 30, 49, 40, 54, 28, 18, 64, 42, 45, 36, it is correct.	Yes
Ok. Inga, good girl	Fourty five.
John, good, good	Sixty
Hot stuff, Rwina ok but better than last time, but not enough.	Drie en twintig (twenty-three)
Kwendu, alright better than last time.	Fifty-six
Tuna	Forty-three
Forty three, ok. We are also getting better but we are not there. Alpo	Forty-five
Christi	Forty-eight
Come, last time we had more. De Wet	Fifty-three
Sandy, good girl	Fifty-nine
Marie, much better	Thirty-four
Peter, kom kom kom	Forty-one
Ebbe, Ebbe get sixty everyday	sixty
Eunike, forty come you out of the net	I am forty
Andries	Forty-five
Good Kappy, fifty	Fifty
Kandetu	Fourty-four
Dina Marie	Fifty-three
Tabita	Forty-five
Kakola, good	Fifty
Kakolonya?	Fifty-seven
Ok! Mbishi?	Sixty
Good , Disha, good girl.	Sixty
Christi, ok Shelima.	Sixty
Ok, Billi	Fifty-two
Right, Not so bad, not so bad. Ok. Paste it in. let' have yesterday's homework.	
Ok yesterday's homework. Did we mark everything yesterday?	Yes ma'am.
Ok. Alright, even better. All right. Decimal fraction, we gonna do revision. Grade five we finish all the work so we gonna do the revision exercise for me today. Grade sixes, which we have not done so far, is the word sums. Ok. So exactly the same, we have done adding,	Open number sentence.

TEACHER	LEARNERS
subtraction, multiplication and division. What must I do before I do my word sum?	
Open number sentence. Open number sentence. Ok. All right. Grade sixes. John. Ok Grade sixes, just leave the first question for a long just read number two don't start.	<b>Juffrou, we do not have the copies of the work.</b>
Grade five extra pages. Ok Grade five revision the first one what are you going to do for me? Write as decimal fraction.	<b>decimal fraction</b>
Ok. What have we got? We got A. what do we call this?	<b>Common fraction</b>
Ok. Common fraction. We must write it as decimal fraction.	<b>Decimal fraction</b>
How many noughts?	<b>One</b>
One. How many places after the comma?	<b>One</b>
So What I must write?	<b>Nought comma five</b>
Nought comma five. If I have got seventy-six over a hundred, Brina!	<b>Nought comma seven six.</b>
Two zeros, two places after the comma.	<b>Yes m'e'm</b>
What is the tricky one? What is the tricky one? If I have got five over a thousand? John!	<b>Nought comma, nought comma nought nought five.</b>
Ok, What should that be? How many noughts?	<b>Three</b>
Three, How many places after the comma? Three.	<b>Three</b>
I want you to do number one for me. Just number one. Ok.	<b>Op die papiere?</b>
No, in your book. In your book. In your book. Grade sixes, just have a look first. The first one normal multiplication and division. Right, don't forget your comma.	<b>Comma</b>
Number two, number two, you have got seven pieces of wire and you got each one is four hundred and seventy two millimetrers and they are cut from the piece of wire five metres long. Let's have a look. What are you starting with? One piece of wire. How long is my wire?	<b>Five metres.</b>
Five meters. Ok. Five meters. How many pieces am I going to cut?	<b>Seven</b>
Seven. One, two, three, four, five, six. Seven pieces. How long is each piece of wire?	<b>Four hundred and seventy two.</b>
Four hundred and seventy-two millimetres. What must you notice first as well? What is the unit here?	<b>Millimetres</b>
What is this one? Meters	<b>Metres</b>
What must I do to this one?	<b>Five thousand millimetres</b>
Five thousand millimetres. Ok. What is my first step going to be? What are they asking us? The length of the remaining piece.	<b>Remaining piece.</b>
So in other words, this piece over here that's left that is the answer we want at the end. That left that is the answer they were ok. We have to do two sums. What are we going to do first?	<b>We multiply four hundred and seventy two.</b>
Ok. Four hundred and seventy-two multiplied by seven and then we have I got that answer now.	<b>Divide by five hundred metres</b>
Divide?	<b>Subtract by five</b>

TEACHER	LEARNERS
	<b>metres</b>
Subtract your five metres. Just check your unit. Ok number three you can cross out you know you don't have to do that because you are diving by a comma. You don't have to do. Ninety-seven comma eight kilometres. What happened now? His car?	<b>His car</b>
His car is kaput.	<b>Fifty six</b>
Nought comma five six not fifty-six, ok.	<b>Nought comma</b>
Sandy, difficult one? Aaha just have a look what do we got $\frac{74}{100}$ so it is an improper fraction. The man is too heavy for the donkey. Try again Sandy.	<b>Seven</b>
Ok but we want to write as decimal fraction!	<b>Seven comma four</b>
Seven comma four much better.	<b>Yes ma'am</b>
Next one now $\frac{154}{100}$	<b>Zero comma one five four</b>
Your number at the top is bigger. Your number at the top is bigger. I have got a hundred and 54 over hundred?try again Inga	<b>One comma five four</b>
Ya!	<b>Add the two and subtract. Yes mam</b>
One comma five four. Ok thirty three over ten? Learners, Tuna?	<b>Three comma three.</b>
Ok, you all got the pattern and the last one, right.	<b>Two comma zero one</b>
Ok. All happy	<b>Yes ma'am</b>
Hockey donkey alright. Let's have a look in number two. Let's give any number look on the chalkboard. I have got thirty-eight comma four seven. Just look on the board thirty-eight comma four seven. If I ask you, what is the value of the three? Ebbe?	<b>Thirty</b>
Thirty, do you agree?	<b>Yes ma'am</b>
Let's have a look. Let's write down thirty. These are tens units, there is my comma. Tenth and hundreds. What is the value of eight?	<b>Eight hundred comma eight</b>
Eight. Eight what?	<b>Units</b>
Eight units. What is value of the four?	<b>Nought comma four</b>
That's right, nought comma four. What is the value of the seven, Petrus?	<b>Seven</b>
Seven what, Alpo	<b>Juffrou, juffrou seven</b>
Nought comma nought seven or seven hundredths ok? Nought comma nought seven. If I have to ad all these together. Let's see what it does. How many hundredths?	<b>Seven</b>
Seven. How many tenths?	<b>Four</b>
How many units?	<b>Eight</b>
How many tenths?	<b>Three</b>
So what's my number?	<b>Thirty-eight comma four seven</b>

TEACHER	LEARNERS
Remember when you did expand notation as well. It is exactly the same, exactly the same. Let's keep the same number that we have. Thirty-eight comma four seven. We could say what? Thirty plus	<b>Eighty</b>
Plus?	<b>Nought comma nought seven.</b>
Yaa, so what is the value of the seven?	<b>Comma nought seven</b>
How else can I write that nought comma nought seven? What is another way of writing it?	<b>Seven</b>
$\frac{7}{100}$	<b>Hundredths</b>
Seven hundredth. And this one is going to be?	<b>Nought comma four</b>
Four tenths, isn't? Ok, right question number two. It says write down the place value of each digit. You got sixty-two comma eight five. Different numbers to I wrote. Write down the value of the six, the value of the two, the value of the eight and the value of the five. Ok, let's go quickly. Ok my Grade six are we writing?	<b>Yes ma'am</b>
Do not forget to put commas in their own places in the multiplication. Count the places, one two three, two places after the comma. Woo Opie gaan was jou hande. Have you got the other one? Check a Grade five learner is sick?	<b>Walk around, send her to blow the nose. Back to other Grade five learners.</b>
Yes let's see. That's right. I want you to write the numbers for me. Six is going to be what? Sixth. A tenth is what? It can't be. Six is just six. Six tens or sixty. Sixty dollars, the value of the item. That's right and that's it and that's it. Ok ok. That's also right one answer for me. Good Good Good! Good! Good! All right can we move on to the next one?	<b>Yes ma'am</b>
All right, now you have to write in expanded notation, exactly what we have here in the board. Ok so let's have a look at the first one, what is the first one? Four comma eight what are you going to write? Four plus zero comma eight.	<b>Zero comma eight.</b>
Ok....what you have heard. Remember to stretch your numbers indicate that they have you got fifty four then you got fifty plus four like on the board. Thirty-eight you got thirty plus eight you got to stretch each number. Chapter five. Each one you are doing it separately. Remember to stretch your numbers. Ok, how many, how many units have you got? Grade six are you winning?	<b>Yes ma'am</b>
Grade six first answer? Eighty six comma six eight eight. Yes ma'am	<b>Yes ma'am</b>
Grade five, you getting yourselves out muddle up. Is the subtraction fifty-nine comma two three. Grade five just look here, Grade fives fifty-nine, twenty-three you got to do each individual number in expanded notation. Individual number with expanded notation, you cannot start saying fifty-nine. You're got to do each one on their own. Ok. Fifty then you take the next number. What is that number?	<b>Nine</b>
Nine units – now we take the two.	<b>Nought comma two</b>
Then I take the three.	<b>Nought comma</b>

TEACHER	LEARNERS
	<b>nought three.</b>
Nought comma nought three. If you count one two, three, four numbers in your expanded notation you must have numbers as well. Do not join the whole numbers and say fifty-nine, because then you have not expanded. Expanding is to make bigger. You haven't make it bigger and longer. Are you winning? Ok ninety-six, you got too many, you got too many. How many places after the comma? Two and you have got how many? Three?	<b>Yes ma'am</b>
Is there anyone who has got a thousand? Grade 5 none of our numbers has a thousand. You should not have any thousand anywhere. Who want to come and do that one on the board? Riaan, ok let's give him the bat. Have a look and see if yours is right. Fifty nine comma two three. Have a look and see yours is correct. Grade 6 if you got a plot that square. What are the properties of the square? All of the sides are the same.	<b>Same</b>
Having a little conversation with Grade six learner.	<b>Four</b>
So you are going to multiply by? So, what are you going to write right now a rectangular path. We gonna look for properties of rectangle. This is a rectangle, this is the length and this is the breadth. So what are you going to do? Two or add them together and multiply by two. Ok is Brwina beat first. Let's ... so plus nine plus this nought comma three. this is good.	<b>Four, ok.</b>
Ok F Kwendu! Let's see het jy laa geskryf, het jy reg kom? Ok, who's gonna do this difficult one? Ok, Marie. Are you, you got it now? Check, make sure you are also right. Ok. Write one hundred and one comma one five in expanded notation.	<b>Writing</b> <b>50 + 9 + 0,2 + 0,03</b>
Tell us what you are doing!	<b>A hundred</b>
AA, ok a hundred, it looks like a ... That's not nought	<b>Plus one, plus nought</b>
Volleyball that is not a nought. Your will be a teacher one day. Hopes so. Right let's take one of the girls, let's take one of the girls, Sunday. Ok nine is ninety, is that right? Yes, plus six plus nought, four plus zero coma zero one.	<b>Yes ma'am</b>
Yes or Ok. Last one on this row. This is for the good sheff; this is for the short outjie. Who is going to do this one? Tuna, ok are yours right? Take julle moet merk ne. you must see what is correct and fix what is not. Have you fix any of those you just look at the front and ever? Net teggemaak kom. Ok is Tuna right? If you for example here?	<b>Yes ma'am</b>
Gou net Tuna die uitvuur. If you for example, write here. If Tuna saying a plus, plus nought and then comma three, that is not wrong. Ok, if you put the nought at the places, you are better. The value of zero is zero, is not wrong, but you have to put on the nought. Ok. Is the same as if you say, there are 5 children in the class. If I say five, zero. It is still the same value. Virstaan julle saam? The value stays the same.	<b>Yes ma'am. Jeffrou kan [pause] nought comma nought daar by</b>
If you say, you can, nought comma nought is the same as zero. Is the same but, the value is nothing, it is not wrong but you do not need to put	<b>Ja, yes</b>

TEACHER	LEARNERS
it in, ok.	
You do not need to put it in. even if you do, dit is nie verkeerd nie (it is not wrong). Alright, next one, are we are going to do that on our own? Ok, Marie, let's have a look. We have this sum this way around. Ok when... What are we going to do now? Now we are going to reverse. I am going to give you the expanded notation now. So we are going to say: three plus nought comma six, let's get another colour. Three plus nought comma six plus zero, zero two is equal to? Now we are going on the other way. We have expanded notation. Now we start with the expanded notation and we got to right one number. Ok, how many units are there?	<b>Three</b>
How many tens?	<b>Six six</b>
Why zero? How many tens?	<b>Six</b>
How many hundredths?	<b>Two</b>
So, what is my number three comma six two? Be carefully if we do it if you do have a space. Let's give an example: ten plus five plus nought comma nought eight. Let's have a look. How many tens?	<b>Ten tens</b>
So we are going to say: three plus nought comma six, let's get another colour. There are no ten tens.	<b>One</b>
How many units?	<b>Five</b>
How many tenths?	<b>Nought</b>
This is where you have to remember to put in your zero (as a place holder, do not forget your zero). How many hundredths?	<b>Eight</b>
So it is fifteen comma zero eight. You must not forget your zero. This is where it is important. If you leave out the zeros and you writes fifteen comma eight is that the same value? Not, is not the same value ok.	<b>No</b>
Right?	<b>Juffrou, can we copy the whole thing?</b>
Ya, you can just write the answer. You can just write the answer. Grade sixes can we mark a couple?	<b>Yes ma'am</b>
The multiplication and division the first sum can we mark this?	<b>Yes ma'am</b>
The first one it is eighty-six comma six eight eight, yes ma'am	<b>Yes ma'am</b>
ok, B you have to multiply by eleven; sixty-three; three hundred and ninety-three	<b>Yes ma'am</b>
How many yeses? All of them?	<b>Yes ma'am</b>
All right. Multiply by twenty-five, how many places after the comma?	<b>Three, three</b>
Three, so?	<b>Eighty-seven comma one zero zero</b>
Say again, Eighty-seven comma one zero zero.	<b>Eighty-seven comma zero zero</b>
How many places after the comma?	<b>Three</b>
Three, ja. Make sure your comma is in the correct place. Eight seven comma. One zero, zero. Where is your comma you? Ok, yours is right, ok, be careful. All got the commas on the right places? Count the places you have after the comma. Ok D. you have to divide by seven. One	<b>Yes ma'am</b>

TEACHER	LEARNERS
three comma two six two.	
Numbers on top of each other on the right places.	<b>Yes ma'am</b>
Alright three dividing by eight. Two comma zero four nine? Who left the zero in the middle? Everybody got the zero?	<b>Yes ma'am</b>
How many places after the comma in your first number?	<b>Three</b>
On you answer.	<b>Three</b>
Ok, make sure the other day we left out the commas. And then dividing by nine hundred and thirteen comma ...	<b>Nine hundred and twenty-eight.</b>
Nine hundred and twenty-eight.	<b>Yes ma'am</b>
Just have a look; one hundred and eighteen just give me the number.	<b>One hundred and eighteen comma one five two.</b>
Say it again, Sherive	<b>One hundred and eighteen comma one five two.</b>
Ok, what are we dividing by?	<b>Nine</b>
Nine ok dividing by nine.	<b>Ya</b>
Haha, Taimi ok nine goes into eleven?	<b>One</b>
Remainder?	<b>Two</b>
Two. Nine goes into twenty-eight?	<b>Three</b>
Three times reminder	<b>One</b>
One. Nine goes into eleven?	<b>Once</b>
Once, remainder?	<b>Two</b>
Nine goes into twenty-five.	<b>Two</b>
Twice, remainder?	<b>Seven</b>
Seven. Nine into seventy-two.	<b>Eight</b>
Right, one hundred and twenty-three thousand, one hundred and twenty-three; thirteen comma one hundred and twenty-eight. Who got that?	<b>It's me</b>
Christi, what did you do? You said nine goes into eleven? Ok! Have we done the first, word sum? Nog nie, ok. I will give you a chance. When you write your number sentences put in your units. Put in your units you are leaving out metres and millimetres. Once, remainder?	<b>Two</b>
Where are the units I want to see the units in your answer as well? Don't. Leave out, Are the metres of the millimetres, are you ok?	<b>Yes ma'am</b>
Ok, for you Tunary. Ok, can you mark this one? Quick show.	<b>Yes ma'am</b>
Ya, ya!	<b>Zero comma five seven</b>
Zero, oh we all get different answers here. Niks gedoen nie. No no, you are not looking. Do not looking at your numbers, you are not looking at your numbers, it says zero comma five plus zero comma zero seven. Are there any whole numbers?	<b>No ma'am</b>
No, so what must I start with? Zero comma. What's next? I am looking for my tenths. How many tenths are there?	<b>Five</b>
Five. How many hundredth, are there?	<b>Seven</b>



TEACHER	LEARNERS
Seven. Zero comma five seven. So it is not a fifty or a five you got zero comma five seven. Hei, let's have a look at the next one. b) Eight plus zero comma three plus zero comma zero three is equal to? Then ask questions. How many units?	<b>Eight</b>
Eight. How many tenths?	<b>Three</b>
Three. How many hundredths?	<b>Three</b>
Three. Eight comma three three. Where is the comma? Marie, all is; You got units then you got tenth then you got hundredth there is no thousands in your sum. Niks duisend nie (there is no thousand). No thousand. That's where my comma comes ok. Write that underneath over here, on the sides. Write that down. Ya, that is Good! That's is Good, good start. Sukkel julle? (Are you struggling?) Sukkel julle? (Are you struggling?) Aaaah, Have you drawn a picture?	<b>No juffrou</b>
Get a piece of paper and draw a picture. And then you got to look at it again. I will do it on the board. Draw the picture. With your word sums, draw yourself the picture. You want to park a car. These are realistic examples you need to park a car. But you park your car on top on top of someone else's car?	<b>No</b>
No, you got to have some space in between. Ok. Take a extra piece of paper and draw diagram for me. Here are some papers. Draw a diagram and then I will help you know. Will give you 2 minutes, try and solve it yourself. Draw the diagram. Just listen, the length of the car is so much, the other one is the next amount. They parked the car five hundred metres apart, ok. What is the distance between the front bumper of the first car and the rear bumper of the second car? So word, juffrou Andre park her car here and I came and park behind her and there is a distance of hundred metres in between. From her front bumper to my back bumper, how far is it? Draw a picture, draw a picture. Five. Fine what else what we want, ok, let's have a look quick answers last round last round. Where how far did we get? We did A and B fine. Cs answer nine comma nought six.	<b>Nought six</b>
D. Let's have on answer from Inga.	<b>Twenty-six comma four zero</b>
Twenty six comma four or if you want Twenty-six comma four zero Rwina.	<b>Forty nine comma one seven</b>
Forty nine comma one seven, good stuff!	<b>Forty nine comma one seven</b>
F. Sandy	<b>Five two six comma seven five</b>
Ok, five hundred and twenty six comma seven five. Ok G. Christi?	<b>Eighteen comma three seven.</b>
One hundred and eighty-three comma? Peter?	<b>Comma zero seven</b>
Comma zero seven. Hey, the last one John?	<b>Thirty two comma forty two</b>
Ok, not comma forty two but comma four two. Ok, Grade fives happy?	<b>Yes ma'am (in</b>

TEACHER	LEARNERS
	choir)
Ok, ready for the test?	Some, yes ma'am
Not yet!	Some no/yes ma'am
Ok put that paper inside your book don't past it in. just put them in your book so that we can carry on Monday nee. We are not going to get homework today. No, you don't have to pass it on. Grade six; Grade five just waits for two minutes. Ok Grade five AH. Grade six NN. Grade five Christy Ok. There is my first car ok there is the porch and there is the drawing two cars label them A and B. Ok let's see. How long is the first car, the car are called A and B. How long is my first car, let's just write it again.	Four comma seven two five metres.
And the second car?	Four thousand one hundred and ninety-five metres
Four thousand one hundred and ninety-five metres. That's the distance of that car; this is the distance of that car. Ok how far are my car's apart five hundred metres ok?	Five hundred metres
What does click in your head? This one is in mm and there are in?	Metres
Metres. What must I do? I need to convert my mm to metres. My units must be the same. If I have got five hundred millimetres?	Zero comma five metres
Zero comm. Five metres. So this space is Zero comma five metres. What we want to work out? From this bumper, to this bumper.	Add up
What are so you got to do add it up? This one plus zero comma five plus this one, it will give you the total distance. If you draw the picture, it makes it easy, it makes it easy. Now how far did you got? Who's not on number five?	Raise up hands those that are not on number five.
How far are you Tabita? Juffrou Nalitje will be here in a minute. But you have to finish, I have to go in English next door. So you guys can finish that for now. Ok, Grade sixes. Grade fives wat doen julle nou?	Afrikaans
Afrikaans? Het jy werk om te doen?	Ya
Juffrou Nalitje left you with work. Ok you take and you do your Afrikaans. Ok, just leave your maths and do your Afrikaans. If you get a chance just now then you can finish your maths.	
End of the lesson	

## APPENDIX L: Classroom observation transcript for Bibi

TEACHER	LEARNER
We end with division by a single digit divisor	<b>Yes sir</b>
and the and the last one that you did and you did for exercise was on page forty five, number one point six number f.	<b>Yes sir, yes sir.</b>
Can we quickly have a look at it again? Opening your work and look.	<b>Yes sir</b>
Make sure you know and understand and still up to date what we have discuss and done.	<b>Yes sir</b> <b>Yes sir</b>
Grade 6. I want you quickly in your pairs just move your desks next to each other listen, listen before you move.	
Just move quickly your desks together and with your partner, discuss with him, the work that we have done in multiplication with the multiples of ten.	<b>Of Ten.</b>
Ne, multiples of ten that you have done yesterday. Discuss and see, if you and your friend solve this problem if you still have a problem discuss it with him or her.	<b>Yes sir</b>
Within few minutes I am going back with you and we will see where is the problem areas.	<b>Yes sir</b>
The same as you have done in number C	<b>C</b>
Where you have to find the multiplicand, the multiplier and the product. Ne?	<b>Yes sir</b>
Can quickly check your work, carry on in silence while I am busy with the Grade 6s	<b>Grade 5</b>
You may move Grade 6.	<b>Move their desks to join mates</b>
Grade 5; let's do quickly revision of what we have done yesterday. Close your book, put a pencil in your book or your book into each other and close it and all your attention here.	
Yesterday we have looked for a number divide by a single digit divisor. Ne? (single digit divisor). There is different ways to divide. The one that we discuss to work on we have said We discussed to break up this first number into two numbers ne? and in each number, we divide by nine.	<b>Nine</b>
But we also said what did we say what is very important when we give you break up this number in two numbers?	<b>All two numbers must be divisible by nine.</b>
So nine, the two numbers that I use here, must be divisible by nine.	<b>Nine</b>
So what numbers can we use? Do you think a what number that nine can use to divide into?	<b>Ninety</b>
Ninety, yes plus and the number that I add to ninety must give me: one hundred and seventeen.	<b>Seventeen</b>
So you remember what we we spoke about this yesterday, ne?	<b>Yes sir.</b>
So what is this? Can you give me the whole number?	<b>Twenty-seven</b>
Can you agree with that?	<b>Yes sir.</b>
So ninety plus twenty seven?	<b>Yes sir</b>

<b>TEACHER</b>	<b>LEARNER</b>
So these two numbers if you add it, it will give us one hundred and seventeen?	<b>Yes Sir</b>
And we say divide by nine.	<b>Divide by nine. Yes Sir</b>
What is the next step that we, we say now Karopa?	<b>Ninety divided by nine</b>
(Ninety divided by nine) ne? So we do this one now. What is the next step (learners)	<b>Twenty-seven divided by nine</b>
Twenty-seven divided by nine now, what is the quotient?	<b>Ten. Ninety divided by nine is equal to ten.</b>
Ninety divided by nine is ten. Plus?	<b>Ten.</b>
Plus twenty-seven divided by nine. Nikote?	<b>Twenty seven divide by nine is three.</b>
What is the next final step? Xupifo?	<b>We add the two</b>
We add the two and say ten plus three is: thirteen	<b>Thirteen</b>
So. What does this thirteen means? One hundred and seventeen divide by nine gives us thirteen.	<b>Divide by nine is thirteen.</b>
So. We have to check our answers. How are going to check our answer to see if it is correct?	
What are we going to do Jerome?	<b>Thirteen, nine times, thirteen times nine.</b>
Do you say thirteen times nine?	<b>Yes.</b>
What must it give, what must I get? One hundred seventeen. And let's check our answer, let check our answer.	<b>One hundred and seventeen</b>
We say now as Jerome said: thirteen times nine will give us one hundred and seventeen.	<b>Yes.</b>
Three times nine?	<b>Twenty seven</b>
Twenty seven. Nine times one?	<b>Nine.</b>
Nine. Plus two is?	<b>Eleven.</b>
Eleven. I need is is it true?	<b>Yes sir.</b>
Is it correct?	<b>Yes Sir</b>
You know thirteen is correct. So this is one way that is to divide. It is an easy way when you can use group method. Anyone who experience a problem with this? Who experience a problem with this? Is it clear?	<b>Yes sir</b>
Is it reasonable?	<b>Yes sir</b>
We also say. Yesterday I told you that we are going today a bit further and it is now, when you have a double digit divisor. What are you going to do now? Another way of division with a double digit divisor. The division is always difficult. Ne?	<b>Yes sir</b>
But, but what is important, you know your time tables. You must know your timetable. And if you look at the double digit divisor it means you have a two digit at the end that you divide two hundred and ten divide by fourteen. Two	<b>No.</b>

TEACHER	LEARNER
hundred and ten divide by fourteen is equal to what? What are we going to do? Do we know our fourteen time timetable?	
But now we can say two hundred and ten and instead of breaking up this number, we can break up this fourteen. Which two numbers can we multiply with each other to give us fourteen: Gigu?	<b>Seven. Seven times seven.</b>
No, no it can't be.	<b>Seven times two.</b>
Seven times two. So, we say first, two, we can say two hundred and ten divided by seven is not fourteen. Which other number do I use? We use two. And we don't say times two but we say divides by two.	
Two hundred and ten divide by seven divide by two.	
So that means I first do this division and get my quotient and then this answer divide by two. To get my final answer.	<b>Two</b>
Let's see, two hundred and ten divide by seven it is easy. I know twenty one divide by seven.	<b>Yes sir.</b>
Is three! But then this two hundred and ten is ten times bigger. So what will my answer be for two hundred and ten divide by seven. It will be Michel.	<b>Thirty</b>
Thirteen, thirty. Thirty divide by two. Wuuu mental arithmetic. Thirty divide by two, Jerobiam!	<b>Sir, sir, sir</b>
Jerobiam	<b>Fifteen</b>
Fifteen. It is fifteen. Thirty divide by two is: fifteen. We were correct.	<b>Yes sir</b>
Even you can swap these two numbers these numbers by saying divide by two divided by two divided by seven you will also get it correct.	
Let's check our answers. Did we work correct? Which numbers are we going to...? Which way are we going to use to check our answers? Jerobiam?	<b>Yes sir</b>
Fifteen times forty do you agree with Jerome? To check our answer he is saying fifteen times fourteen do you agree?	<b>Yes sir</b>
Jan, do you agree?	<b>Yes sir</b>
So let's see fifteen times fourteen. Do you still remember how we do with a double digit multiplier?	
Let's have a look four times five is?	<b>Twenty</b>
Twenty. I carry over out the two remember it four times one, plus what?	<b>Two</b>
two gives us six.	<b>Four</b>
I work with the ten's do I put down the zero for the tens now I say one time five is?	<b>Five</b>
Five. One times one is?	<b>One</b>
One. Now I add the two I am glad to hear the plus zero plus zero is: zero	<b>Zero.</b>
Six plus five is: eleven	<b>Eleven</b>
Carry over the one. one plus one is:	<b>Two</b>
Two hundred and ten. we compare?	<b>Yes</b>
Same with the original starting number ne?	<b>Yes sir</b>
So Is this correct? Yes!	<b>Yes</b>
By breaking up the fourteen plus two numbers plus multiply these two numbers to give me fourteen. Ok by multiply ne?	<b>Yes sir</b>

<b>TEACHER</b>	<b>LEARNER</b>
You see the difference. The different way of a double digit divisor. Use the double digit divisor. It is the same as the double digit divisor. Gigu.	<b>Yes sir.</b>
Let's quickly use another number I will give you soon. I just wanted to give you another one six hundred forty-eight divided by twenty-four you are going to help me with that one. Grade 5 your attention here close your books close all your attention here. Six hundred forty eight big number divide by twenty four.	
Six hundred forty-eight divide by?	<b>Twelve, twelve, sir.</b>
Which two numbers can we use?	<b>Sir!</b>
To multiply and give us a to give us twenty four?	<b>Sir!</b>
Four? Lita. You have to speak up.	<b>Twelve.</b>
Twelve and what? To multiply. Two numbers to multiply with this each other Nicky?	<b>Twelve divided by two.</b>
two numbers speak up I cannot hear you Which two numbers to multiply? Which two numbers Rita?	<b>Plus</b>
Aah not plus say multiply	<b>Sir, sir twelve</b>
I say multiply	<b>Times two</b>
Twelve times two. So we say twelve times two. So let's say, we can even say two and twelve, so we say divide by ne? First we can say divide by two or divide by twelve. And on the second number also ne?	<b>Yes sir</b>
Did we say? Did we say first this one ne?	<b>Yes sir</b>
Can we divide it with this number? Yes.	<b>Yes sir</b>
Say two divides into, into?	<b>Six</b>
Six. It is?	<b>Three</b>
Three. Six divide by two is? Six divide by two is three.	<b>Three.</b>
Let's say four divide by two is?	<b>Two</b>
Eight divide by two?	<b>Four</b>
Four. let's say the second digit we rewrite here as well ne?	<b>Yes sir</b>
Can twelve divide divide into this number? Let's have a look.	<b>Yes sir</b>
and three divide by twelve no ne? Can thirty-two divide by twelve?	<b>Yes</b>
How many times can twelve divide into thirty-two?	<b>Three</b>
Three times do you hear [now we say]. Now we say one times twelve. Two times twelve. Three times twelve?	<b>Thirty-six</b>
If we say three times twelve is thirty-six it is too big.	<b>Yes sir</b>
So it can't be three but two times ne? Two times, And two times. And two times twelve; two times twelve is what?	<b>Twenty-four</b>
Twenty-four I subtract twenty-four now from thirty-two. Mental arithmetic thirty-two – twenty-four is Gigu?	<b>Eight</b>
Ag eight, eight so we have small idea. Eighty-four divide by twelve you know your times twelve times what it gives you eighty-four?	<b>Sir, two. Two</b>
Nnnnn. No Think. You are too fast, too fast. No give twelve times five is what?	<b>Sixty</b>
Sixty, do you have eighty-four? Make sure make sure before you.	<b>Twelve times</b>

TEACHER	LEARNER
	<b>eight.</b>
Twelve times eight? No. I think you are too big. Seven. What is twelve times seven?	<b>Seven</b>
Seven. What is twelve times seven? Twelve times seven is?	<b>Eighty-four</b>
Eighty four. Eighty four and there is no reminder	
Six. six hundred forty-eight divide by?	<b>Twenty-four</b>
Twenty four	<b>Is twenty seven</b>
Is twenty seven. Even if you swap these numbers to and do your division say first six hundred forty-eight divide by twelve divide by two. You will only end up with this.	<b>Twenty seven</b>
We can check it. We can check our answer. Twenty seven. Kambala are you finish? For today make sure do some revision I will be few minutes with you. twenty-seven times	<b>Twenty-four</b>
Twenty-four. Four times eight.	<b>Twenty-eight</b>
Twenty-eight come on, help me seven times four is twenty-eight. Do we hear? Four times two Nicky?	<b>Eight</b>
Plus two?	<b>Ten</b>
Ya, work with the tens now. Place zero for the tens two times seven (Vilho)	<b>Fourteen</b>
Fourteen. One here two times two?	<b>Four</b>
Rocha. Is four plus one. Esli, nnn two times two is four plus one is?	<b>Five</b>
Ya, the next step? Eight plus zero is?	<b>Eight</b>
Add it eight plus zero is	<b>Eight</b>
Zero plus four is?	<b>Four</b>
One plus five is?	<b>Six</b>
Six. Six hundred forty eight. Six hundred forty eight. So we know this is true.	<b>Six hundred forty-eight</b>
Grade 5s, open your textbooks. Let's quickly do some exercises on top of page 46 Number 1.7 (b) While I am busy with the Grade you carry on with this. Number 1.7 (b) two hundred twenty five Jerome follow. Two hundred number b. one point seven number b. two hundred twenty-five divide by fifteen. And number c. one hundred ninety-two divide by sixty. Now the same method that we use here on board, you are going to use now. Calculate to solve this problem. Write today's date Exercise Number, Page Number neatly and we will see in the few minutes.	<b>Yes sir.</b>
Grade 6, yesterday we discussed the multiplication by powers of ten Like yesterday, Gerry, yesterday we still remember we say what happen if we multiply by ten? Multiply by a hundred, multiply by a thousand.	<b>Multiply by a hundred, multiply by a thousand.</b>
This is very easy.	<b>Yes sir</b>
Always the same. If we say now four times ten we know it is?	<b>forty</b>
Forty. The four and the zero's of the ten nothing else.	<b>Yes sir.</b>
If we say seven times hundred.	<b>Seven hundred</b>
Seven hundred. The seven and two zeros of the hundred.	

<b>TEACHER</b>	<b>LEARNER</b>
If we say nine times a thousand is a nine with three zeros thousand. No problem with this.	
We also discuss what happen if we say this is four times number twenty?	
Can we say twenty is another multiple of?	<b>Ten</b>
Ten. Now what two numbers gives twenty if you multiply? Two times ten. Yes.	<b>Two times ten.</b>
It does not matter what number you have in front. If you multiply with twenty the multiple of ten we can break down this number times ten and this as we say it is two times ten.	<b>Two times ten.</b>
So it it very easily. We can find our answer by first say four times two times ten	<b>Ten</b>
Four times two we know is eight. Eight times ten is eighty	<b>Eighty</b>
So it is very easy to find the answer of eighty.	
The same we can use any digit number here mm. the procedure will be the same. That number times two times ten. What happens if we say for instance seventeen times say three hundred? What will happen now? Seventeen is the you see is multiplicand, the three hundred is the multiplier you can say. Three hundred means? Three times hundred.	<b>Three times a hundred</b>
Three times a hundred. So, you can say first seventeen times three? Is, is what and now ok. And now we can say ok. What is three times seven? It is?	<b>Twenty one</b>
Twenty one and now three times one is?	<b>Three</b>
three plus two is	<b>Four</b>
Five. Three plus two is five. What do I hear? Four. Think think ne? And now fifty-one times hundred gives us now?	<b>Fifty one hundred</b>
Fif, five the one and the two zeros and we read that? Five thousand one hundred.	<b>Five thousand one hundred.</b>
You now need time to concentrate. Think, you think what we do. Think what we do. Is not your sleeping time now. Multiples, of ten of a hundred, and let's quickly look at say. If we say thirteen times a two thousand? What does two thousand mean? Two times a thousand?.	<b>Two times a thousand</b>
The same as we did here with the tens. After tens, multiples of ten, Multiples of hundred. we do with the multiples of thousand	<b>Thousand</b>
And say now, we have to write it down thirteen times two times a thousand. And what is if we now say thirteen times two. Twenty-six.	<b>Twenty six</b>
So we can now write it down. We can say times a thousand we know. We just add the three zeros at the end	<b>Three zeros at the end.</b>
We can just give the answer of twenty six thousand. Word is not two thousand but it is twenty six thousand.	<b>Twenty-six thousand</b>
Here comes exercise.	<b>B</b>
B and C with each other.	<b>Yes sir</b>
Who experienced a problem with these things? Who experience a problem?	<b>No one</b>
Are you sure?	<b>Yes sir</b>
Let's quickly have a look here. Just quickly have a look. The first one is twenty-nine times fourteen.	<b>Twelve</b>



<b>TEACHER</b>	<b>LEARNER</b>
Let's hear. Milton and your partner, what is your answer you give for twenty-nine times fourteen.	<b>One hundred and one thousand one hundred</b>
You say it is one? You have to speak clearly so that we can hear you.	<b>One thousand one hundred and six</b>
Do you agree with him?	<b>Yes sir</b>
Do you others agree with him?	<b>Yes sir</b>
The next one let's quickly have a look. Number three.	<b>Thirty-eight times</b>
Thirty? Hei don't shout thirty-eight times sixty Petra	<b>Two thousand two hundred and eighty, yes</b>
Two thousand two hundred and eighty.	<b>Yes sir</b>
Charlotte do your partners get the same?	<b>Yes sir</b>
Two thousand two hundred and eighty? By following the, the rules?	<b>Yes sir</b>
Number	<b>Six</b>
Six that I gave you was a sixty-one times fifty Desmond, you and your partner what did you get here?	<b>Three thousand and fifty.</b>
Three thousand and fifty. Do I here you correct	<b>Yes sir</b>
Three thousand and fifty.	<b>Yes sir</b>
The next one. Number seven. Seventy two times seventy. seventy two Shaun	<b>Five zero and forty. Five zero four zero</b>
Five thousand and forty. Not five zero. Like this ne?	<b>Yes sir</b>
Five thousand and forty remember your place values, place value ne? Units tens hundreds thousand.	<b>Tens, hundreds, thousand</b>
So this is five thousand and zero hundred so this is forty. Five thousand and forty.	<b>Five thousand and forty.</b>
Next one, three and eleven times thirty. Grade Kambidhi you & your partner?	<b>Nine thousand three hundred and thirty, yes</b>
Nine thousand three hundred and thirty like this do I hear correct	<b>Yes sir.</b>
Nine thousand three hundred and thirty. Grate! And the last one Two hundred and thirteen times forty. Two hundred and thirteen times forty nnnmm Shelly.	<b>Eight thousand five hundred and twenty</b>
Eight thousand five hundred and twenty. Do you differ?	<b>Yes sir. No, no. It is correct No</b>
We can quickly check again. Quickly check yours again make sure we say first two hundred and thirteen times four.	<b>Iyaaa.</b>
And times ten? Gigu, you have a problem? Quickly Grade 6, check your answer.	<b>Yes</b>
Milton eight thousand five hundred and twenty you were correct to find this one. Ne?	<b>Yes sir</b>
Now, can I have your attention here Grade six? We say if we have two numbers, numbers there for instance we have here a four and we say four	<b>Multiplicand</b>

TEACHER	LEARNER
times six and we say four times six and we get the answer twenty-four the very first number is has a name and we call it Desi.	
Multiplicand ne multiplicand and please make sure that you know this name ne. Multipli-cand	<b>-cand</b>
Multiplicand remember it the talk about them a number they call it a multiplicand you know what they talk about.	<b>Yes sir</b>
The second one Victor?	<b>Multiplier</b>
Charlotte multipliers multi-plier. And the answer for the for the multiplicand and the multiplier we call (Sheline)?	<b>Product</b>
The product, the product, and always know if know these. If you know these names you immediately know which number we talk. So you have another number and that is what we have done, they give you the multiplicand, they give you the multiplier you can work out what is the product. What is the product here Karina?	<b>Forty five.</b>
It is forty- five and that is what you have done for homework. It must be forty five the missing number that you bring in here ne? Forty five. We give you the multiplicand, and the multiplier.	<b>Six, six thousand and thirty.</b>
IThe next one they gives you also the multiplicand that is twenty one and thirty and they ask you to give them a product. Milton, what is the product here?	<b>No, no.</b>
Six thousand and thirty he say?	<b>No No sir. No No sir. It is true.</b>
It is true. It is true let have a look thirty means three times ten. What is twenty one times three?	<b>Sixty three.</b>
It gives you sixty three. Sixty three times ten?	<b>Six hundred and thirty.</b>
Six hundred and thirty is correct. You still remember your rules, don't forget ne? Yaa remember them like that.	<b>Six hundred and thirty.</b>
The following one they give you, the product of Fourteen and the multiplier of seven but the multiplicand is missing. What is it Desmond?	<b>Two</b>
How did you get two? What did you do to find two?	<b>Fourteen</b>
Fourteen.	<b>Divided by seven.</b>
Fourteen divides by seven gives me? Two	<b>Two</b>
And I say now two times seven gives me? Fourteen	<b>Fourteen</b>
Ya, it is easy. If you look further. There is a next one. Let me write it here. They give you a product of one hundred and sixty a multiplier of twenty what is the multiplicand? Shelly	<b>Eighty</b>
Did you say eighty? Did you say eight	<b>Eight</b>
Charlotte did you say eighty?	<b>Yes sir</b>
If the multiplicand is eight if I say eight times twenty it will give me one hundred and sixty?	<b>Yes sir. No. Yes.</b>
Yes, yes, it works. If you say eighty then you will not get one hundred and sixty but one thousand six hundred.	<b>One thousand six hundred. Eight times two is sixteen, sixteen</b>

TEACHER	LEARNER
	<b>times ten is one hundred and sixteen.</b>
Eight times two is sixteen times ten is one hundred and sixty.	<b>Yes sir</b>
Ya. The next, the next one. What is given is sixty-three ne? And they give you a multiplicand of seven. Ok, what is the multiplier Kambidhi?	<b>Nine.</b>
Can you say how did you find nine?	<b>Sixty three divided by seven.</b>
Sixty three divided by seven is?	<b>Nine</b>
Nine. Yes. And now the last one. That you have done. They give you a product of one thousand two hundred and sixty and forty-two as your multipliers. What will be the next one?	<b>Thirty</b>
Thirty	<b>Yes sir.</b>
Three zero?	<b>Yes sir</b>
Do you hear you correct?	
Three. Thirty? Is it correct?	<b>Yes sir</b>
Are you sure?	<b>Yes sir</b>
Can we say forty-two times three will give us one hundred twenty-six? Three times two is six; three times four is twelve times the ten. That is one thousand two hundred and sixty it is correct ne?	<b>Yes sir.</b>
I hope you did it all and you mark it.	<b>Yes sir</b>
Remember; multiplicand, multiplier and the product. Remember these words. It is important. Now Grade six. You can close your books.	<b>Yes sir</b>
Grade 5, are you finish? Check your work make sure I will be soon with you.	<b>No. No sir</b>
Grade 6, last year we did multiply by say two hundred and thirty eight times and we have a double digit multiplier. That means two digit in the multiplier ne.	<b>Yes sir</b>
And let's say for instance eighteen. Two hundred and thirty eight times eighteen let's make sure that our procedures that we follow, two hundred and thirty eight times eighteen. We first multiply with the units.	<b>Yes sir</b>
Eight times eight is?	<b>Sixty four</b>
Sixty four and I write down the unit. And the six what happen to it? We say, carry it over to the tens. You can write it softly on the top remember I must add it.	<b>Keep it</b>
Eight times three?	<b>Twenty-four</b>
Twenty four plus six.	<b>Thirty</b>
Then write down the units and [pause]. What happen to the thir, three of the thirty?	<b>Three hundred</b>
Eight times two?	<b>Sixteen.</b>
Sixteen. Plus the three is?	<b>Nineteen</b>
Nineteen. Write down this. One of the nineteen the tens of the nineteen, I just write it down. Why? Because there is no more digit.	
What do we call this first number? Multiplicand.	<b>Multiplicand</b>
Now, the multipliers. The tens of the multiplier. It is the tens that you must	<b>Yes sir</b>

TEACHER	LEARNER
write down the zero for the tens.	
Write down the zero. Don't forget it. Some of you will forget this zero for tens. Now you say one times eight is: eight	<b>Eight</b>
One times three is: three	<b>Three</b>
One times two is: two	<b>Two</b>
But now I add those two numbers. Say four plus zero is four	<b>Four</b>
Zero plus eight is: eight.	<b>Eight</b>
Nine plus three: twelve.	<b>Twelve</b>
One plus one is two plus two is?	<b>Four, four,</b>
So what is my product?	<b>Four thousand two hundred and eighty four.</b>
Four thousand two hundred eighty-four.	<b>Eighty four</b>
This is a two digit multiplier. Did you understand this one? Where is the problem?	<b>There is no problem.</b>
No problem? Charlotte? No problem. Where is the problem? I am not so sure let's hear. Speak.	<b>What if you have three numbers there?</b>
Three numbers here? Multiply? We will come to it. For now, we look a two digit multiply we will come later for the three digit multiplier. We just hold this for that, for now.	
Let's quickly turn into page forty-eight in your text book. Open your textbook page 48. In the middle of page forty-eight. Desi you are there?	<b>Yes sir</b>
You find the capital A in the middle of page forty eight and you are in class now.	<b>Do number one</b>
Look at number one. Number two and Number three now in class.	<b>Yes sir</b>
So, today's date?	<b>It the five.</b>
Fifth of June page number is page forty eight. Exercise seven point three A. Number one two and three. You use your ruler to draw the line.	<b>Yes sir</b>
Neat work make sure, no calculator is used make sure you know your timetable your timetables.	
Grade five, let's have a look. Let's quickly have a look. Michel, can you do this?	<b>Two hundred twenty-five divided by fifteen is equal to two hundred twenty-five divided by three divided by five is equal to seventy-five divided by five is equal to fifteen</b>
Thank you Michel ok. Do we agree with Michel?	<b>Yes sir</b>
Quickly have a look here. Compare with yours. Some of you have two	<b>Fifteen</b>

TEACHER	LEARNER
hundred twenty-five divided by fifteen. Look here Nikote. And we say two hundred twenty five with the divisor fifteen he say it is three times five. Three times five gives me?	
Fifteen. It is true, first by three afterwards by five. You can also swap these numbers ne? And say divide by five divide by three. Ne? You can also come up with the same answer.	<b>Yes sir</b>
Two hundred twenty-five divided by three can we agree with his division seventy-five?	<b>Yes sir</b>
Now that you agree with this seventy-five divided by five again can we agree with fifteen? Ok.	<b>Yes sir</b>
Who did it by saying two hundred twenty-five divided by five divided by three? Who did it this way? Did you get the same as Mike here fifteen?	<b>Yes sir</b>
How will you do it now? By saying two hundred twenty-five divided by five divided by three?	<b>Three</b>
Can five divide into twenty-two? Yes how many times?	<b>Four</b>
Four times. Four times five is twenty subtract from twenty two it is?	<b>Two</b>
Two. And twenty five divide by five is?	<b>Five</b>
Five. Forty five divide by three. And now forty-five divided by three is equal. My answer will be? Fifteen. It is also same with the other one.	<b>Fifteen</b>
We know three and five is the only two numbers if I multiply with each other will give me fifteen.	<b>Fifteen</b>
Gigu! Do you have a problem or you understand now. Can you solve it? You also get this answer?	<b>No</b>
Where did you? Where was the problem? This division?	<b>Yes sir</b>
Make sure, make sure about that. Leona, can you quickly do one on this side number?	<b>C</b>
C. We learn from each other.	
Did you get nineteen?	<b>Yes</b>
Ok. So, the last one is this.	
Let's have a look here. Is this a separate number that she copied?	
One hundred and ninety-two divided by sixteen so, she find the two numbers, multiply with each other. So eight and two. Eight times two is sixteen.	
Let's quickly have a look did she calculate correctly?	<b>Yes sir</b>
Four divided by four these two numbers can give you sixteen.	
Grade 6 you are still busy with the remaining? Do you finish?	
Let's see Desmond. It is the end of our period now. Let's have a home work Before you leave. Before we step down for mathematics. Look! Look at numbers one point seven and this one you have one point seven, numbers E and number F. For or Freddy.	<b>Four</b>
Look further 1.9 A, B and C these you see for multiplicand by ten, hundred and by a thousand. So, you write down the number sentence but next to it is the answer. Mainly that's for tomorrow. Just wait I just want to finish with the Grade 6.	
Grade 6. For home work for tomorrow that 7.3 A. Look at No.9, No, 10; and	

<b>TEACHER</b>	<b>LEARNER</b>
No. 11. Those three for tomorrow. Look at number 9, 10, 11 quickly put away your things.	<b>Yes sir.</b>
<b>END OF THE LESSON.</b>	

# APPENDIX M: Classroom observation transcript: Shiwa

Teacher (T)	Learner (L)
So, we are going to continue on with our work on fractions but before we start on fraction. As you know, we are always trying to do our times tables like this.	<b>Yes ma'am</b>
So we are gonna do a quick review of the times table. I am going to write down on the board some of the times table that you must to study especially tonight. Because you are having difficulties with those. So let's have a quick do review the timetable and then you are going to write down the one that you are struggling with now. Few of you know them all which is great. But most of you are struggling with some of it. Ok. So let's see how we are going with it now. Ok, let's see how we are running this.	
Two times nine?	<b>Twenty-three</b>
Three times three?	<b>Nine</b>
Two times five?	<b>Ten</b>
Two times four?	<b>Eight</b>
Three times two?	<b>Six</b>
Four times four?	<b>Sixteen</b>
Four times one?	<b>Four</b>
Three times five?	<b>Fifteen</b>
Eight times one?	
Three times two?	
Four times two?	
Four times three?	
Ok, the one that you still struggling with, we are gonna to write them down in your note book and you are gonna study those today until you know them all. What I am suggesting you to do is you take a little piece of paper. Put the question on one side, the answer on the back and find a friend to test each other. Three times five; four times six; three times eight. Ok. So let's take our math books and complete number seven.	
After practicing the tables, the lesson starts.	
The teacher wrote down the fractions which the learners are struggling with.	<b>The learners were distributing the rulers and pencils to their classmates. They also started to copy down the tables which the teacher wrote down.</b>
Ok. Can we quickly see what we have done when it comes to fractions? What I want you to do is; I want you to draw for me three rectangles that are exactly the same length.	<b>Drawing the three rectangles as per teacher's instruction.</b>
I want you to divide the top fraction into twelve equal parts.	<b>Dividing the fractions as per instruction</b>

Teacher (T)	Learner (L)
I want you to divide the second one into eight equal parts, and then I want you to divide the third one into four equal parts.	<b>Following the teacher's instruction.</b>
Ok. On the top fraction, I would like you to shade in. let's say nnnnn three twelfths. Second one, I would like you to shade two eighths and the last one I would like you to shade in one fourths. No, each rectangle should be of the same length. Each one should be the same length. When you break it up into twelve equal parts this side you have six and six. Ok. For the, for the purpose of comparing, I want you to shade in the fractions, starting from the left and working to your right. So three twelfths, how many fractions are you shading?	<b>Three</b>
Three. Then I can shade then side by side so that we can be able to compare. Ok! Three twelfths. Ok. How many fractions pieces of fraction are you shading in two eighths?	<b>Two</b>
Two, two nnnnn eighths. And how many pieces of fraction are you shading in one quarter?	<b>One</b>
One. Just write them on the same line with the answer. Ok. Check on the board. What do you notice about those three fractions? If there is anyone who can tell me if you notice anything that [pause] up in those three fractions. Which one is greater?	<b>Twelve</b>
Which shaded part is greater?	<b>Three, three, no, four, equal</b>
Thank you, they are [pause].	<b>Equal, equal</b>
Now, I do not know if your diagrams were drawn accurately, but if you draw your diagram correctly, they should line up. Which means, three twelfths is equal to two eighths which is equal to one quarter? What should we call those fractions? Let's see if you remember those terms.	<b>Equivalent fractions</b>
Equivalent fractions? Grate. Let's write back equivalent fractions.	<b>Equivalent fractions</b>
They have different denominators, different numerators but the actual value is the same. I can have a chocolate bar that was in twelve equal pieces. Another chocolate bar in the same length, but it is in eight pieces. Another chocolate bar with the same length in four equal pieces, and if I ask you to give me three twelfths or two eighths or one quarter of the chocolate bar, I will get the same amount regardless. Is just that this bar is broken up into more little pieces, this one, the pieces are a little bit bigger, and the third one, the pieces [pause] are even bigger. Verstaan julle? ( <i>Do you understand?</i> )	<b>Yes juffrou.</b>
Are you sure?	<b>Yes</b>
Ok. Let's do one more example. I want you to make three circles. I want you to divide the first one into four parts, the second one into [pause] let's see let's divide it into eight parts and the third one into two parts. I want you to shade in two quarters. Shade in	<b>Yes</b>



Teacher (T)	Learner (L)
four eighths and shade in one half. Good! You are ready to go!	
Ok. (learner), how many pieces of the pie do I shade in for two fourths?	<b>Two</b>
Two pieces are shaded. Ok, I am shading this piece here, then I will shade in this piece here. Nnnn (learner)! How many pieces of the pie do I shade for four eighths?	<b>Four</b>
Four. One, two, three, four. Ok!	<b>Two, three, four.</b>
And (learner), how many pieces of the pie do I shade for the one half?	<b>One.</b>
One pieces. What do you notice about three pies?	<b>They are equal.</b>
Each fraction [pause] Show an equal amount of the pie. So we say two fourth is equal to four eighths which is equal to one half. So they are equivalent fractions?	<b>They are equal. Two quarter is equal to four eighths which is equal to one half. So they are equivalent fractions.</b>
Four eighths which is equal to one half. So they are equivalent fraction. Now, how do I make an equivalent fraction? For example if I give you nnnnn one fifth? If I give you a fraction of one fifth, how do you go about making an equivalent fraction? One that is of the same value, but different denominator and numerator? How will you make an equivalent fraction for one fifth? You did it for your homework. If you don't, remember, check your homework. Number sixty-eight, b and c, how did you make equivalent fraction? You multiply [pause] The top number and the bottom by [pause].	<b>The top number The same number.</b>
The same number. Two over two, four over four, nine over nine. Each of those is called identity element.	<b>Number</b>
Five pieces of the five pieces means?	<b>One</b>
One. Twelve pieces of twelve pieces means?	<b>One</b>
So let's write that down and they must [pause] for your homework assignment. Read it with me. Ok. Pencils down. This one, let's see what we just wrote down. Equivalent fractions can be made by multiplying the numerator and the denominator by the same number. For example?	<b>Equivalent fractions can be made by multiplying the numerator and the denominator by the same number. For example</b>
Here I took the one quarter. I multiply it by the identity element of three thirds and I came up with its equivalent three twelfths.	<b>Three twelfths</b>
One quarter times three over three gives me three twelfths. One quarter and three twelfth. I circle them in red because they are equivalent. They have the same value.	<b>Equivalent.</b>
Another example on the pie chart. I took one half I multiply it by four over four and I got four eighths.	<b>Four over four</b>
They are equivalent. One half, four eighths. As long as you multiply the numerator and the denominator by the same number. It does not matter what number it is, you will end up with the equivalent fractions. Because you are doing exactly the same	<b>Yes mum</b>

Teacher (T)	Learner (L)
thing to the number as to the bottom number. That's why the value doesn't change. Understand?	
Ok. Three quarters if you multiply with three thirds what is your answer? Ok. Now you finish copying, and open your books to see if [pause]. Number one. You need to make two equivalent fraction of one third by multiplying it by two halves. What is your answer?	<b>Two sixths</b>
Two sixths. Who got that? Number two. You multiply one half by five fifths, what is the answer?	<b>Five tenths, one half</b>
Number three. I take one half by multiplying it with three thirds. Ok. Three quarters if you multiply it with three thirds what is your answer?	<b>Nine twelfths.</b>
Number three. I take one half by multiplying it with three thirds. Ok. Three quarters if you multiply it with three thirds what is your answer?	<b>Nine twelfths.</b>
Nine twelfths. How are you doing?	<b>Fine</b>
Florida, have you done your work?	<b>Yes ma'am.</b>
Good! Number four. Four fifths if you multiply it by two halves gives you?	<b>Eight tenths</b>
Eight tenths. What is eight tenths equivalent of?	<b>Four fives</b>
Four fifths, it not equivalent to two halves but it is equivalent to four fifths. Not four fives, four fifths.	<b>It is equivalent to four fifths.</b>
Ok. Number five.	<b>Seven tenths</b>
Seven tenths multiplied by ten tenths gives you ... ?	<b>Seventy hundredths</b>
Seventy hundredths	<b>Seventy hundredths</b>
Say hundredths	<b>Hundredths</b>
Yes. Number six. Seven twenty fifths times four fourths or four quarter is?	<b>Twenty eight hundredths</b>
Twenty eight hundredths. Twenty five plus twenty five plus twenty five plus twenty five gives you?	<b>Hundred</b>
Number seven. Twenty one fiftieths times two halves gives you?	<b>Forty two Hundredths</b>
Forty two Hundredths. Now you know your multiplication right?	<b>Yes</b>
Is there anyone else that can't do the work?	<b>I am not finish with nine and ten</b>
If you are not finish [pause] where is your book?	<b>Here</b>
Then do! If you are not finish [pause] do because I [pause]. Have you done yours?	<b>Yees!</b>
You have also done it?	<b>Yes</b>
Yes. Those who are not doing great may be [pause]. And then we will continue with our math a little bit and then we move to English. You will have to finish your math [pause] Finish correcting after a break.	
The lesson continued after the break.	
Excuse me, if you have a problem speak in English. What is it	<b>Ms. Shiwa, he is accusing</b>

Teacher (T)	Learner (L)
going on?	<b>me that I took his pen.</b>
Say, I don't have your pen.	<b>I don't have your pen.</b>
Ok. Let's continue. Number nine. Three tenths times something is equal to thirty hundredths	<b>Ten</b>
Tell me what is the identity element? Oh. Let us check. Does three times ten equal to thirty?	<b>Yes</b>
And ten times ten is equal to a hundred?	<b>Yes</b>
Yes it does. Number ten. Eleven twentieth times something gives you fifty five hundredths. I am gonna ask you this Upili. What [pause] times eleven gives you fifty five?	<b>Five</b>
Five, and does five times twenty give you a hundred?	<b>Yes</b>
Upili	<b>Yes</b>
Are you sure?	<b>Yes</b>
Good! Five fifths. How are we doing?	<b>Fine</b>
It is all clear to you?	<b>Yes</b>
Ok. Let's quickly go over that to see. Complete the equivalent fractions. One half is equal to [pause] nnn [pause].	<b>Three</b>
Josefina, now how did you get two sixths? What did you multiply two by? Three. So, you have to multiply one by three and what do you get?	<b>Three</b>
So your answer should be three sixths. How are we doing? Great with number one. Number two. Two thirds is equal to something twelfths. Lina?	<b>Twelve</b>
Twelfths. You gonna [pause].	<b>Four</b>
No, you have three times four to give you twelve. Now you have to multiply two by four. What is two times four?	<b>Eight Ms.</b>
Your answer is eight twelfth. You understand what we are doing here? In your mind you have to multiply by the identity element. Number three. Three quarters, is equivalent to how many eighths Daphney?	<b>Six</b>
Yes, you multiply by two to get eight and you multiply by two to get six.	<b>Six</b>
Number four. Two fifths. Is equivalent to [pause] I am gonna ask somebody Lisa. Sorry. No. Five times four makes twenty. Two times four makes?	<b>Eight</b>
Eight twentieths. Number five. I am gonna ask Queen. Five sixths is equivalent to ten what Queen?	<b>Six</b>
No what did you multiply by five to get ten?	<b>Two</b>
Ok. So, whatever you do to the top one you have to do the same to the bottom one. What is six times two?	<b>Twelve</b>
So your answer is ten twelfths. Fix it up but it is ok.	<b>Twelfths</b>
Number six. Two sevenths is equal to six what?	<b>Twenty one</b>
Six twenty one, you are correct. Six twenty [pause] unless you say six twenty first.	<b>Six twenty first</b>

Teacher (T)	Learner (L)
Ya, two times three is six, seven times three is twenty one.	<b>One</b>
This is why you have to memorise your math facts. So that when you do this you don't have time to count on your fingers. Ok? Number seven I am gonna ask Jaco. Three eighths is equal to nine what?	<b>Twenty four.</b>
Twenty four. Ok. Because three times three is nine. And eight multiply by nine is twenty four. Number eight, I am going to ask Upli. Seven tenths is equal to multiply three by [pause]?	<b>Two Aaai?</b>
Ring, three times what gives you twelve?	<b>Four</b>
So, if you multiply seven by four what is seven by four? That's one thing that you need to memorise.	<b>Twenty eight</b>
Twelve twenty eighths. Well, twenty eighths. And the last one I am going to ask Valentina. Ok. Five eighths is equal to how many thirty two? Eight times four is thirty-two, so what is five times four Valentina.	<b>Twenty-one, twenty, twenty-two, I have all of those correct.</b>
Jaco and Valentina to have this and to show me tomorrow morning. I want your math work done ok. Queen. Before we move on to English, we have so much to cover. We are going to do some more things and that is; we are going to put fractions in order. We are going to put fraction in order. Ascending and descending order. Ok. So let's put down ascending order. Ascending means going up as if you are going upstairs. Right? Going up, from the smallest to the biggest. Ascending order. I am going to give you some fractions so that you can put them in order from the smallest to the biggest. So I am going to put up number one. And you have to put them in order from the smallest to the biggest. From the smallest to the biggest. $\frac{4}{6}$ ; $\frac{3}{6}$ ; $\frac{1}{6}$ ; $\frac{5}{6}$ ; $\frac{2}{6}$ . Now you can use your fraction chart to help you. Or you can save yourself or you make yourself a little picture. Divided into six parts. You can do it that way. Ascending order, from the smallest to the biggest. Now think about the chocolate bar. So, if you want the smallest piece of the chocolate bar, what fraction do you want? Good. Good! You finish?	<b>Yes</b>
This is not in your book.	<b>It must be in the Grade six book</b>
Ok, well! In your one sixth is just a one piece of the chocolate bar. Two sixths is two pieces, three sixths, four sixths, five sixths and six sixths. So, from the smallest to the biggest, you should have arranged them in order like this.	<b>Yes I have done that.</b>
I hope you are all fine now.	<b>Yes I got it. Ascending and descending.</b>
Ok. Ascending and descending. Let's try another one. Number two. They all have the same numerator. And I told you; we talked about this last week. If you have a third of a pie, a fourth of a pie,	<b>One fourth</b>

Teacher (T)	Learner (L)
a sixth of a pie, a fifth of a pie and a half of a pie, which one is greater and which one is less? You can use the chart to help you. How much is the half? How much is the third? How much is the fourth? How much is the sixths? You are gonna arrange them from the smallest to the largest. From the smallest to the largest. Maria, you are taking these and you put them in the right order. This is the right order than this. Ok. Number two. Well, if you remember, we talk about this last week. The bigger the denominator, the more pieces of pie. Right? And that means the more pieces of the parts, the smaller they are. Right? If I have pie and I just cut it into for example eight pieces each piece s will be smaller than if I just took the pie and I cut it into four pieces. Right? This is one quarter, this is one eighth. When the numerators are the same, then to figure out what is greater and which is less, you look at the denominator. The smaller the denominator, the bigger the fraction. So, if you put these in order, which one will come first as the smallest? What is the smallest?	
If you have the pie what do you take, one fourth or one sixth? If you want one half this is bigger. So the smallest is?	<b>One sixths</b>
And the little bit bigger is?	<b>One fifth</b>
And the little bit bigger is?	<b>One fourth</b>
One quarter and then?	<b>One third</b>
One third and then?	<b>One half</b>
One half. That is the order of the fraction. Who got that? Sometimes you need to draw a picture to help but you can look here, everybody look at this chart. See two three, four, five, six, seven. Eight, nine. The bigger the denominator, the more pieces in each whole.	<b>Whole</b>
Here you have ten equal pieces. Nine equal pieces, eight equal pieces. Where there are only two equal pieces each individual piece is bigger. Ok. Number three.	<b>Number three</b>
With this one, I would like you to put your pencil down and watch: $\frac{2}{3}$ ; $\frac{5}{6}$ ; $\frac{1}{3}$ ; $\frac{1}{6}$ ; $\frac{1}{2}$ . This one looks more challenging, because here we have the same numerators but when you look here, [pause] the numerators are different. How do we compare the fractions if the numerators are different? And the denominators are different? Right, we can try and use equivalent fractions. Let's leave this alone and let's change each of these into a fraction with the denominator six. Two thirds times what will give me a fraction of the denominator six?	<b>One Ai Two Three Ms. Two</b>
Two. Three times tow is six. Two times two is?	<b>Four, four</b>
Two thirds and four sixths are equivalent. Four sixths, now you got five sixths now you can change this one to the fraction with the denominator six. One third times what will give us a fraction	<b>Two, two</b>

Teacher (T)	Learner (L)
of the denominator six?	
Yes, our identity element is two halves. Three times two is equal to six. One times two is?	<b>Two</b>
So, one third is equivalent to?	<b>Two sixths</b>
Two sixths. So, this one, it already has a denominator six and this one should also get the denominator six. Let's get the equivalent. Ok! One half times what can give us a fraction with the denominator six?	<b>Three</b>
Three. Three thirds. Two times three is six, one times three is?	<b>Three</b>
Three. So three sixths is equivalent to one half. Now if you put them in order what is the biggest?	<b>Wuuuuuu!</b>
Five sixths. I was able to arrange them in order by changing these to their equivalents with the same denominators. Do you see that?	<b>Yes mum.</b>
All right. Let's try one together.	<b>Ms. Shiwa, we are still writing.</b>
No it is ok. Three: $\frac{7}{10}$ ; $\frac{3}{5}$ ; $\frac{1}{2}$ ; $\frac{4}{5}$ ; $\frac{4}{10}$ . Ok. If you have different denominators, different numerators, so, how we compare this? Put them all of them over the same denominator?	<b>No</b>
Yes we can. How are we going to do that?	<b>You find equivalent fractions.</b>
You find equivalent fractions. Which denominator, do you want to change them to?	<b>Tenth</b>
Tenth! Let's keep this one as it is and change this one to the denominator of ten. Five times what equals to ten?	<b>Five, two.</b>
Two. So, what is three times two?	<b>Two; six</b>
Six. So your equivalent fraction of three fifths is [pause]?	<b>Six</b>
Six tenths. Alright, let's change this one to the denominator of ten. Two times what gives you ten?	<b>Five, five</b>
So what is one times five? Ok. That's the equivalent for one half. Let's change this one for a denominator of ten. What is [pause] How do you get ten?	<b>Five, four, four Five, four, four</b>
Five times two, so, what is four times two?	<b>Eight</b>
Eight. Now put this in order from the smallest to the biggest. What is the smallest?	<b>Six tenths; five tenths; eight tenths; four tenths.</b>
Thank you. All tents here, four tenths is the smallest. Which one comes next?	<b>Five tenths</b>
Five tenths is equivalent to ... ?	<b>One half</b>
One half?	<b>Six tenths</b>
Six tenths which is?	<b>Seven tenths</b>
Seven tenths. And what is the biggest?	<b>Eight tenths</b>
Eight tenths which is four fifths. Math facts, especially the ones that I gave you. One times to five times. Two. Ok, write in ascending order. Examples which you do not hear in class.	<b>Aaah! You were too fast.</b>
I was too fast?	<b>Yes</b>

Teacher (T)	Learner (L)
<p>Noo. Watch very carefully. We just, we just made those that do not have the same denominator. We just found their equivalent for the denominator ten. How did I make this ten? By multiplying by two. Then I have to multiply by two the top as well. All you are doing is finding equivalent so that all the fractions you get have the same denominator. If they have the same denominator is easy to put them in order. Do the best you can, we all going [pause] Tomorrow but do the best you can. Ok? Alright. Put this in descending order:</p> <p>a) <math>\frac{7}{8}</math>; <math>\frac{5}{8}</math>; <math>\frac{3}{8}</math>; <math>\frac{6}{8}</math>; <math>\frac{4}{8}</math></p> <p>b) <math>\frac{1}{5}</math>; <math>\frac{1}{8}</math>; <math>\frac{1}{2}</math>; <math>\frac{1}{10}</math>; <math>\frac{1}{4}</math></p> <p>c) <math>\frac{5}{8}</math>; <math>\frac{3}{4}</math>; <math>\frac{1}{2}</math>; <math>\frac{3}{8}</math>; <math>\frac{7}{8}</math></p>	
It is time!	
<b>THE LESSON ENDS HERE.</b>	

## APPENDIX N: Acceptance letter from Khomas Region



REPUBLIC OF NAMIBIA

**MINISTRY OF EDUCATION  
KHOMAS REGION**

Tel: (+264 61) 2934356  
Fax: (+264 61) 231367

Private Bag 13236  
Windhoek

File No.:12/2/4/4/2

June 2, 2008

Kapenda Loide N.  
Education Officer: Research  
NIED  
P/Bag 2034  
OKAHANDJA

Dear Madam

**PERMISSION TO CONDUCT RESEARCH ON TEACHING OF MATHEMATICS  
IN A MULTIGRADE UPPER PRIMARY PHASE**

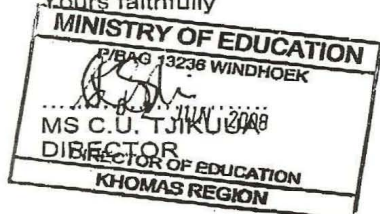
Your letter dated 27 May 2008 which was received on the 30 May 2008 on the above subject refers.

You are hereby given permission to conduct research at [redacted] and [redacted] Primary Schools on condition that:

- o you contact the principal of the school to make logistical arrangements
- o the research should not disrupt the normal school programme
- o anyone who will participate in the interview should do so on voluntary basis
- o the final report should be made available to us.

We wish you all the best of luck in your studies.

Yours faithfully



ALL OFFICIAL CORRESPONDENCE MUST BE ADDRESSED TO: THE DIRECTOR, KHOMAS REGION



## APPENDIX O: Acceptance letter from Hardap Region



**REPUBLIC OF NAMIBIA**  
**MINISTRY OF EDUCATION**  
HARDAP REGION

*Enquiries: Mr. F.P.R. Cloete  
Ref. Number: 11/1/1*

*Private Bag 2122  
MARIENTAL*

19 JUNE 2008

Ms. L.N. Kapenda  
NIED  
Private Bag 2034  
Okahandja

**RE: RESEARCH IN HARDAP REGION**

Your letter dated 27 May 2008 has reference.

Permission is hereby granted to you to do research in schools in the region as requested. On condition that:

- The normal program of the school is not put in jeopardy
- The outcome of the research be shared with the region.
- The region be acknowledged in your work

Yours sincerely

  
B. BOYS  
DIRECTOR



*Correspondence to this regional office must be addressed to: The Director: Ministry of Education  
Telephone: 063-245700, Fax: 063-242053*

## APPENDIX P: Informed consent form for the teachers

### **INFORMED CONSENT LETTER FOR TEACHERS**

I ..... a teachers at ..... hereby stating that I have agreed to take part in the data collection for the **teaching of mathematics in multigrade settings** which is conducted by Ms. Loide N. Kapenda. I am going to help Ms. Kapenda with her data collection activities, which will involve the classroom observation, interviews and the analysis of the documents which I developed for multigrade teaching.

I am fully aware about her research ethics (my right of privacy and anonymity) and also know my right to withdraw in the participation of her study at any time. I **will/ will not** prefer to proof read the report in order to ensure that the information is accurately recorded and reported.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX Q: Bibi's lesson preparation

MAR-07-2010 17:29 From:NIED

062509104

To:+27 00 000

P.4

5/06/08

Maths (5)

P.45 Check: nr. 1.6 (F)

P.45 Discuss: Division by two digit divisor

P.46 Multiplication by 10, 100, 1000

P.46 Do: nr. 1.7, 1.8, 1.9

Maths (6)

P.47 Check: nr. 7.2 (B)(C)

P.48 Discuss: Multiply by 2- + 3-digit numbers.

P.48 Do: nr. 7.3 (A, B)

Maths (7)

P.75 Check: nr. 1, 2, 4

P.75 Do: nr. 6, 9, 11, 13

Test: Mo. 9/06/08 - Decimal test.

Revision: Decimals.

P.230 Do: nr. 1, 2, 3.

Soc. Stud (5)

Discuss: Tourism + conservation

Do: Questionnaire P.3

Learn: Tourism + conservation

Soc. Stud (6)

Class test: Questionnaire P.6

P.50 Discuss: The first colonists in southern Africa

P.52 Check: Think + do nr. 1

P.53 Discuss: The effects of the movement of people.

P.53 Do: Think + do nr. 2.

4/06/08

Bybel(?)

Behandel: Les 6 - N.T. Name en indelings v.d. Boeke

Leer: Name van N.T.

Maths(5)

P. 45

Check: nr. 1.6 (b, c, d, e)

P. 46

Do: nr. 1.7

Maths(6)

P. 47

Check: nr. 7.2(A)

P. 47

Do: nr. 7.2(B)(C)

P. 48

Discuss: Multiplication by 2+3 digit numbers.

Maths(7)

Speedtest:

P. 73

Check: nr. 4(d)

P. 74

Do: nr. 5

P. 75

Exer. 4.9. nr. 1, 2, 4, 6.

Soc. Stud(?)

P. 54

Check: Think + do nr. 2

P. 56

Discuss: Types of maps, charts + graphs.  $\equiv$  Street maps/plan  
Road maps  
Graphs and charts

P. 59

Do: Think + do nr. 1, 2, 3

Learn: P. 47 - 58

# APPENDIX R: Jatty's lesson preparation

Lesson Plan		
Date: 9 June		
Subject: Mathematics		
Period	Grade 5	Grade 6
	<p>Theme: Common fractions</p> <p>Topic: Compare and order common fractions with the same and different denominators</p> <p>Objectives: Know how to compare the values of simple fractions up to and including tenths. Arrange fractions in a stated order.</p> <p>Teacher Activities: Explain</p> <p>Teaching Aids: Copies of fractions up to tenths</p> <p>Learner Activity: Complete questions based on activity</p> <p>Homework: Make shapes and divide in <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{3}</math> etc</p>	<p>Theme: Common Fractions</p> <p>Topic: Compare, order &amp; simplify common fractions up to a denominator of 1000</p> <p>Objectives: Compare fractions with easy and commonly used denominators up to 1000 and arrange them in a stated order.</p> <p>Teacher Activities: Explain</p> <p>Teaching Aids: Copies of worksheet</p> <p>Learner Activity: Complete questions</p> <p>Homework: Exercise</p>



APPENDIX S: Janet's term planning

TERM PLANNING		JANUARY - APRIL 2007				
SUBJECT: <u>Mathematics</u>		GRADE <u>6</u>				
		MON	TUES	WED	THURS	FRI
		SCHOOL TEACHERS		SCHOOL LEARNERS	<u>Tables</u>	
15-19 JAN	1					
22-26 JAN	1	pg 36	Draw bar graphs	pg 37	Ex. ✓	
29 JAN - 2 FEB	2	<u>WHOLE NUMBERS</u> counting 100 000	pg 38-40	pg 40-45 Place value		pg 50-53 Approx's
5-9 FEB	2	Comparing ordering	pg 47-49	Sum diff	product quotient	Divide add over multiples
12-16 FEB	2	+ -	square no. rectang. no. pg 57/8		INVEST 18 ✓	
19-23 FEB	2	+ -			✓	
26 FEB - 2 MAR	2	x -				
5-9 MAR	2	word problems/order of operations				TEST 1 ✓
12-16 MAR	2	word problems				
19-23 MAR		INDEPENDENCE MID-TERM BREAK				
26-30 MAR	3	<u>COMMON FRACTIONS</u> Equivalent fractions			INVEST 15	
2-6 APRIL	3	Comparing + ordering				GOOD FRIDAY
9-13 APRIL	3	EASTER MONDAY	+ -			
16-20 APRIL	3	word problems				TEST 2
23-27 APRIL	3					

# APPENDIX T: Shiwa's lesson preparation

SUBJECT GRADE: MATH 5-7

Date July '08

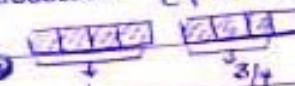
## LESSON PLAN

Theme and Topic Common Fractions

Learning Objectives:

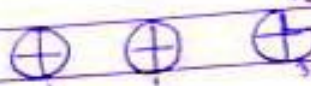
- Distinguish b/w. proper fractions, improper fractions, & mixed numbers
- To reduce a fraction to its simplest form (or its lowest term)
- To compare & order the 3 kinds of fractions

Introduction: (p 67 M5L5)

  $7/4$  (seven quarters) = improper fraction  
 $1 \frac{3}{4}$  (one + three quarters) = mixed fraction

Group Instruction/Modeling

$7/4$  means  $7 \div 4 = 1 \text{ R } 3$

  $2 \frac{3}{4}$  circles or  $11/4$  circles  
 $(2 \times 4) + 3 = 11/4$

Student Task(s)

See p 67-69 M5L5

p 69-71 DM6

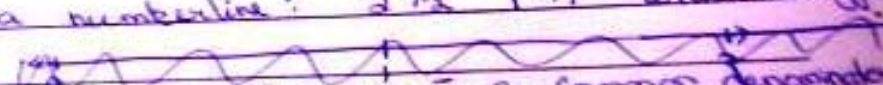
p 69-73 DM7

(See p 69 DM6)  $\Delta$  Simplest form is obtained by dividing the num. & denom. by its largest common factor.

$\Delta$  Compare & order fractions by finding when least common denominator. • then writing equal fractions with that denominator. (See top of p 73)

Closure:

Show on a numberline:  $2 \frac{1}{2}$   $1 \frac{3}{4}$  Which is bigger?

(SEE BACK) 

Write as fractions w a common denominator.

Homework:

From above tasks