Design of assessment tasks in grade seven mathematics

By

THABO MOSES MNISI

Submitted in partial fulfilment for the requirements for the degree

M.Ed Assessment and Quality Assurance

Department of Mathematics, Science and Technology Education

Faculty of Education

University of Pretoria

PRETORIA

SUPERVISOR: PROF. G.O.M. ONWU

AUGUST 2013

APPROVAL

This work has been examined and has been approved as meeting the required standards of scholarship for partial fulfilment of the requirements for the degree Master in education at the University of Pretoria.

_____ _____

SUPERVISOR DATE

_____ _____

EXTERNAL EXAMINOR DATE

ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF PRETORIA

FACULTY OF EDUCATION

RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE	**CLEARANCE NUMBER :** SM 11/04/01
DEGREE AND PROJECT	MEd Design of assessment tasks in grade seven mathematics
INVESTIGATOR(S)	Thabo Moses Mnisi
DEPARTMENT	Science, Mathematics and Technology Education
DATE CONSIDERED	27 February 2012
DECISION OF THE COMMITTEE	APPROVED

Please note:

For Masters applications, ethical clearance is valid for 2 years

For PhD applications, ethical clearnace is valid for 3 years.

CHAIRPERSON OF ETHICS COMMITTEE Prof L Ebersohn

DATE 27 February 2012

CC Jeannie Beukes

GOM Onwu

This ethical clearance certificate is issued subject to the following conditions:

1. A signed personal declaration of responsibility
2. If the research question changes significantly so as to alter the nature of the study, a new application for ethical clearance must be submitted
3. It remains the students' responsibility to ensure that all the necessary forms for informed consent are kept for future queries.

Please quote the clearance number in all enquiries.

UNIVERSITY OF PRETORIA

DECLARATION OF ORIGINALITY

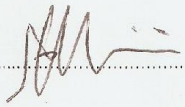
This document must be signed and submitted with every essay, report, project, assignment, dissertation and/or thesis.

Full names of student: THABO MOSES MNISI

Student number: 29441073

Declaration

1. I understand what plagiarism is and am aware of the University's policy in this regard.
2. I declare that this DISSERTATION (eg essay, report, project, assignment, dissertation, thesis, etc) is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.
3. I have not used work previously produced by another student or any other person to hand in as my own.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

SIGNATURE OF STUDENT: 

SIGNATURE OF SUPERVISOR: .....

S 4722/09 7

ACKNOWLEDGEMENTS

I would like to thank the following people who made the road to achieving this degree a smooth one;

- God the almighty for giving me the courage and the resilience to complete this project.
- My supervisor Prof G.O.M. Onwu for his guidance, patience and mentorship. He sacrificed his time in shaping this work and his comments added a scholastic touch and voice to this piece of work.
- The Mpumalanga Department of Education for allowing me to conduct the research at the schools.
- The teachers and learners who gave up some of their time to participate in the study.
- My parents and siblings for their endless love and support.
- My two beautiful daughters; Siphesihle and Yoliswa who felt neglected when I devoted more time to my studies.

TABLE OF CONTENTS

LIST OF ACRONYMS

AS	**Assessment Standard**
C2005	**Curriculum 2005**
CASS	**Continuous Assessment**
DoE	**Department Of Education**
GET	**General Education And Training**
LO	**Learning Outcome**
MATH	**Maths Assessment Task Hierarchy**
NCS	**National Curriculum Statement**
NPAQ	**National Policy On Assessment And Qualification For The School In The General Education And Training Band**
OBE	**Outcomes Based Assessment**
RNCS	**Revised National Curriculum Statement**

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The study reports on two Grade 7 mathematics teachers' assessment practices in an attempt to identify the knowledge and competencies that they have and use in designing Grade 7 mathematics tasks and how they provide feedback to the learners. These two Grade 7 mathematics teachers were selected from schools that had consistently good results despite disabling teaching conditions such as large and under–resourced classes.

Data was collected through semi-structured interviews with the teachers to assess their knowledge and practice of continuous assessment. Classroom observation and analysis of teacher's portfolio and learners' exercise books were undertaken to triangulate data on teachers' practices and interview protocols. A mathematics taxonomy referred to as MATH taxonomy was used as a framework to evaluate teacher mathematics assessment tasks in grade 7 lessons. Classroom observations focused on how the two teachers planned and implemented their Grade 7 mathematics lessons with emphasis on the assessment procedures.

The results of the study showed that the two teachers had rudimentary knowledge and understanding of continuous assessment and its practice. Both teachers failed to demonstrate knowledge or ability with any knowledge taxonomy including the MATH taxonomy in designing (or selecting) their mathematics assessment tasks in Grade 7. The mathematics assessment tasks frequently used by the teachers were sourced from the school textbooks, and these were found to be mainly recall-type questions involving routine procedures, and which according to the math taxonomy are classified as low order thinking assessment tasks. Furthermore both teachers presented feedback to their learners in superficial ways that would not necessarily assist the latter to improve in their learning methods and the former in their teaching methods.
The education implications of the findings of this study are discussed.

List of keywords; assessment, continuous assessment, mathematics taxonomy, evaluation, feedback

LIST OF OPERATIONAL TERMS

Assessment standard:	A benchmark that indicates the minimum requirements that should be met to indicate achievement in a task.
Assessment task:	An assessment activity that is generated to assess a range of skills and competencies of learners.
Assessment:	in this study assessment is the process of gathering information in terms of learner progress.
Authentic assessment:	in this study authentic assessment is the assessment that is based on real life situations. Such assessment is based on the context that both the learners and the teacher can relate to.
Continuous assessment:	the process of continually assessing learners using different forms of assessment.
Feedback:	constructive, motivational and informative comments made by the teachers to the learners regarding the learners' performance in an assessment task.
Learners' needs:	in this study learners needs refer to the conceptual and cognitive needs of the learners.
MATH taxonomy:	a tool designed to assess whether designed assessment task demands a range of skills from the learners.
Task design:	the process of generating a task that will assess the learners on a given content.
Real-life context:	a context that is related to the life experiences of the learners

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Every year, especially as the school year ends, the attention of the nation in South Africa focuses on education, especially with regard to the performance of the learners in annual assessments. The reason for this ritual is the fact that learner performance has been consistently poor in Grade 12, especially in the learning areas of mathematics and science, for quite some decades.

Recently the focus on mathematics as a learning area and fundamental component of the General Education and Training (GET) band, which comprises Grade R to 9 (Department of Education, 2002), has intensified. The GET provides the foundation for the higher senior secondary level. It is being argued, in educational circles, that more attention should be directed to the foundational level at an early stage, as one way of addressing the problem of poor achievement, particularly in respect of the final year results in Grade 7 mathematics. However, it would be naïve to focus on the final year results alone at the senior phase without taking into account how those results are derived by the teachers, a situation in which continuous assessment (CASS) plays a key role. Continuous assessment is an ongoing process that measures learners' achievement during the course of a grade, providing information that is used to support learners' development and enable improvements to be made in the learning and teaching process (DoE, 2007).

In recent years the importance of continuous assessment is increasingly being accepted, in contrast to a single examination result as an indicator of a learner's level of development and achievement at a specific level, (DoE, 2002). Teachers have a singular and crucial responsibility in successful continuous assessment as designers of assessment tasks, especially in internal continuous assessments at schools. Since continuous assessment is the main method through which assessment takes place, it contributes significantly to summative assessment (DoE, 2002). Against this background, the nature of the tasks designed by the Grade 7 mathematics teachers was investigated. In this study, tasks design refers to the process of generating a task that could be used to assess learners' knowledge or skills in a

given mathematics content. The source of generating the task could either be from the teacher's knowledge base or outside of the teacher such as textbooks etc.

Assessment, aside from being important to teaching and learning, is regarded as a powerful way of measuring the quality of teaching and learning as well as the quality of both the teachers' effectiveness and learners achievement (Broadfoot & Black, 2004; Shay & Jawitz 2005; Meier, Rich & Cady, 2006), hence serving as a communication mechanism between education and the wider society. The communication implies that the results or outcomes of school learner assessments are not a concern for the teachers alone, but also a range of other stakeholders too. The parents, the private sector and government officials, particularly those attached to education departments, would have an interest in accessing and assessing the results in order to do systemic evaluation and curriculum reviews. Assessment therefore forms an integral part of the school curriculum.

1.2 OVERVIEW OF THE SOUTH AFRICAN CURRICULUM

With the democratic political dispensation of 1994 in South Africa, Curriculum 2005 (C2005) was promulgated in 1997. The approach adopted by C2005 was that of outcomes based education (OBE). The implementation of C2005 was not a smooth process as challenges were experienced as indicated by Aldous, (2004) due to the use of complex terminology such as continuous assessment, performance indicators and range statements. One of the issues with OBE was, as Ramoroka (2007) found, that teachers were not ready for an OBE curriculum implementation, a situation that could be attributed to the fact that the curriculum was channelled via circulars and workshops that were poorly conducted, instead of it being implemented through appropriate and continuous training of the teachers (Mweemba & Chilala, 2007; Vandeyar, 2005). Furthermore Fraser, Killen and Nieman (2005; p238) mention that "if too much emphasis is placed on foundational competence with little emphasis on school-based demonstration of applied competence, there is a possibility of poor educator performance or inappropriate execution of the roles played by the teachers". This situation led to teacher anxiety and confusion that further resulted in teachers having great difficulty in adapting their assessment practices to the guidelines provided by OBE (Combrink 2003; Vandeyar, 2005).

The teachers, who were meant to put the curriculum into practice, were affected and had difficulty in adapting to the new curriculum because it took the teachers into an unfamiliar curriculum domain (Marais & Meier 2007; Vandeyar 2005). As a result of problems associated with this aspect of implementation of C2005, the Revised National Curriculum Statement (RNCS) was set in place in 2000. A new document called the Curriculum and Assessment Policy statement (CAPS) came out in 2010 and has been introduced in the foundation phase at schools. Mathematics teachers will be expected to make changes to their assessment practices while they had not adapted to the current outcomes based assessment implemented at the schools in South Africa.

The curriculum strives to enable all learners to achieve their maximum potential, as expressed in critical outcomes and developmental outcomes (Department of Education, 2002). Critical outcomes indicate the abilities that are envisaged from the learners (DoE, 2007). These abilities of the learners can be determined through a process of assessment which is characterised by high quality tasks (Lumby, 2008; Vandeyar & Killen, 2003).

1.2.1. Assessment in OBE

Teachers were expected to change their traditional strategies and adapt to continuous assessment (CASS). The change in assessment was to be characterised by;

- A shift from using end of year examinations as the only method of assessment to designing a variety and series of tasks that would contribute to a final mark.

- A shift in assessment from summative norm-referenced to criterion-referenced formative assessment (Vandeyar, 2005). Criterion-referenced assessment evaluates learners against the assessment standards while norm-referenced compares learners against each other (Frey & Schmitt, 2007).

The change in assessment procedure was meant to achieve more authentic ways than hitherto ways of assessing learners (Beets & le Grange 2005). However, studies by Vandeyar (2005) and Vandeyar and Killen (2006) in teachers assessment practices highlighted that primary mathematics teachers are struggling to come to terms with demands placed on them by CASS and hence found changing their assessment practices difficult.

Furthermore, teachers had to use assessment as a tool for monitoring learners' progress, making instructional decisions and evaluating learners' achievement, thus becoming learner-centred (Latterral, 2005; Louw, 2003). Therefore teachers now have to continually assess and make valid inferences from the assessment (Vandeyar, 2005).

1.2.2 Demands of continuous assessment on teachers

For quite some time assessment in general was used for the purpose of ranking learners' skills and knowledge against those of their contemporaries (Clifford, 2002). The ranking was done according to end of the year examination, test results and summation of achievement based on marks that were achieved by the learners (Beets, 2007). These end of year examinations and monthly tests seem no longer adequate for learners' needs because they focus primarily on the recall of facts and basic procedures which do not effectively measure learning (Louw, 2003; McDuffie, Ackerson & Morrison, 2003). Moreover these examinations, especially in Grades 4-12 mathematics covered a narrow range of the subject matter (content) and generally emphasized low level thinking (Senk, Beckmann & Thompson, 1997).

Mathematics teachers now have to design tasks that would eventually assess all the assessment standards. According to the National Policy on Assessment and Qualifications (NPAQ, 2007) CASS contributes 100% of the total assessment for Grade 7. As a result, a greater responsibility and accountability is placed on teachers for the learning outcomes of their learners (Wilmot, 2003). Moreover mathematics teachers are further required to interpret the said assessment documents to be productive in their practise (Parker, 2006).Given such a responsibility this study was concerned with determining how teachers designed their tasks in Grade 7 mathematics for the continuous assessment of their learners.

The envisaged 100% in total assessment for Grades 7-8 should comprise different tasks designed by teachers and administered to learners. The NPAQ requires of the mathematics teachers to have had twelve formal recorded assessment tasks annually for Grade 7. The twelve tasks should vary from assignments, investigation, projects, class work and homework to tests and examination (DoE, 2002). An assertion supported by Mothata, van Niekerk and Mays (2003) that teachers need to consider the three overlapping elements of assessment when assessing their learners, namely:

- *Ongoing informal formative assessment* which means that teachers have to constantly assess and evaluate the progress of the learners

- *Ongoing formal continuous assessment* which highlights using various assessment tasks like tests, assignments, projects and investigations

- *Formal summative assessment* which refers to the use of external exams which follow the model of the internally designed tasks and external moderation of assessment. Summative assessment is further viewed as the assessment of learning and is teacher - centred while formative is the assessment of learning and leans more to the learners' side (Beets & le Grange, 2005).

It is through such classroom assessment that teachers can monitor, confirm and improve the learning of their learners and even decide whether or not to promote the learners to the next grade (Van Aswegan & Dreyer, 2004). Therefore teacher-designed tasks and their assessments are the primary sources of information regarding learner achievement (Eckert, Dunn, Codding, Begeny & Kleinmann, 2006). However teachers need to note that assessment tasks are, by their very nature, developmental tools and not measurement tools (Vandeyar & Killen 2006).

The challenge is that of developing and implementing criterion-referenced assessment that it is complex and demands a high level of expertise from the teachers as assessors (Wilmot, 2003). A question therefore arises as to what knowledge and expertise Grade 7 mathematics teachers have in criterion-referenced assessment in mathematics.

1.3 PROBLEM OF THE STUDY

The role of the teacher in the classroom has evolved rapidly in the past decade and increasing demands on the teacher mean that they play multiple roles such as:

- Learning mediator

- Interpreter and designer of learning programmes and materials

- Leader, administrator and manager

- Scholar, researcher and lifelong learner
- Community, citizenship and pastoral role
- Learning area/ subject/discipline/ phase specialist and
- Assessor (DoE, 1996).

The role of the teacher as an assessor was put under scrutiny in this study because, as an assessor, the teacher is expected to have an understanding of the purpose and effects of assessment and be able to provide helpful feedback to learners. Furthermore, the teacher must design appropriate assessment tasks (DoE, 1996).

However, since the majority of primary school mathematics teachers in practice were generally ill-equipped to deal with curriculum changes (Vandeyar, 2005) and the fact that the requirements of criterion-referenced assessment were difficult to put into practice, as well as being time-consuming, implementation of the new curriculum created more problems than it solved. As a result many teachers assessed their learners in a haphazard pattern without giving serious consideration to why and what they are assessing (Popham, 2000). Some of the teachers even resisted the changes and kept to their own assessment strategies with which they were familiar (Vandeyar & Killen, 2006). In short teachers had difficulty in adapting their assessment practices to the guidelines provided for the OBE curriculum changes (Combrink 2003; Vandeyar 2005). Teachers had no choice as Ramoroka (2007) notes that, when a curriculum changes, the assessment processes change as well. However, as Phudi (2006) noted, a conflict arises if teachers had to practise a new curriculum while their conception is rooted in the past. He further noted that teachers should be conversant and keep abreast with what is happening in education. Therefore the design of assessment tasks by the teachers should not be based on the teachers' experiences in teaching the mathematics learning area but on the policies as prescribed by the National Department of Education of South Africa and their knowledge of the current curriculum.

The assessment changes were indeed challenging for the teachers as teachers had to ensure that the assessment tasks they designed were authentic, continuous, multidimensional, varied, balanced, accurate, objective, valid, fair, manageable, time-efficient, bias-free, sensitive to gender, race, culture and learner ability (DoE, 2000). It follows, therefore, that the likelihood

could arise in which teachers were overawed when confronted with accommodating all these aspects, and found themselves needing appropriate skills and competencies for designing assessment tasks.

Apart from records documented in the literature, other anecdotal evidence, personally experienced by the researcher, indicated that mathematics teachers in the senior and further education and training phases (mostly Grades 8-12) engaged in debate about the achievement of learners in primary school compared to their performance at secondary level. Primary school mathematics teachers argued that learners performed better at primary school than they did at secondary school level, a situation attributed to primary teachers' commitment. But secondary school teachers attribute learners' success at primary school to the poorly designed assessment tasks set by their primary school counterparts. In the circuit where this study was undertaken, it has been found that the learners normally attain an average of 70% in mathematics when in primary school, but in secondary school they suddenly dropped to a percentage almost half this (around 30-35%). This trend has been confirmed in the analysis of results in a certain circuit in Mpumalanga. The learners tended to score high marks on internally designed tasks and performed poorly on externally designed tasks.

Moreover, on a personal level, as a member of the school management team, I had the responsibility of evaluating mathematics teachers' tasks before they were given to learners. After evaluating the tasks, I instructed most of the teachers to redesign their assessment tasks. This was largely due to the fact that the tasks either did not address the necessary learning outcomes, or the teachers used the same form of assessment such as tests only instead of various forms.

This study was therefore aimed at gaining some insight into how Grade 7 mathematics teachers designed and used their assessment tasks.

1.4 THE PROBLEM STATEMENT

The problem of the study was to investigate what knowledge Grade 7 mathematics teachers have about the types and nature of assessment tasks that National Protocol on Assessment and Qualifications (NPAQ) recommends, and how the teachers designed and implemented the different tasks in Grade 7.

1.5 THE RESEARCH QUESTIONS FOR THE STUDY

The problem statement gave rise to the following research question:

> How knowledgeable are Grade 7 mathematics teachers in designing appropriate assessment tasks in Grade 7 mathematics?

The following sub-questions were addressed to answer the main question:

1. What knowledge and skills do Grade 7 mathematics teachers have in terms of designing mathematics assessment tasks at that level?
2. How do the teachers design different mathematics assessment tasks for Grade 7 learners, and give feedback to the learners after their completion of the assessment tasks?

1.6 OBJECTIVES OF THE STUDY

The objectives set for the study are:

- To determine some aspects of mathematics teachers' knowledge of continuous assessment and practice, and how the teachers design assessment tasks for learners in Grade 7 mathematics lessons.
- To find out how the teachers provide feedback to their Grade 7 mathematics learners based on their mathematics assessment scores.

1.7 SIGNIFICANCE OF THE STUDY

Assessment policies in the South African curriculum are explicit regarding what has to be assessed, for example, learning outcomes and assessment standards (DoE, 2002). The policies further emphasise that the learning outcomes (LOs) and assessment standards (ASs) can be achieved through the use of assessment tasks. However, there appears to be a void on how teachers should design these assessment tasks.

The focus of this study was on whether mathematics tasks, as designed by teachers, addressed the identified assessment standards. In other words, the assessment practices of Grade 7 mathematics teachers were evaluated to get in-depth understanding of their knowledge of continuous assessment and how they actually assess their learners in Grade 7 mathematics.

The significance of this study lies in the fact that assessment tasks, as designed by the teachers in Grade 7, were investigated. At the core of this thinking was the intention to find out what knowledge and skills teachers use to design their mathematics assessment tasks for the purpose of any intervention or remediation required to improve performance. Given that there has been some controversy about the quality of assessment of Grade 7 learners generally regarding their future performance at secondary level it would be useful to get some insight into teachers' knowledge and skills.

1.8 SUMMARY

This chapter gave a background to the study. The need to investigate the design of assessment tasks by Grade 7 mathematics teachers was explained. The research questions were stated and attention was drawn to the significance of the study. The chapter ends with an overview of the structure of the dissertation.

1.9 THE STRUCTURE OF THE DISSERTATION

The first chapter of the dissertation deals with the background to the study, an overview of the national curriculum, the problem explored in the study, the research questions and the significance of the study.

The second chapter reviews and discusses the literature relevant to the investigation. The validity and reliability of assessment are discussed, followed by a description of teacher assessment practices that have been studied by other scholars. The concept of continuous assessment and the nature of assessment in the learning area of mathematics are examined. This chapter concludes by unveiling the conceptual framework designed for the study.

The third chapter outlines the methodology applied in the investigation. It describes the population and the procedures for sampling teachers for the case study. The research

instruments are validated and the analysis of data collected is described. Ethical issues considered for this study are dealt with as well.

The fourth chapter of the study sets out the actual data collection procedures and analyses the collected data. Each case study is narrated in terms of the data obtained from the observations, document analysis and interview schedules.

The fifth and last chapter discusses the findings derived from the case studies against the framework developed in chapter two. Similarities and differences of the case studies are highlighted by focusing on the seven themes identified for the study: knowledge continuous assessment, knowledge of assessment techniques, the planning of assessment, sources of assessment tasks, learners' needs and feedback to learners. As a conclusion to the study recommendations for appropriate teacher development and further research on the issue are offered.

CHAPTER 2
THE LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews existing literature related to teachers' assessment of primary school learners' learning achievements. The validity and reliability of assessment tasks, teacher assessment practices, and the concept of continuous assessment are discussed.

2.2 THE VALIDITY AND RELIABILITY OF ASSESSMENT TASKS

According to the National Department of Education in South Africa (2007), assessment is the process of collecting, synthesizing and interpreting information on learner performance measured against the assessment standards (ASs) provided to assist teachers, parents and other stakeholders in making decisions about the progress learners have made over a certain period of time at specific level. Assessment is also viewed as a tool for monitoring learners' progress, for making instructional decisions and evaluating learners' achievement (Latterral, 2005).

Various scholars such as Leyendecker, 2006, Romagnano, 2001, Killen, 2003 and Gronlund 1998 list two important traits of assessment; these are validity and reliability. Respectively these two traits have also come to be referred to as the meaning and consistency of assessment (Romagnano, 2001). The validity of an assessment task lies in its ability to measure what it is designed to measure. Assessment has to be meaningful and seen to be reliable to both teachers and learners. Airasian (2001), in fact, speaks of these two traits as the characteristics of good assessment. In other words assessment is classified as good when the teachers deliberately reconcile their assessments with their classroom instruction (Bohlam, 2006).

Killen (2003) identifies the facets of validity, as content validity and construct validity. According to Killen, the focus of content validity is more about the curriculum content coverage and the item relevance of assessment tasks, for example a mathematics task that is designed to compare integers must have items that demands of the learner to compare the

integers and therefore such a task cannot demand of the learner to find or determine prime factors of given numbers. Meanwhile construct validity is more concerned about the skills to be measured by assessment tasks for example learners may be instructed to use the thermometer to measure and record different temperature of water (i) at room temperature, (ii) from the fridge and/ or boiling water. These aspects of validity namely, content and construct validity, as defined by Killen, appear to be in line with the assessment guidelines for mathematics as provided by the National Department of Education (2002). The assessment guidelines of mathematics for the intermediate and senior phases (DoE, 2002) state clearly that all assessment tasks must cover all the learning outcomes (LOs) and assessment standards (ASs). The guidelines further define an assessment task as an assessment activity that is designed to assess a range of skills. The skills that are to be assessed are embedded in the LOs and the ASs. Teachers' assessment tasks must therefore conform to the given guidelines. This study evaluated whether the mathematics assessment tasks, as designed by the Grade 7 mathematics teachers observed, conformed to content and construct validity.

The other trait of assessment is reliability and it refers to the production of consistent results despite changes in assessment situations (Vandeyar & Killen, 2003; Romagnano, 2001). Reliability is one aspect of assessment tasks which should not be overlooked by the teachers. Vandeyar and Killen (2003) advise that an assessment task can be considered reliable when the conditions under which it is administered and the marking which is the assessment tool, are designed to minimise errors of judgement. Reliability is therefore be enhanced by ensuring that the designed tasks are not worded in an ambiguous manner for the learners.

2.3 ASPECTS OF TEACHER ASSESSMENT PRACTICES

According to the literature, teachers appear to be challenged when designing quality assessment tasks (Reyneke, Meyer, & Nel, 2010; Wiggins, 1998). Wiggins further mentions that teachers generally often worry about satisfying their own needs when designing assessment tasks, such as the need for easy-to-test and easy-to-score results. The quality of the assessment task is likely to be compromised by such actions if that is the case.

Studies by scholars such as Austin, Carbone and Webb (2011) and Rizvi (2006) revealed that prospective teachers found it difficult to pose mathematics word problems that are an element of assessment task design and gave, as an example, fractions as a particular challenge. Austin et al. (2011) further mentions that word problems are rich with real-world situations. As a result learners might understand the content which is assessed if it is linked to their prior knowledge. This assertion is also highlighted by Rizvi (2006) when he argues that the posing of word problems in mathematics assessment is seen as the teachers' ability to link mathematical content to real-life situations. Therefore assessment tasks designed for the learners should in one way or the other be based on real-life situations or situations the learners can relate to.

The literature (Killen & Hatting, 2004; Kyriakides, & Gagatsis, 2003) further uncovers the fact that teachers are used to assessing learners using the traditional methods that has the primary aim of grading the learners according to their factual knowledge, even though assessment has generally shifted from assessing quantity to assessing quality and understanding. In the traditional methods the awarding of marks and grading of learners are overemphasized while the giving of useful advice as feedback on a given task is underemphasized and, as such, memorization of content was encouraged at the expense of its comprehension (Black & William, 1998; Segers, Dochy, & De Corte, 1999).

Furthermore, teachers tend to design and use short answer tests in their assessments instead of using a variety of assessment techniques which would benefit the teachers in terms of understanding the manner in which the learning takes place (Meier, et al., 2006). Besides, teachers rely mostly on tests provided by textbooks without any modifications (Senk, et al., 1997). The above mentioned practices of mathematics teachers are against the principles of criterion-referenced assessment. Amongst these principles are the premises that;

- The main purpose of mathematics assessment is to improve learning and teaching.
- The methods of mathematics assessment should be such that they enable learners to demonstrate what they know rather than what they don't know.
- Mathematics should operationalize all goals of mathematics education.

- The quality of assessment tasks should not be determined by accessibility to objective scoring, and

- That assessment tools should be practical too (Verhage & de Lange, 1997).

The tasks, designed by the teachers, must not just be easy to mark for the teachers, but must also be meaningful for the learners. According to Chirume (2007) teachers need to have knowledge of assessment principles and skills and be competent in assessment task design, marking the task and analysing the task. Besides designing assessment tasks and assessment tools teachers are to make judgements from such assessments. This study also aimed at determining what Grade 7 mathematics teachers do with their learners' assessment scores. Randall and Engelhard (2008) mentioned that primary teachers when compared to their secondary counterparts are likely to promote learners regardless of their grades or scores as more emphasis is placed on the abilities of the learners and the way in which they master content. This assertion by Randall and Engelhard (2008) implies that primary teachers' assessments are criterion-referenced when compared to more prevalent norm-referenced assessment by secondary school teachers. However a question therefore arose as to whether the teachers sampled for this study had necessary mathematics assessment skills to carry out criterion-referenced items.

Given the above-mentioned teacher practices, this study set out to try to determine whether Grade 7 mathematics teachers were assessing in accordance with the prescribed RNCS curriculum.

2.4 CONTINUOUS ASSESSMENT (CASS) IN GRADE 7 MATHEMATICS TEACHING

The national protocol on assessment and qualifications (NPAQ) requires of the mathematics teachers to have had 12 formal recorded assessment tasks annually for Grade 7. The 12 tasks should be designed by the teachers at school level and vary from assignments, investigations, projects, class /home works to tests and examinations (DoE, 2002). These tasks are used amongst others for assessment and progress purposes.

Besides designing the tasks teachers also have to design the complete assessment tools, for example, memorandums, rubrics, checklists and so forth. Another question arises as to

whether the teachers actually do design different tasks at all, or whether they still use the traditional assessment methods which do not seem to assess comprehensively high order cognitive skills like problem solving, critical thinking, reasoning and conceptual understanding (Segers, et al., 1999).

Nair and Pillay (2004) mention that CASS is characterised by criterion-referenced assessment which emphasises high-order thinking skills and that CASS replaces the traditional assessment approach of "once-off, once-size-fits-all" mindset, thus providing for variety of assessment opportunities. The literature (Reyneke, et al., 2010; Frey & Schmitt, 2007; Khoza, 2004 & Popham, 2000) indicates that there are indeed challenges in the way teachers conduct their assessment, consequently teachers become increasingly uncertain about the design of tasks in terms of construct and content validity. This apparent deficit could be partly attributed to the fact that the teachers' assessment practices do not always conform to the principles of CASS.

Continuous assessment is formative in nature, that is, it takes place over a long time and thus helps teachers and learners to check progress by providing meaningful feedback (DoE, 2002). This formative feature of CASS calls for the design of varied tasks so as to cater for the different conceptual and cognitive needs of the learners. These aspects of CASS are tabulated in the mathematics assessment in the general education and training phase guidelines that remind teachers to ensure that assessment:

- Takes place over a long time and is on-going
- Supports the growth and development of learners
- Provides feedback to learners
- Uses a strategy that caters for a variety of learner needs (DoE, 2002).

The above are some of the OBE assessment principles that are covered by CASS. What is more a careful analysis of the principles reveals that assessment should be more about the learner rather than the teacher, thus becoming learner-centred. However, one is left with a question as to whether or not the relevant principles are taken into account by Grade 7

mathematics teachers. Moreover how the teachers go about designing the various mathematics assessment tasks.

According to official the national education documentation such as the NAPQ and RNCS (DoE, 2002), as a learning area, Mathematics is meant to equip learners with an ability to work in real life situations. Therefore mathematics assessment should measure learners' proficiency in solving complex mathematics concepts, reasoning and communicating mathematically, and must address the socio-cultural background of the learners (Beets, & le Grange, 2005; Lane, Liu, Ankermann, & Stone, 1996). Mathematics assessment also needs to be relevant, contextualised, varied and practical in order to assist learners' development through the experience of assessment, hence to acquire skills and values as listed in the RNCS document. Assessment is therefore said to be authentic when it addresses such concepts.

Researchers such as Frey and Schmit (2007), Moon and Schulman (1995) and Pandey (1990) agree that assessment is authentic when it addresses real-life situations, but task developers, including mathematics teachers in general, appear to be unsuccessful in their attempts to design tasks that do this, even though linking assessment to real-life situations is a common global trend in mathematics (Bansilal, & Wallace, 2008). Mathematics assessment should therefore be contextualised by addressing situations with which the learners are familiar. Van Etten and Smith (2005) allude to the fact that the context in which the content is presented plays an important role in teaching and learning because it assists the learners in the translation of content from context to mathematics and from the mathematical solution to an answer to the original question. The context in which the content is delivered therefore impacts on the learners' grasp of the content. If the context is familiar to the learners it therefore boosts the learners' understanding of the content and eventually success in the tasks (Vandeyar, 2005).

Another crucial point for consideration is that assessment needs to be fair (DoE, 2002) that is learners need to be notified of an oncoming assessment and the content to be covered. Assessment must represent the way in which learning had taken place, aim to assess knowledge, skills, values and attitudes in contexts that closely resembles actual situations, and must ensure that the tasks measure the learners' productivity and their choice of formulation or approach (Moon, & Schulman, 1995; Pandey, 1990). The question is: are

these issues taken into consideration by Grade 7 mathematics teachers when designing their assessment tasks? Assessment should assess what was learnt by the learners prior to the assessment (Verhage, & De Lange, 1997), but this does not necessarily imply that learners should be tested on memory only. Assessment should and must promote high order thinking which encapsulates complex skills such as analysis and synthesis (van den Berg, 2004). A question therefore arises around how the teachers are currently assessing their Grade 7 mathematics learners.

In order to ascertain whether assessment tasks designed by the sampled Grade 7 mathematics teachers satisfied the above-mentioned aspects, the mathematics assessment task hierarchy (MATH) as developed by Smith, Wood, Coupland, Stephenson, Crawford and Ball (1996) deemed to be a valid tool to use as it ensures that assessment tasks incorporate, amongst other things, high order thinking skills was considered. Smith et al. (1996) mention that the MATH was developed to serve as a mechanism for constructing examinations that assess a range of skills and knowledge, at the same time encouraging learners to reflect on their learning. In addition, learners could be assisted in reflecting on their work if meaningful feedback is given by the teachers. Giving feedback to learners is another global and long-standing practice and used to enhance learning (Van Aswegan, & Dreyer, 2004).

To summarise the relevant literature reviewed indicates that the key elements of assessment particularly relevant to the study are validity and reliability and it was noted how teachers tended to assess their learners despite the shortcomings of assessments that do not appear to be valid and reliable. For example, teachers developed tasks of poor quality (Reynecke, et al., 2010). These tasks were more norm-referenced instead of being criterion-referenced. From the literature it was also learnt that after each assessment teachers are expected to give meaningful feedback to the learners. However, teachers need to have knowledge and the right skills to design assessment tasks as well as marking and analysing them before appropriate feedback can be given.

Mathematics assessment, according to the literature (DoE, 2002; Verhage, & De Lange, 1997), is meant to equip learners with an ability to work with real-life situations, and authentic situations need to be incorporated into the assessment tasks that teachers design for the specific the development of learners. To achieve skills such as applying mathematics to real-life situations classroom assessment must be done on a continuous basis. This study

attempted to find out how teachers designed their mathematics continuous assessment tasks for Grade 7 and assessed their knowledge of CASS.

The section that follows describes how the conceptual framework was developed from the literature review. The conceptual framework was then used to develop data collection instruments in relation to teacher knowledge and skills in the designing of appropriate mathematics assessment tasks.

2.5 CONCEPTUAL FRAMEWORK

From the literature review of relevant text there is evidence that several factors need to be taken into account when developing assessment tasks. Firstly teachers need to create an environment that would address learners' needs. The creation of an environment could be effectively done by addressing the identified LOs and ASs for that lesson in preparation for the assessment. Secondly, teacher-designed assessment tasks need to be structured in such a way that they assess a variety of skills as per the advice of Smith, et al. (1996). The MATH taxonomy designed by Smith et al. (1996) served as framework for assessing whether the Grade 7 mathematics teacher-designed tasks adequately assess such skills as well as classifying the assessment task items. Moreover the MATH taxonomy is deemed a useful tool to assist task designers, teachers in this regard to construct tasks that would asses a range of skills (Bohlmann, 2006; Bennie, 2005).

The literature confirms that assessment should be more learner-centred (Louw, 2003). The framework for implementing learner-centred assessment developed by van Aswegan and Dreyer (2004) is more relevant when ascertaining whether teacher-designed tasks are appropriate and learner-centred. An assertion supported by van den Berg (2004) that assessment should play a development role (to the learners) instead of a judgemental one (by teachers). She further alludes to the fact that assessment should be well-planned and appropriately managed by teachers. Therefore teachers should not see the design of assessment tasks as an afterthought or unnecessary, but as integral to the process of teaching and learning (de Lange, 2007). These factors were at the foundation of this framework.

In this study the MATH taxonomy and the framework for learner-centred assessment were used in a framework for the study. The MATH taxonomy was used to classify the items within an assessment task designed by the teachers.

The MATH taxonomy will be discussed first and then the learner-centred assessment framework proposed by van Aswegan and Dreyer.

2.6 THE MATHEMATICS ASSESSMENT TASK HIERARCHY TAXONOMY (MATH)

In the MATH taxonomy (Table 2.1) task items could be classified into three groups and these were referred to as group A (low order questions), group B (middle order questions) and group C (high order questions) in that hierarchical order and discussed separately.

Table 2.1 MATH taxonomy (*Source*: Smith, et al., 1996)

Group A	**Group B**	**Group C**
Factual knowledge	Information transfer	Justifying and interpreting
Comprehension	Application to new situation	Implication, conjectures and comparison
Routine procedures		Evaluation

Group A is characterised by low order questions than is described as factual knowledge, comprehension and routine procedures. Smith et al. (1996) mention that tasks that involve recalling information for example, in problems where the learners have to calculate the perimeter of a rectangle, learners need to first recall the formula; *perimeter = 2 (length + breadth),* fall under the factual knowledge category. While tasks that require the ability of the learner to demonstrate that they understand symbols used in formulas, and their substitution, fall under the comprehension category. Where learners are required to carry out all the steps in a procedure that may contain a number of underlying processes, like the long division method of decimal fractions, such tasks would lie in the routine procedures category. Group B is characterised by middle order type questions and has two categories namely; information transfer and application of knowledge to new situations. Tasks that fall in the information transfer category demand the following from the learners:

- Ability to construct a mathematical argument from a verbal outline of method for example; *Johnson bought a cap for R20.00 and sold it for R15.00, did he get any profit or did he loose? Why?* The learners, in this instance would be required identify the cost and selling prices, to note that the cost price (R20) is bigger than the selling price (R15) and conclude that Johnson did not make any profit at all.

- Recognising when a formula or method is inappropriate to a context for example; *a shape has two pairs of opposite equal sides has the dimensions as 15cm and 5cm, calculate its area and perimeter.* This scenario requires of the learners to recognise the type of a shape referred to (a rectangle/parallelogram) and to recall the formulae of area and perimeter of the shape.

- Transforming information from one form to another, for example, verbal to numeric for example: *the enrolment of learners in a particular school was 600 in 2010 and has increased by 10% each year, what was the enrolment for the school in 2012?* In this scenario the learners are required to find out how many learners were enrolled at the school for each year from the year 2010 to 2012. They have also to obviously express or calculate the percentages of the given quantity, thereafter add to the given quantity in order to find the quantity of the following year. Learners have to repeat the process to find the enrolment for 2012. Verbal (words) information is transformed to mathematical processes to get the answer.

Group C is characterised by high order questions and has three categories namely: justification and interpretation, implications, conjectures and comparisons and evaluation. In the category of justification the task demands of a learner to justify a result, for example, proving a theorem such as showing how the formula for calculating the area of a rectangle was derived.

The category of "implication, conjectures and comparison learners" demands of a learner to make conjectures prove them rigorously, and draw comparisons from given scenarios. The following is an example of a problem which requires the learners to apply the above-mentioned skills;

The school choir in 2004 won 7 trophies before being eliminated in a regional level competition. In 2005 however it won 5 trophies and became champion at the national level. In which year did the choir perform better and why? The learners need to compare and draw conclusions from the given scenario.

The evaluation category demands the ability of the learners to think creatively and use organisational skills. An example of a problem that demands creative thinking and organisational skills is given below;

Observe the learners in grades 5 and 6 from Monday to Friday and note check how many of them were wearing jerseys and how many were not. Sort your data according to boys and girls. Use the tally system to record your data, draw a stem and leaf table for the data. And lastly draw a graph to display your data.

The complete MATH taxonomy is summarised in table 2.1 and was used in this study to classify and assess the level of complexity of task items from the mathematics Grade 7 teacher-designed tasks.

2.7 THE FRAMEWORK FOR IMPLEMENTING LEARNER-CENTRED ASSESSMENT

As discussed above it is evident that the MATH taxonomy can only be used to classify the tasks designed by the mathematics teachers, therefore the framework for learner-centred assessment, as recommended by van Aswegan and Dreyer (2004), was modified and used to assess the skills and procedures followed by the participating teachers for assessing their learners.

The framework identifies three phases for effective assessment, namely, planning, implementing and responding to assessment. The frame work was chosen because its conceptualization is in line with the RNCS Grade 7 mathematics curriculum currently offered in South African schools. The phases of the framework are discussed as follows:

Planning of assessment

Assessment is a process that needs to be planned. As a point of departure teachers needed to identify the learning outcomes (LOs) and assessment standards (ASs) to be addressed in their lessons and subsequently the assessment tasks. The identified LOs and ASs should be communicated to learners so that they know what is expected of them when they are assessed. The LOs and ASs should be clarified for the learners. The designing of tasks should follow immediately after the identification of the LOs and ASs.

Implementing assessment

For learners to achieve the intended outcomes, the teachers should provide sufficient opportunities for the learners to learn what they need to learn. In a sense teachers needed to give learners countless opportunities for learning with meaning and understanding (Sharod, Dwyer, & Narayan, 2009). Learning should be such that it transcends the classroom situation and addresses real life situations; and when tasks are designed they should be structured in such a way that learners can complete them effectively in different ways. Furthermore, the mode of assessment should be communicated to the learners in terms of how and what will be assessed so as to maximize learner performance. A question therefore arises as to whether the sampled Grade 7 mathematics teachers do these?

Responding to assessment

The completed tasks provided the evidence of the learner's mastery of a piece of work. Teachers need to assess the completed work that, in reality, is the data related to learner's performance. From the literature review section of this report it was recorded that teachers satisfied their own need for easy-to-test and easy-to-score results. It is important that teachers design appropriate assessment tasks with effective assessment feedback to the learners after their completion is done as it builds the learners' confidence (Bansilal, James, & Naidoo, 2010; Horne, & Naude, 2007). Therefore the framework, as summarised in Figure 2.1, is appropriate of terms of answering the research questions of this study and it is presented below;

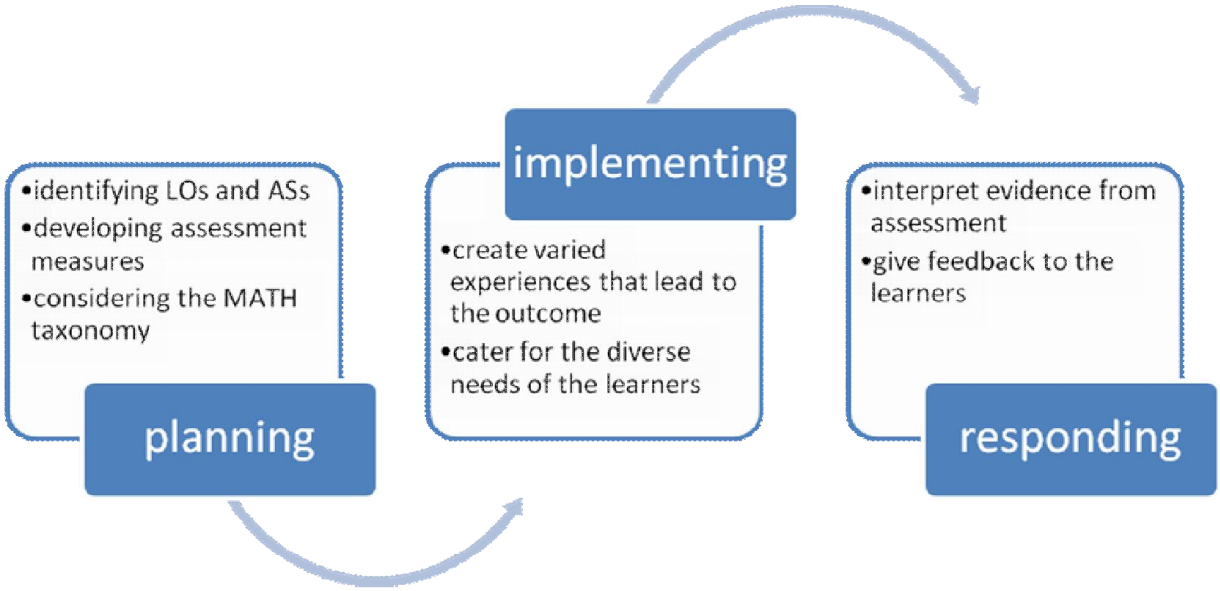


Figure 2.1: The modified conceptual framework for the study (*Source*: van Aswegan, & Dreyer, 2004)

The modified conceptual frame work which has three aspects namely; planning, implementing and responding may appear to be linear but it is cyclic. Teachers need to redo the whole process should the need arise for example if the learners performed poorly on that task.

The aspects of the modified framework are now discussed. The planning section encompasses clear identification of LOs and ASs to be addressed in the lesson to be presented. The LOs and ASs of the lesson must of necessity be those that will have to be assessed by the teacher's task items. The task can be developed using the MATH taxonomy as a guide to ensure authenticity and quality in assessing a range of skills inherent in the taxonomy. Moreover teachers are expected create varied experiences that would cater for the diverse conceptual and cognitive needs of the learners in their lessons. Finally the teachers are expected to analyze evidence from each assessment task and give meaningful feedback to the learners.

The presented conceptual framework for this study was created with supportive comments from the literature on the topic of assessment of learners in the field of mathematics. The

dissertation will now continue discussion and focus on the study's research design and its methodology.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter deals with the research procedure as applied in the study. The development and validation of the research instruments, the sampling procedures and administration of the main study are described in detail.

3.2 RESEARCH PROCEDURE

Descriptive research involving the case study method was used in this study to try to gain some insight into how two practising Grade 7 mathematics teachers design and implement assessment tasks for continuous and criterion-referenced assessment in senior phase mathematics in the classroom. The study used a qualitative research approach to gather data at a particular point in time with the intention of describing the two teachers' existing knowledge, skills and practices in mathematics assessment task design.

This case study method involved both interviewing the two teachers and observing what they do and how they do what they do when teaching Grade 7 mathematics lessons and assessing learners using assessment tasks they had designed. Other studies in the South African setting (Lumby 2007; Ramothlale 2008; Randall 2008) have successfully used the case study method when investigating the teaching of large classes and associated learner assessment by drawing on a small sample of teachers and analysing their practices. The advantage of the case study method is that "the focus is on understanding and illuminating important cases rather than on generalising from a sample to a population" (Patton, 1999, p1197). This implies that a case study allows the researcher to focus and gain insight into a specific phenomenon by providing rich descriptions to allow for more understanding of the issues under scrutiny. However the main disadvantage of this method is that, according to Cohen et al. (2007, p256) "findings may not be generalisable". In this study the unit of analysis is the teacher, in this case, the two teachers whose learners consistently achieved a pass rate of 70% in mathematics and above in their external examination.

3.3 RESEARCH SITE AND POPULATION

The population for this study was all the Grade 7 mathematics teachers in 21 primary schools in a certain circuit in Mpumalanga whose learners had been performing well over the years. The said learners achieved an average of 70% and above in their end of year examination organised by the provincial Department of Education. Of the 21 primary schools only one is a former Model C school that is a self-sustaining, fee-paying school and which previously (prior to 1994) only admitted white learners and since 1994 most of the learners appeared to be from the more well-to-do families. Three of the primary schools are private schools, four are fully-fledged senior phase no-fee paying schools (starting at Grade 7 to Grade 9) and 13 are no-fee paying primary schools. The two teachers of this study were purposively sampled from two no-fee paying government schools based on the learners' good performance in year-end mathematics assessment and the length of time the teachers had taught Grade 7 mathematics.

3.4 SAMPLING PROCEDURES

The selected circuit in Mpumalanga was approached for records of the year-end assessments in Grade 7 mathematics. From these records, schools that had achieved a pass rate of 70% and above in the externally designed examination for the past 3 consecutive years were identified. A second criterion for the selection of the teachers for the sample was that the teachers needed to have been teaching mathematics in Grade 7 for the past three years or more and in the same circuit.

Finding teachers who met the set criteria presented some challenges as teachers are often allocated to different Grades on a bi-annual basis in most schools. However, in the end, one female teacher who matched the set criteria was purposively selected from a primary school. The other teacher, a male, who also met the criteria, was also purposively selected on the basis that he was in his fourth year teaching Grade 7. In the light of the new assessment procedures introduced into South Africa's education post-1994 that specifically required continuous and criterion-referenced assessment, an in-depth study of how individual teachers, design and implement their assessment tasks in mathematics at a specific level was necessary. The researcher's decision to use two teachers to undertake this study was guided by this fact. A similar approach in selecting two teachers to do in-depth studies was adopted by other

researchers, such as Chick and Harris (2007) and Randall (2008), when they conducted in-depth studies on teacher cognition and a teacher's knowledge base. The demographic profiles of the two purposively selected teachers are given below in tabular form (Table 3.1).

Table 3.1: Profiles of the participating teachers

ITEM	SIPHO	SIPHELILE
Educational qualifications	• Primary Teachers Diploma (Mathematics and Physical Science) • Advanced Certificate in Education (Mathematics) • Advanced Certificate in Education in Technology Education	• Primary Teachers' Diploma (Mathematics and Physical Science) • Advanced Certificate in Education (Mathematics)
Current school location	Rural setting	Rural setting
Gender	Male	Female
Age	37	43
Experience (at the time of the research)	15	20
Grades taught since appointed	Grade 7 to 12	Grade 4 to 7
Subjects taught	Mathematics and Natural Science	Mathematics and Technology
Current studies	BEd (Educational Management)	BEd (Educational Psychology)

The two teachers were from schools that are labelled quintile A, meaning that most of the learners are from areas of high unemployment and low socio-economic status. Furthermore the schools are under-resourced in terms of learning and teaching support material (LTSM), that being the case, the researcher felt that it would be more informative in terms of future intervention measures to select teachers from schools that could be seen as needing extra help especially as such schools are preponderant within the circuit.

3.5 RESEARCH INSTRUMENTS

The following instruments were used to gather the necessary data to help address the research questions and to triangulate the data:

1. A checklist for analysing teacher-designed assessment tasks
2. Teacher interview schedules
3. A schedule for classroom teacher observation.

Leedy & Ormrod (2010) point out that the use of such a set of instruments means that the data collected would of necessity have some convergence for triangulation purposes. In describing each of the instruments its format, layout or content is first presented followed by how it is scored.

3.5.1 A checklist for analysing teacher-designed assessment tasks

A checklist of categories of skills and knowledge for assessing hierarchically, the conceptual or cognitive demands of an assessment task in mathematics according to a mathematics taxonomy was adapted from Smith et al. (1996). The list was used to collect data that would respond to the first research question which aimed to identify the knowledge and skills that mathematics teachers teaching Grade 7 have in terms of designing assessment tasks using Category A, B and C of the Mathematics Assessment Task Hierarchy (MATH) (Ref. Table 3.2).

In Table 3.2 below, the categories labelled A, B and C are described as corresponding to the different knowledge and skills attributable to them. Category A refers to task items that demand factual knowledge, comprehension and routine procedures from learners. The test items in this category are deemed to be low order questions or tasks. Category B comprises the task items that demand information transfer and application of information to a new situation. The test items in this category are seen as middle order questions. Category C refers to task items that require learners to justify and interpret information, to state implications, conjectures, draw comparison and evaluate. The task items in this category are deemed to be high order questions.

Table 3.2: Checklist for the analysis of assessment tasks according to the Mathematics Assessment Task Hierarchy (MATH) taxonomy[1]

CATEGORY	TASK / MATH	TASK 1	TASK 2	TASK 3
A	Factual knowledge			
	Comprehension			
	Routine procedures			
B	Information transfer			
	Application to a new situation			
C	Justifying and interpreting			
	Implication, conjectures and comparison			
	Evaluation			

Researcher's comments: _____

Scoring procedure for the checklist

The teacher's assessment tasks are scored using the MATH taxonomy. The task items (questions) are categorised according to the knowledge, skills or competencies required of learners to complete each task item successfully.

[1] Source Smith et al. 1996

Mathematics task items that demand factual knowledge, comprehension and use of routine procedures from learners are deemed to be low order tasks and are to be classified in Category A. Task items in Grade 7 mathematics that demand mental processes like information transfer and application of information to a new situation are ranked middle order items and placed in Category B. Other assessment tasks with items requiring justifying and interpreting, noting the implications, assuming conjectures, comparing and evaluating as functions of learners' cognitive processes are deemed high order questions and ranked as Category C. A teacher whose tasks have items ranging from group A to C of the taxonomy is scored as possessing adequate skill and effective in task design while one whose tasks are dominated by either group A, B or both is viewed as possessing inadequate skills and ineffective.

In order to verify whether components of the conceptual framework for implementing learner-centred assessment (planning, implementing and responding to assessment) are addressed, another category was added to the check list. It is referred to as Category D checklist below (Ref. Table 3.3).

Table 3.3: Category D checklist: learner-centred assessment framework

D	Availability of annual assessment plan (planning of assessment)			
	Assessment addresses real life situation			
	Analysis of learners' marks (responding to assessment)			
	Is there any teacher written feedback on learners' books			

In Category D the teachers' assessment documents and lesson plans will be analysed to find out whether:

1. The teachers plan their assessments. The availability of an annual assessment plan, work schedule and completely filled lesson plans will be noted as evidence of planning.
2. The designed assessment tasks are authentic, that is they address real-life (real-world) situations, recognised by Bansilal and Wallace (2008; p78) as "situations that mimic the kind of activities learners might engage in outside of school". The task items of each teacher's assessment task will be checked to see whether they are based on real-life situations or not.
3. The teachers review the scores obtained by learners in their assessment tasks. The marks, and mark schedules used by teachers to record learners' marks after assessment will be analysed. The analysis and evaluation will be based on whether the teacher uses basic descriptive statistics involving learners' scores, such as the total number or percentages of learners who wrote each task and the number of learners who passed/failed that task, the class average etc. A mark schedule that has those statistical features will be regarded as one in which the teacher is likely to use learners' scores to assist in making inferences about performance placement and possible intervention measures. Any of those features, whether present or absent will be cross-checked with relevant information from interview data.

Scoring Procedure for the Category D checklist

The teachers are scored on whether they use an assessment plan to schedule and assess their learners. The presence of the plan and its co-relation with the tasks that are administered to the learners are scored as an effort to plan assessment, while the absence of such will be regarded as poor or lack of planning for assessment by the teacher. On assessment addressing life situations, the teachers are scored on their use of real-life examples in the three tasks that will be evaluated. A task that has at least one task item addressing real-life situation is scored as addressing real-life situations and a task without any task item addressing real-life situation is scored as not addressing that requirement. Teachers are also scored on the availability of descriptive statistical summaries of each task at the end of the mark schedule. The presence of such statistics for all the tasks is scored as the teacher responding to

assessment. Teachers are also scored on how well they use the information from the statistical analysis if any, such as providing feedback, giving the learners opportunity for repeating the tasks or re-teaching. If a teacher gives learners a second chance on the task and learners improve on their scores such is translated as giving effective feedback.

Written teacher feedback is looked for in learners' workbooks. A teacher who frequently provides helpful comments is regarded as giving positive feedback to the learners. On the other hand, learners' work books with only ticks for correct answers and crosses for wrong answers with no additional comments by the teacher are scored as a lack of positive feedback to learners.

3.5.2 Teacher interview schedules

The teacher interview schedules (Table 3.3) is designed firstly, to elicit information from the participating teachers on research questions 1 and 2 below:

1. *What knowledge and skills do Grade 7 mathematics teachers have in terms of designing mathematics assessment tasks at that level?*
2. *How do the teachers design different mathematics assessment tasks for Grade 7 learners, and give feedback to the learners after their completion of the assessment tasks?*

The teacher interview schedules (Table 3.4) are designed firstly, to elicit information from the participating teachers regarding the understanding and knowledge of the continuous assessment process in which task designs feature significantly. Secondly, how the teachers respond to learner's assessment scores regarding making inferences and giving feedback to learners.

The data from the interview schedules will be based on whether the three components of the conceptual framework for implementing learner-centred assessment are applied by the two teachers in their assessment procedures. Attention is paid to:

3.5.2.1 Planning the assessment: eight questions are posed to find out how teachers planned their assessment practice (Ref. Table 3.4).

3.5.2.2 Implementation of assessment: five questions are constructed to probe how teachers implement assessment in their mathematics class. (Ref. Table 3.4)

3.5.2.3 Response to assessment: five questions are written to find out how teachers responding terms of giving feedback to their learners after giving each task. (Ref. Table 3.4)

In total 18 questions will be asked during the interview (Appendix A and Appendix D).

Table 3.4: The teacher interview questions used

Components of the learner-centred assessment framework	Questions	Answers
Planning of assessment	1. What is your understanding of continuous assessment? 2. What is the main purpose of assessment? 3. How confident are you in developing assessment tasks? Very good, satisfactory or find it difficult? Explain. 4. For how long have you been teaching Mathematics and specifically Grade7 Mathematics? 5. How would you describe a good assessment task? 6. Which taxonomy do you use in Mathematics teaching if any, and why? 7. What forms of assessment do you use in Grade7? Of these which do you use often and why? 8. Have you generally been used to using the same type of assessment tasks throughout the year? If yes, which one? And why? If not, name the ones you've been using throughout the year and for each comment on its success or failure as an assessment technique?	

Implementing assessment	9. Do you usually design assessment tasks? When do you plan them? 10. Do you develop tasks for Mathematics? Do you consult anyone in designing your Maths tasks? If so who, if not, why? 11. As a teacher who has been teaching Mathematics learning area for many years, how regularly do you change your assessment tasks? Please give reasons for your answer. 12. What are your sources of information for the assessment tasks that you normally use in Mathematics? 13. How do you identify and cater for the different learning needs of the mixed ability learners in your Mathematics assessment tasks?	
Responding to assessment	14. What do you do after administering each assessment task? 15. How often are your assessment tasks evaluated by the head of department? 16. What happens after the evaluation process? 17. How would you define a task on which the learners have performed: done well or underperformed? Explain. 18. When and how do you provide learners with feedback on each of their assessment tasks?	

Scoring of the teacher interview schedule

The teachers are scored 'correct', 'incorrect' or 'deficient' regarding their knowledge of documents and policies relevant to continuous assessment (CASS); the definition of CASS and its purpose; and the knowledge of the MATH taxonomy, or any other that they might use in their tasks; and on how they plan their assessment tasks. The scoring will be undertaken using the work schedules provided by the school and the annual assessment schedule as benchmarks (Appendix U). Their knowledge of the forms of assessment and use of

assessment guidelines will be scored as per the Revised National Curriculum Statement (RNCS).

The teachers are scored qualitatively on their use of assessment; whether they teach the learners as a homogenous or mixed ability group; and if they take cognisance of individual differences and conceptual needs. The teachers are also scored on the resources used for compiling assessment tasks: whether they develop or design them themselves or source them from textbooks and/or other sources. They are scored 1 for low, indicating that classes are taught homogenously and used textbooks as sources of assessment. They are scored 2 for high, which means the teacher teaches his or her classes as a heterogeneous group and does not rely on the textbook for task designs.

On the aspect of responding to assessment, the teachers are scored on how they give assessment feedback to learners. A sound working routine would include, for example, doing corrections after each task as a form of remediation and evaluating the effectiveness of the assessment process. In addition, if the teacher's working routine for evaluating learner performance indicates that assessment tasks are evaluated by a more senior colleague who gives quality assurance comments in reviewing the task this would be recorded as a positive attribute. A teacher whose tasks are moderated and appropriate follow-up are assured in making the amendments on the task are score qualitatively. A comment of responding well to assessment will be noted. However, if a teacher's set tasks are not moderated and there is no consultation with a senior, and only corrections are dealt with no attempt being made to focus on improving learner performance, the score/comment by the teacher is noted as a poor response to assessment.

3.5.3 Classroom observations

The classroom observation schedule (Table 3.4) is designed to gather data on how teachers teach as they prepare the learners for the designed assessment tasks. The observation schedule is meant to confirm, expand, query or disregard the interview data protocols and the MATH taxonomy checklist on teacher-designed task.

The classroom observation schedule is designed and based on the components of the conceptual framework for implementing learner-centred assessment which includes planning,

implementing and responding to assessment. Thus the classroom observation schedule seeks to measure and assess the following:

1. For planning assessment: here teachers are assessed;
   (i) Whether they have prepared lesson plans for the content to be presented
   (ii) What math baseline assessment procedure is used for finding out what learners already knew on matter to be presented
   (iii) Whether the learning outcomes (LOs) and assessment standards (ASs) as well as the mode of assessment are communicated to the learners at the beginning and/or end of the lesson.
2. Implementing assessment: the teachers are observed as to whether they provide learners with enough learning opportunities to interact with the presented content, and whether real life examples are used in class teaching, as one way of contextualizing Mathematics teaching.
3. Responding to assessment: teachers are observed as to whether they use oral or other forms of assessment during and after the lesson, and how they respond to learners' answers and questions if any.

Table 3.4 Lesson observation template

Teacher's name: _____ Number of learners: _____

Content focus (LO & AS): _____

COMPONENTS OF THE LEARNER-CENTRED ASSESSMENT FRAMEWORK	**ASPECTS TO BE OBSERVED**	**OBSERVATIONS MADE**	**OBSERVER'S REFLECTIONS**
Planning assessment	Availability of lesson plans		
	The use of baseline assessment in the topic to be presented		
	Communication of learning outcomes (LOs) and		

	assessment standards (ASs) to the learners		
	Communication of mode of Mathematics lesson assessment to the learners		
Implementing assessment	Provision of learning opportunities to learners		
	The use of real life situations in lesson presentation		
Responding to assessment	Are learners asked oral questions throughout the lesson and how does the teacher react to the learners' responses?		
	Are relevant informal tasks given at the end of the lesson?		

Scoring of the classroom observation

The teachers are rated as poor, average or good in planning for assessment. A teacher who neither has lesson plans, does not use baseline assessment, does not communicate the learning outcomes and assessment standards or mode of assessment to the learners scores 'poor' for planning. The teacher scores 'good' for planning if s/he uses baseline assessment. The teachers are scored as well on the provision of learning opportunities. A teacher who uses a variety of methods of teaching such as group work, pair-work or individualisation is scored as efficient in the provision of learning opportunities. The use of more than one teaching strategy in a lesson by the teacher is scored as effective provision of learning opportunities. The focus is also on the teachers' use of real or daily life situations or examples in their mathematics teaching to convey and assess mathematical ideas, concepts and thinking at that level. A teacher is scored as 'good' in using real-life situations when real-life situations are used in at least one of the phases (introduction, presentation and assessment) of a lesson. The use of real-life examples is scored insufficient when they do not appear in all phases of the lesson.

Questions are often viewed as a method of gauging learners' prior knowledge and checking how learners are grasping the content presented. The teachers are scored on their effective

use of different questioning techniques including open and closed questions, as well as the distribution of questions during lesson presentation. The use of probing guided discovery open-ended questions throughout the lesson is scored as 'effective'

3.6 VALIDATION OF INSTRUMENTS

In order to enhance both the face and content validity of the data collection instruments three independent experts from the Department of Mathematics, Science and Technology Education at a certain South African university were asked for their opinion in that regard. These experts worked independently of each other. They scrutinized the content and format of each of the three instruments in order to establish content validity and reliability and checked whether the questions were relevant to the research questions. Furthermore they checked whether the interview schedules were likely to generate similar responses from different categories of respondents.

In order to enhance the reliability of the interview schedules, the following forms of reliability were applied equivalent form and test-retest. The interview schedule was first split into two versions (Appendix A and Appendix D) and was used twice on different occasions on the same respondent as per the guide lines of Leedy & Ormrod (2010) and Pieterson and Maree (2007). The forms of reliability were applied in the pilot stages of the study and results are discussed in the pilot study section (see 3.7).

The instruments were then, in consultation with the three experts modified and fine-tuned and used in the form as presented in this study.

3.7 PILOT STUDY

Cohen et al. (2007) argue that there are many threats to the validity of instruments and the threats can be minimized through conducting a pilot study that involves having a trial run before actual use for data collection. A pilot study was done in one school specifically to test whether the instruments could yield data that would assist in answering the research questions in the other two schools that were amongst the best performing schools.

It was found that the researcher could use the instruments with consistency. This finding is based on the fact that the pilot study yielded same results after it was administered on two different occasions to one individual.

3.8 PREPARING FOR THE MAIN STUDY

The following protocol was followed:

- Permission was sought for and granted by the Mpumalanga Education Department (Appendix J), immediately after the proposal was defended at and accepted by the University of Pretoria through its Department of Science, Mathematics and Technology Education. Schools that have performed well were identified in a certain circuit. Permission (Appendix G) was sought from these best schools and granted to conduct the study in their schools.
- The data collection instruments were validated and tested.
- Teachers were approached and they verbally agreed to participate in this study. They were given the letters of informed consent (Appendix H) and were requested to append their signatures. These letters detailed the purpose of the study, benefits, confidentiality clause and explained that participation was voluntary. The teachers were respectively given the pseudonyms of Sipho and Siphelile.
- Permission to scrutinize learners' books was sought and granted by the parents of the identified learners (Appendix I).

3.9 ADMINISTRATION OF MAIN STUDY

- After all the protocols as required by the University of Pretoria had been met, the researcher visited each one of the two participating teachers individually and discussed the whole research process.
- The two teachers were interviewed separately at their respective schools. The schools seemed the most convenient place for holding the interviews. These interviews served as a starting point of data collection.

3.9.1 First interviews

Sipho at the time of the interview was the head of department (HOD) for senior phase Mathematics and Science in the school. The interview took place in Sipho's office. It was recorded for transcription and analysis at a later stage. The interview with Sipho lasted for 40 minutes.

Siphelile is an experienced post level 1 female teacher at her primary school with Grade 7 as its exit grade. She has been teaching Mathematics for 20 years, 15 of which were at Grade 7. The interviews for Siphelile took place in the school's book room where there were no disturbances. The interview process only took 35 minutes with her and was recorded for transcription and analysis at a later stage.

3.9.2 Classroom observations

- Sipho's school is situated in a rural area and is easily accessible as the road has been recently tarred. It is a fully-fledged senior phase school that starts from Grade 7 to Grade 9 and is in the process of being upgraded to a Further Education and Training school. However the school is under-resourced as the classes had no learning and teaching support material. For example, learners did not have textbooks as Sipho was observed taking textbooks to class for the learners to share. At the end of the lesson he took the textbooks back.

  The school has three different Grade 7 classes, 7a, (41 learners), 7b (42 learners) and 7c (44 learners) with almost similar numbers of learners. Sipho was observed teaching the Grade 7a class. In total 10 lessons in a period of 10 working days were observed.
- Siphelile's school is a primary school situated in a rural area. It caters for classes from Grade R to Grade 7. The road leading to the school is gravelled but accessible. The school is well resourced as each learner is supplied with textbooks for the different learning areas. The school has only one class for Grade 7 with 72 learners. The Grade 7 class can rightly be defined as a large class. Siphelile also improvised by making charts depicting mathematics content and displayed them in the classroom. In Siphelile's case the same approach of observing 10 lessons in 10 working days was applied.
- In both cases the researcher was a non-participant observer.

3.9.3 Document analysis (using the MATH taxonomy checklist)

Three teacher-designed assessment tasks from each teacher were evaluated using the checklist to classify the items of each task. Three learner workbooks and their assessment scripts were sampled in order to check the written teachers' feedback for each learner.

3.9.4 The second interview

The aim of the second interview was to try and substantiate the data collected through the observations especially the aspect of responding to assessment. The interview took place shortly after the classroom observations were done. The interview lasted for 25 minutes with Sipho and 20 minutes with Siphelile.

3.10 DATA ANALYSIS

Data collected was analysed using the study's conceptual framework for implementing learner-centred assessment, an approach suggested by Van Aswegan & Dreyer (2004). The conceptual framework is based on three aspects namely, planning, implementing and responding to assessment. The conceptual framework was used to address and investigate the study's research questions. The data analysis was done on the basis of these seven themes:

1. Knowledge of continuous assessment - finding out teacher's knowledge of CASS and forms of assessment to be used in mathematics assessment.
2. Knowledge of assessment techniques - finding out whether teachers know and use a taxonomy for their assessment task.
3. Forms of assessment used by the teacher - finding out which forms of assessment and assessment tools are used by the teacher and the frequency of such forms of assessment.
4. Planning of assessment - finding out how teachers plan for assessment and whether they have and use documents such as annual assessment plan, complete lesson plans, and finally whether they inform the learners of LOs and ASs to be addressed and the mode of assessment will be used when assessing learners.
5. Sources of assessment tasks - finding out whether teachers designed their own assessment tasks and the sources of the tasks.
6. Learners' needs - finding out which methods of teaching that were used by the teachers.
7. Feedback to learners - finding out whether teachers give meaningful feedback to learners in classroom interaction and after assessment.

The above stated themes were investigated through the observation of lessons, interviews with the teacher and assessment task assessment. After categorising the data it was important to enhance the trustworthiness of the study. As one way of enhancing the trustworthiness of the study the findings were communicated to the teachers for their comments.

3.11 TRUSTWORTHINESS OF THE STUDY

Yin (1999) is of the opinion that, in a case study, the collection of data should be done through a variety of instruments in order to strengthen the evidence. This study followed the same trend as more than one method of data collection (observation, interviews and a checklist for document analysis) was used in this study for each case.

Furthermore Cohen et al. (2007) and Onwuegbuzie and Leech (2006) mention that doing member checks (respondent validation), triangulation of data and persistent observations are vital in enhancing the dependability of data. In an attempt to follow this view the respondents' validation of the data collected was done through giving the respondent individually a chance to comment on the preliminary findings on the data that was collected by the researcher after data was collected and analysed. Their inputs were requested as per the recommendations of Lacey and Luff (2007).

3.12 ETHICAL CONSIDERATIONS

The confidentiality of the respondents was maintained through the use of pseudonyms, the teachers were therefore allocated pseudonyms of Sipho and Siphelile respectively. The schools were also given pseudonyms.

The teachers and parents of the identified learners signed the consent forms. There was no mention of the names of the learners whose books and scripts were analysed. Moreover the participants were informed that participating in the study was voluntary and that they could voluntarily leave the project whenever they chose to do so, and without any repercussions.

The above mentioned processes are in line with ethical considerations as indicated by Schurink, Schurink and Poggenpoel (1998) which lists amongst others:

- Voluntary participation on the part of those requested to be part of the data gathering process.

- The participants would need to give their informed consent – this means that they will be informed of what the research entails and of how they can participate.
- Confidentiality and anonymity should be assured in the contract drawn up between the researcher and the participants.
- The competency of researcher should be assured, as well as the scientific soundness of project.

In sum, consent was sought from all participants and all participants were free to choose to participate or not.

CHAPTER 4
RESULTS OF THE TWO CASE STUDIES

4.1 INTRODUCTION

In this chapter the results of the analysis of data of the two teachers are presented. The data was analysed against the background of the main research questions of how knowledgeable and skilled Grade 7 mathematics teachers are in designing appropriate tasks in school mathematics. The results are presented in two cases describing each individual teacher's knowledge of and skills in designing mathematics assessment tasks in Grade 7.

4.2 CASE STUDY 1: SIPHO

In order to answer the first research question:

What knowledge and skills do Grade 7 mathematics teachers have in terms of designing mathematics assessment tasks?

The following aspects were considered:

- The teacher's knowledge of the concept of continuous assessment (CASS)
- The teacher's knowledge of assessment techniques
- The forms of assessment used by the teacher
- The teacher's planning of assessment.

4.2.1 The knowledge understanding of CASS

Sipho's responses to the questions that relate to his understanding of continuous assessment are presented in tabular form:

Questions	**Answers**
1. What is your understanding of continuous assessment?	[2] *"I think continuous assessment is assessing the learners as you teach them. It could be formal or informal. In most instances the assessment is informal as the learners get a chance to display their understanding when teaching a particular content. With formal assessment there are intervals where the learners are assessed. So continuous assessment is ongoing.* Sipho sees continuous assessment as assessing learners as you teach them, which can be formal or informal.
2. What is the main purpose of assessment?	*"It is to determine progress of the learners and getting feedback. As a teacher you must get feedback from the learners who are with you to report to the parents."* For Sipho the main purpose of assessment is to determine the progress of the learners and for the teacher to get learner feedback.

Sipho defines continuous assessment (CASS) as assessing learners on an ongoing basis which could be formal or informal. He sees continuous assessment as a means of obtaining feedback on how well his learners are doing and also for him to be able to report their progress to their parents. Sipho's assertions on CASS to a certain extent but no wholly are consistent with the documents of the Department of Education. His knowledge of CASS is therefore based on his understanding of the concept the processes that underlie it, such as obtaining learner feedback. The Department of Education (2002) defines continuous assessment as formative in nature, and that it is ongoing and that, it takes place over a long time and thus helps teachers and learners to check progress by providing meaningful feedback.

[2] The researcher has captured the main ideas conveyed by the respondents from written notes and tape recorded interviews. The oral conversation has been transformed to written text in Standard English (right hand column). Additional comment(s) relating to the question and response are given underneath.

4.2.2 The teacher's knowledge of assessment techniques

Sipho's responses to the questions on assessment techniques were as follows:

Questions	Answers
1. For how long have you been teaching Mathematics and specifically Grade 7 Mathematics?	*This is my eleventh year teaching mathematics from Grade 7 to Grade 12. However, this is my third year in Grade 7.* Sipho is an experienced secondary school mathematics teacher having taught mathematics at different grades.
2. How would you describe a good Mathematics assessment task?	*A good assessment task must address the outcome the teacher has at hand. It must address the specific skills that he or she wants the learners to achieve. Furthermore assessment should assess what was taught in class. It should be at the level of the learners. It must determine whether the learners are progressing or need assistance.* For Sipho a good or well-designed task assesses the identified outcomes of the lessons including the knowledge and skills taught. It should be at the appropriate conceptual level of the learners and should provide clear indication of whether there is progress or not and where assistance is needed by learners.
3. Which taxonomy do you use if any, and why?	*"I think on paper it is easy to say Bloom's taxonomy works best for the learners. In case of mathematics there should be at least a question where they just recall. In other words we need questions where even if the learners miss a mark they will at least get two or three of the total marks, to encourage the learners.* *But there are questions where the learners have to work out a solution and that goes with the weighting of the mark. So I wouldn't include many such questions where the learners have to give insight. You'll put 20 per cent of the easy questions, 40 of the moderate and another 40 for the questions that need the learners' insight.* Sipho does not seem to use any particular taxonomy or demonstrate knowledge of MATH taxonomy except a self-determined approach in designing tasks. For

	example, he indicated that questions should be graded according to increasing levels of difficulty suggesting a proportionate mark allocation of 20:40:40, corresponding from easy to moderate to difficult respectively.
4. May you briefly explain the criteria for the designing of your assessment tasks?	*"I take the work schedule and the assessment plan and look at what the schedule needs. I look at the different available textbooks and tasks I designed previously. I check how the content was dealt with; ask myself if the assessment standards were addressed, what type of questions I can use so that the learner may be tested on the skills and assessment standards as demanded by the work schedule.* Sipho depends on different textbooks and his previously designed tasks as sources for his assessment tasks. He is guided by the school work schedule and the corresponding assessment standards. In setting his tasks he checks whether he has dealt adequately with the required content, and the types of questions or tasks that he sets depend on the assessment standards demanded by the assessment plan or work schedule.

According to Sipho his knowledge of a good assessment task in mathematics is one that addresses the designated learning outcomes, mathematical skills and knowledge. He does not appear to have a working knowledge of any knowledge taxonomy especially of the MATH taxonomy as recommended by Smith et al. (1996) and deemed a valid tool to use in designing mathematics assessment tasks in secondary schools (Grades 7-12). However, Sipho claims that he does arrange the task items according to some intuitive levels of task difficulty. For example, what he refers to as low order questions such as recall, are at the introductory or beginning part of the task, he then distributes the 'moderate ones' (middle order) and then those that need the learner's 'insight', perhaps problem solving or thinking (high order) are posed last in that order of presentation. Sources used for setting mathematics tests or tasks items are various mathematics textbooks and previous assessment tasks used before. When the researcher perused the assessment tasks against the textbooks used by Sipho it was found

that the majority of the written mathematics tasks were lifted word for word from a recommended mathematics textbook (see 4.2.7 and 4.5 later in this chapter).

4.2.3 Forms of assessment used by the teacher

Sipho's responses to the following questions on the forms of assessment he uses were as follows:

Questions	Answers
1. What forms of assessment do you use in Grade 7? Of these, which do you use often and why?	*"I use a number of forms of assessment, such as the teacher based assessment where teacher assesses the learners using class work and home assignments. I prefer giving homework to learners so that the parents are there to check on learners and how well the parents think that their children participate in class. I often use investigation or inquiry-based teaching where the learners are given a particular concept or mathematics related idea to investigate such as drawing a family budget, but the learners tend to copy from each other. We also use tests and class work, but I don't use class work very much."* Sipho claims he uses written assignments like homework, investigations, tests and class work to assess his learners. He prefers mainly the use of homework and investigations because he wants the parents to check on the learner's progress and assist the learners. He also expects the learners to work individually to find things out independently and so he often uses inquiry or investigation based assessment.
2. Do you normally use the same type of assessment tasks throughout the year? If yes, which ones? Give reasons for your answer. If not, name the ones you've been using throughout the year and for each comment on its success or failure as an assessment technique.	*"No, I have developed a set of tasks that I will use for the whole year. For instance I used the June 2009 examination paper to prepare the learners for the September examination. I use previous question papers: for example, yesterday I gave the learners a question from the previous year's exam. One boy got the answer right thus boosting his confidence in solving problems that were not drilled in class. I use different assessment types such as the tests,*

	investigations and assignments. If you consistently use one task you sometimes deny the learners growth in their math knowledge. You also disadvantage the current learners because the contexts under which the content was delivered in the previous year might not be the same." Sipho uses various types of assessment such as tests, investigations and assignments which he strives to change on an annual basis. He sees using the same type tasks year in year out as a disadvantage as it denies learners the opportunity to grow.

From the responses, Sipho claims to use various written assessments like homework, individual investigation, tests and class work. He uses mostly the homework because he wants the parents to check the learners' progress and assist them where necessary. Most of these tasks are adapted from past Grade 7 mathematics question papers and textbooks. He claims to have a set of tasks for the whole year but the perusal of his portfolio could not confirm his claims as no question papers or tasks were found to corroborate his statement. He further claims to usually change the mathematics test items on an annual basis, because learners are different and the classroom contexts (such as number of learners) in which the learners are taught are not necessarily the same year in year out. His claim was found to be true when his assessment tasks of the first term in the previous and current years were compared (Section 4.5 that comes later in this chapter); both sets of tasks were found to be different in terms of the task items (questions) though the content assessed was similar. Sipho uses a variety of forms of assessment.

4.2.4 The teacher's planning of assessments

Sipho's responses to the following questions on the planning of assessment were as follows:

Questions	Answers
1. When do you design assessment tasks?	*"I usually come up with the design of my assessment task or the task itself as I present the topic to the learners. It is only after I am sure that the topic or content is covered that I design or plan the type of assessment to use. The planning of formal learner assessment is done after the content has been covered or presented"* Sipho designs his tasks after he has covered the content, and not before. As he presents the content he keeps in mind the assessment task he thinks would be most appropriate for providing learner feedback.
2. Do you develop tasks for Mathematics? Do you consult anyone about your tasks? If so who, if not, why?	*"Yes I do develop my math tasks. I sometimes develop tasks for Grade8 and even for the Grade9. I am developing tasks for Grade 7 now. I consult with colleagues on the aspect of developing tasks. I spoke recently to a colleague from a neighbouring school about coming together for the design of Grade 7 mathematics tasks. We agreed that for the third term he will set one set of tasks and I will set the other.* Sipho prepares his own mathematics tasks not only for Grade 7 but Grades 8 and 9 as well. Some of the tasks are to be developed in collaboration with another colleague in a neighbouring school. Sipho collaborates with others.
3. As a teacher who has been teaching the learning area for some time; how regularly do you change your assessment tasks? Please give reasons for your answer.	*"I think not often, but usually I take the tasks and remove the part of the content that is not in the current year's work schedule. The Department of Education changes the work schedule on an annual basis; you might find that the content you dealt with in January the previous year is now placed in April. For example the previous year we started with numbers and their factors but this year we started with decimals. A previous task can be good for revision. Our learners*

	are unique, some are more intelligent while others are obviously not; you cannot teach and assess them in the same way. I cannot look at the content to be taught and finalize a task. You might find that the task was a bit difficult or too easy and that becomes a problem. Sipho changes his assessment tasks often according to the demands of the work schedule for that year. He suggests that he uses the previous tasks to revise content that is covered. Furthermore his tasks are not predesigned but are developed as he presents the lesson as prior development of assessment tasks may yield tasks that are too easy or too difficult for the learners.

Sipho presents the content to the learners before deciding on what type of assessment task or procedure he would use to formally assess performance. As he presents the maths lesson he tries to assure that he has dealt with the content effectively by addressing repeatedly any questions or issues the learners may have. He mentions that designing the assessment tasks prior to content presentation often creates problems in terms of the level difficulty of those tasks. To design a task before content delivery, he argues, could result or often results in the learners finding the task either too easy or too difficult. He mentions he collaborates with a teacher from a neighbouring school in developing Grade 7 mathematics tasks. His assessment tasks derived mainly from past examination question papers are reviewed and changed from time to time. He generally removes items that are not covered in the assessment schedule.

In summary, Sipho was found to have deficient knowledge of CASS or the MATH taxonomy. However, he uses various forms of assessment tasks which are mainly derived from the mathematics textbooks. He appeared not to be planning effectively for his assessment. Sipho's responses to the second research question are now given.

4.2.5 The second research question

How do the teachers design different mathematics assessment tasks for Grade 7 learners, and give feedback to the learners after their completion of the assessment tasks?

To answer the question the following aspects were considered:

- The teacher's sources of assessment tasks
- Meeting the needs of the learners
- Feedback to the learners.

4.2.6 The teacher's sources of assessment tasks

Sipho's response to the following question on the teacher's sources of the assessment task was as follows:

Question	Answer
1. What are your sources of the assessment tasks that you use in Mathematics?	*"I use a number of sources, a number of recommended and not recommended textbooks. For example I use Mathematics Today, Classroom Mathematics and Successful Oxford Mathematics, I also go to the internet and look for information"* Sipho uses different Grade 7 mathematics textbooks as sources of assessment tasks. He also uses the internet to look for information for mathematics assessment.

Sipho relies largely on different mathematics textbooks at his disposal as sources of the assessment tasks he uses as well as the internet.

4.2.7 Meeting the needs of the learners

Sipho's response to the question on the needs of the learners was as follows:

Question	Answer
1. How do you identify and cater for the needs of the different learners in your assessment tasks?	*"While preparing the assessment tasks I have a picture of my class in mind. And my mathematics tasks aim to address the needs of different groups; those who are average, those who are doing well and very well, those who are below average and those who are continually getting poor grades. All of them must be able to get a pass mark.* Sipho claims that he thinks about his class and plans for a task that is going to cover the different levels of conceptual needs of his learners.

Sipho feels that he caters for the needs of the learners by always thinking of his class when designing the assessment tasks. He mentions that he tries to assure that, in designing or setting his Grade 7 mathematics assessment tasks, he pays attention to adequate differentiating according to learners' abilities so that those who are doing well and those learners who are average and those below average are equally encouraged to at least achieve a pass mark or distinction to match their own capabilities. However, his claims were found to be contrary to his actions when class observations were done (Section 4.4 later in this chapter).

4.2.8 Feedback to the learners

Sipho's responses to the questions on feedback to the learners were as follows:

Questions	Answers
1. What procedures do you follow after administering each assessment task to your learners?	*"I collect the scripts and check whether all the learners have submitted. If for example only 80% of the class were present for the test I arrange to give a second chance to the remaining 20% who were not available for one reason or the other to undertake the task. I mark all the scripts. After marking I analyse the results and check how they fared in all sections of the tasks the easier sections and the more difficult ones. I then do remedial work to correct the areas where the learners have performed poorly.* Sipho tries to ensure that all the learners in his class have a chance to do and submit their assigned work. Those absent or late in submitting the work are given a second chance. The submitted work is marked and the results analysed with a view to identifying sections of the tasks that prove difficult to the learners for remediation purposes.
2. How would you define a task on which the learners have performed well or underperformed? Explain.	*"We rely on figures when we evaluate content. If 15% of the learners have passed then it's my duty as a teacher to give the learners a second chance. We have set a benchmark of 80% of the learners as a performance target for our mathematics department in all the tasks. If only 50% of the learners pass, then I*

	have underperformed. At times figures often mislead. If the task demands that the learners display skill to interpret, describe and analyse, and it is found that the learners were unable to display those skills, then in such a task they did not perform well." Pre-determined benchmarks as percentages are used to assess whether learners have performed satisfactorily or underperformed. But Sipho claims he does not rely on the percentage pass rate alone; he also considers whether the skills demanded by the task have been mastered or not. If the learners fail to display such competence the learners are deemed to have underperformed in that task.
3. When and how do you provide learners with feedback on each of their assessment tasks?	*"For continuous assessment like classroom questions immediate feedback is given. If I recognise that there's a challenge in grasping the content, I give feedback immediately in order to rectify the learners' mistakes. For formal written tasks such as scheduled tests and assignments, it's after they have written and I have marked that I give feedback – within 5 days of doing the task, which includes remedial work and corrections. Our assessment policy dictates that feedback to the learners must be provided not later than five to six days after the task has been done."* Sipho provides immediate feedback to the learners during classroom question and answer sessions essentially to correct them. For formal tasks involving tests and assignments, feedback is provided after marking. The feedback includes remedial work and corrections. He adheres to the school's policy which stipulates that teachers must give feedback within 5 days of writing the task.

Sipho provides feedback to his learners. But before learners are given feedback he tries to assure that all the learners would have done the assignment, which includes giving any absentees a second chance. He follows the next step which is to mark and analyse the scores and answer scripts before deciding on what steps to take for remediation. He also indicated that relying on the scores only, could be deceptive as learners' scores do not always reflect

conceptual understanding. The analysis of Sipho's assessment documents revealed that he did the opposite of what he claimed to do (See section 4.5 that appears later in this chapter).

4.3 CLASSROOM OBSERVATIONS FOR SIPHO

To triangulate the data collected on the two interviews, lesson observations were done focusing on the aspects listed in Table 4.1. During classroom observation sessions the focus was on these two aspects:

1. **Planning assessment:** Data collected involved checking whether the teacher had actual lesson plans for the lessons to be presented. It was also checked whether the teacher communicated to the learners at the start of lesson about the learning outcomes (LOs) and assessment standards (ASs) to be addressed and the mode of assessment to the learners.
2. I**mplementation of assessment:** Data was collected based on whether the teacher provided learning opportunities to learners, and the frequency of use of real-life situations in lesson presentation as per the conceptual framework of the study.

Table 4.1 Lesson observation of one of Sipho's lesson presentations

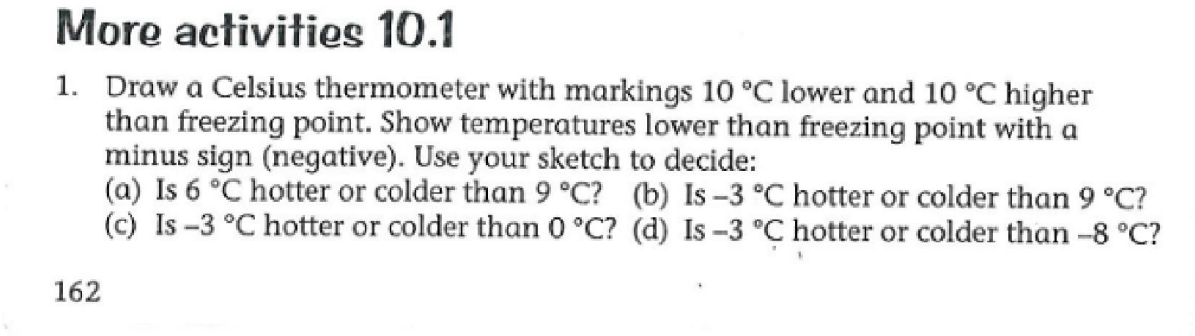
Teacher's name: Sipho Number of learners: 42
Content focus (Learning Outcomes & Assessment Standards): Integers LO1 AS1 AND 3

Aspect of assessment	CRITERIA	OBSERVATION	OBSERVER'S REFLECTION
PLANNING OF ASSESSMENT	Availability of lesson plans	No lesson plan was available especially for the lesson observed. Sipho used a piece of paper that he constantly looked at while teaching.	Sipho had no prepared lesson plans for this particular lesson.
	The use of baseline assessment	Sipho did not use any baseline assessment strategy in introducing the lesson. Instead he began by explaining what integers are; *Integers are the entire negative (-) and positive (+) numbers including zero.*	Sipho did not tap into the learners' prior knowledge of integers to prepare the learners for the lesson he only explained what integers are.
	Communication of LOs	Sipho communicated the LO's and	Sipho communicated the

	and AS to the learners	AS's to the learners. This he did by indicating at the beginning of the lesson the content to be covered; notably the comparing of integers. As his presentation went on the following was observed: He drew a number line starting from zero to 4 and then asked the learners; *what is the biggest number on the number line?* A learner responded *it is 4*. Sipho asked mostly questions about comparing integers. For example, *what is the smallest number on the number line?* A learner responded; *it is zero Sir.* He wrote on the board *4____ 2* and asked; *which relationship sign wills make the statement true?* To which a learner responded: *greater than (›).* Sipho then drew a number line of integers and explained that *integers increase to the right hand side and decrease to the left hand side.*	LO's and AS's to the learners, he indicated the content to be covered. When checking the content against the Revised National Curriculum Statement document it was found that the content was on LO1 AS3 for Grade 7.
	Communication of mode of assessment	Sipho announced at the beginning of the lesson that written class tests on integers and some of the work that had been covered earlier on, would be given the following week.	Sipho informed his class how he will assess them and announced the date of assessment.
IMPLEMENTING ASSESSMENT	Provision of learning opportunities.	As was noted earlier ("Communication of LOs and AS to the learners section") Sipho began the teaching of integers by revising the number line of whole numbers (*learners had to compare integers on a number line*). As he continued with the lesson; he seemed to focus	Not all learners had the opportunity to interact with the content in their own way. Sipho used the question and answer teaching strategy but his questioning technique was deficient and ineffective

		on learners who raised their hands to give answers. Those who didn't appeared to be ignored by Sipho. Therefore Sipho appeared not to be giving the learners enough opportunities to interact with the content.	because they were mostly closed and recall questions. His distribution of questions lacked focus and he concentrated attention largely on learners who answered his questions. His failure to engage more of the learners through his questioning technique left a lot to be desired. The MATH taxonomy document guideline calls for provision of opportunities for fruitful engagement with learners with the possibility of developing teacher knowledge of learners' learning difficulties and preconceptions if any.
	The use of real life situations	The use of real-life events is said to assist learning as the content is put into contexts with which learners are familiar. Familiarity elicits higher order thinking In this lesson on integers Sipho used a graded thermometer (in centigrades) to demonstrate how the measurement of the temperature of cold and hot water, familiar daily life activity, could be used to compare the integers, represented by the temperature. He used the thermometer markings to highlight the similarities, between the arrangement of integers on the thermometer and those on the	Sipho confined the use of integers to cold and hot water temperatures. It could be argued that one real-life example may not be viewed as sufficient for reinforcing learners' conceptual understanding and grasp of content.

		number line. The main similarity was that positive numbers are on the right side of zero and negative numbers on the left in both the thermometer and integer number line.	
RESPONDING TO ASSESSMENT	Are learners asked questions throughout the lesson?	Sipho asked mostly closed questions intermittently in his lesson and used the 'chalk and talk' method most of the time. The learners listened passively and wrote down notes Limited closed recall questions denies not only the learners an opportunity to demonstrate their understanding of the content but the teacher as well in discovering what learners know, how well they are following the teaching and how they think or reason about the topic.	Sipho did not use questions throughout the lesson Questions which were largely closed questions were asked at the end of the lesson. His questioning technique was essentially summative as opposed to formative in the course of presenting the lesson. His technique also rendered the learners as mostly passive listeners.
	Are tasks relevant to the content given to the learners after the presentation?	A task on the comparing of integers was given as homework. This task however did not reflect Sipho's skill on task design as it was taken straight from a textbook (ref. Figure 4.1) below.	A relevant task involving comparing of integers where the learners had to answer questions on a weather report sourced from a textbook was given.



More activities 10.1

1. Draw a Celsius thermometer with markings 10 °C lower and 10 °C higher than freezing point. Show temperatures lower than freezing point with a minus sign (negative). Use your sketch to decide:
   (a) Is 6 °C hotter or colder than 9 °C? (b) Is –3 °C hotter or colder than 9 °C?
   (c) Is –3 °C hotter or colder than 0 °C? (d) Is –3 °C hotter or colder than –8 °C?

162

Figure 4.1 ***Sipho's homework on integers***

To summarise, the classroom lesson observations were used to substantiate the data collected through the interviews. In the interviews Sipho claimed to design or assign tasks after the content had been covered, and not before. But in the lesson(s) observed the learners' mathematics assessment tasks he used were relevant though sourced from a textbook. During his teaching no attempt was made whether at the beginning, middle or end of the lesson to use learners' prior knowledge to facilitate learning. His questioning technique was not effective enough to determine how well the learners were coping with the content.

4.4 DOCUMENT ANALYSIS OF SIPHO'S LESSON PLANS AND WRITTEN ASSESSMENT TASKS.

A document analysis of Sipho's lesson plans and three assessment tasks was undertaken to further triangulate the data from teacher interviews and lesson observations regarding the planning and implementation of assessment. The purpose of the analysis was to check whether the identified LOs and ASs from the prescribed work schedule were indicated in Sipho's lesson plans and whether his assessment task items addressed the identified LOs and ASs.

4.4.1 Planning of assessment (lesson plans)

In this study the lesson plans were checked to see whether they followed a particular format, consisting of the topic, the Grade, the date, the LOs and ASs to be addressed, teacher and learner activities and their logical sequence of both presentation and the assessment procedure. The lesson plans are a good indicator for assessing whether the teacher has a plan for learner assessment.

After carefully perusing Sipho's file it was found that six of the ten lesson plans (60%), had many aspects of a lesson plan left out, such as the LOs and ASs that are key to appropriate assessment. For example the lesson plan on geometric figures (Appendix K). Sipho indicated in the interviews that a task "*must address the outcome the teacher has at hand" (4.2.2)* meaning that he would first identify the LOs and ASs to be addressed before teaching and assessing. However the 60 per cent incomplete lesson plans cast some doubt on Sipho's consistency when planning all his lessons for learner assessment.

4.4.2 Planning of assessment (assessment tasks)

Sipho's three tasks, two tests and one assignment were evaluated using MATH taxonomy, (Table 4.2). The first task, an assignment, assessed the learners on converting common fractions to decimals, and the addition and subtraction of common and mixed fractions. The second task was a test which assessed learners on integers, factors and multiples of numbers and percentages. The third and last task assessed mathematics content on profit and loss, percentage and percentage increase and decrease.

The results showed that Question 1 of the first two tasks required essentially factual knowledge for the correct answer; a low order question of Category A. Question 2 in all the tasks demanded routine procedures, such as the addition and subtraction of mixed fractions, still a low order question of Category A. The results of the analysis using the MATH taxonomy (Table 4.2) showed that Sipho's assessment tasks in Grade 7 mathematics were mainly Category A (low order). Therefore the tasks did not assess a range of skills and knowledge as per the MATH taxonomy.

Table 4.2: MATH taxonomy checklist for Sipho

CATEGORY	TASK / MATH	**Sipho's 1st task Assignment (on common fractions) (Appendix L)**	**Sipho's 2nd task Test (on integers) (Appendix M)**	**Sipho's 3rd task Test on profit/ loss percent and increasing or decreasing percent (Appendix N)**
A	**Factual knowledge**	*Question 1* *Convert fraction to decimal fractions* *(a) ½= _____* *(b) $^{2}/_{5}$= _____* *(c) $^{7}/_{8}$= _____* *(d) $^{17}/_{25}$= _____*	*Question 1* *1.use your calculator to get a correct answer* *(a) $^{3}/_{7} + ^{2}/_{7}$* *(b) $^{4}/_{5} - ^{1}/_{3}$* *(c) -5-3= ____* *(d) 7-9= _____* *2.Which of the following 36, 18,6, 3 and 8*	

			(a) Are factors of 12? *(b) Is a multiple of 12?*	
	Comprehension			
	Routine procedures	*Question 2* *Simplify* *(a)* $2^1/_4+1^1/_2$ *(b)* $3^1/_3-2^3/_4$ *(c)* $2^1/_2-5^1/_3+1^1/_4$	*Question 2* *Calculate* *(a)6% of 1500* *(b)30% of 4,720km*	*Question 2* *Increase the given quantity by the percentage shown in brackets* *(a) 320(5%)* *Increase the given quantity by the percentage shown in brackets.* *(b) 825 (4%)*
B	**Information transfer**			*Question 1* *(a) "Joyce bought a dress for R7.50. She bought some buttons for 90c, altered the dress a little and sold it for R8.82c. calculate her percent profit."* *(b) A factory which produced 8 250 000m of cloth in a year reduced its output the following year by 8%. How much cloth was produced?*
	Application to new situation			
C	**Justifying and interpreting**			

	Implication, conjectures and comparison			
	Evaluation			

In an effort to establish the sources of the written assignments in mathematics the mathematics textbooks he uses were perused. Sipho's mathematics task items were exactly the same as the exercises in the textbook; only three items in 1 of Sipho's 3 assessment tasks that were evaluated were from a previous question paper. This revelation once again confirmed that Sipho relied heavily on the textbooks for designing or recommending exercises to be done in class or as homework his mathematics assessment tasks. The tasks are however characterised by Category A (factual knowledge and routine procedures) and/ or B (information transfer) of the math taxonomy framework. In none of the tasks or assignments was there a Category C item, which requires justifying and interpreting, implication, conjectures, comparison and evaluation. Sipho can be rated inadequate in planning for learner assessment and lacking the skills for designing Grade 7 mathematics assessment tasks.

4.4.3 Document analysis (learners' books for assessment tasks)

To further analyse Sipho's documents, such as the learners' workbooks and teacher assessment portfolio Category D of learner-centred assessment framework (Table 4.4) was used. This framework focused on the availability of documents such as assessment plans as one way of planning for learner assessment, checking whether Sipho analysed learners' scores and gave written feedback on the learners' scripts or books. Furthermore Category D was used to substantiate the data collected through the interviews.

Table 4.3: Category D checklist: learner centred assessment framework

D	**Availability of annual assessment plan (planning of assessment)**	Annual assessment plan is available and guided the teacher's assessment; a work schedule is used to guide the planning of lessons by Sipho.
	Assessment addresses real-life situation	Only one task addressed real-life situation e.g. buying and selling. The other two did not address real-life situations.
	Analysis of learners marks (responding to assessment)	Sipho records the learners' marks but he does not analyse the learners' marks.
	Is there any teacher written feedback on learners' books or scripts?	There were no teacher written comments, on learners' books that serve as corrective feedback from Sipho.

Further perusal of Sipho's documents (learners' workbooks and teacher assessment portfolio) revealed that he had an annual assessment plan that he followed in assessing his Grade 7 learners. The observation is in line with his claims in the interviews that "*I take the work schedule and the assessment plan and look at what the schedule needs.* Sipho followed the annual assessment programme as the dates of his task correlated with those on the programme. Furthermore the number of mathematics tasks administered to learners by Sipho at the time of this study, correlated well with the number of tasks prescribed by the annual assessment programme. Sipho also had teacher designed mathematics tasks from previous years in his portfolio. However the focus was on the three tasks evaluated at that particular time. Of the three assessment tasks that were analysed only one question seemed to address real-life situation. As a result the quality of the tasks that were designed by Sipho can be graded as poor. The conceptual framework of this study requires that teachers analyse learners' scores in order to give feedback. Sipho claimed in the interviews that "*After marking I analyse the results and check how they fared in all sections of the tasks the easier sections and the more difficult ones. I will then do remedial work to correct the areas where the learners have performed poorly*" (Section 4.2.9). His assertions were found to be contrary to what he really was doing when his lesson presentations were observed and his mark schedule. His mark schedule (Appendix O), had no summative information of the class' performance that indicates the number of learners who passed, the percentage pass, the class

average, the number of learners who failed and the percentage failure rate. The learners' workbooks were also without written feedback from Sipho. It can be concluded that Sipho did not use learners' scores to make informed inferences for meaningful feedback.

To summarise Sipho's case, the results show that the tasks Sipho designed or assigned to learners did not reflect any cognitive balance in terms of the demands of the MATH taxonomy. It also demonstrated that he had no knowledge of the taxonomy at all. Sipho relied on textbooks for sourcing items for his assessment tasks. Sipho's knowledge and skills for designing mathematics assessment tasks are viewed as inadequate.
However Sipho knew the forms of assessment and used them in assessing learners his learners in Grade 7 mathematics learners.

4.5 CASE STUDY 2: SIPHELILE

The same methods of collecting data used in Sipho's case were used in Siphelile's case: interviews, classroom observations and document analysis. The data collected is presented in the order mentioned.
The interview sought answers to the research question:
What knowledge and skills do Grade 7 mathematics teachers have in terms of designing mathematics assessment tasks?
The following aspects were considered in a quest to find answers:

- The teacher's knowledge of the concept of continuous assessment (CASS)
- The teacher's knowledge of assessment techniques
- The forms of assessment used by the teacher
- The teacher's planning of assessment

4.5.1 The teacher's understanding of CASS

Siphelile's responses to the questions that relate to her understanding of continuous assessment are presented below in tabular form:

Questions	**Answers**
1. What is your understanding of continuous assessment?	*"Continuous assessment is based on assessing the learners informally or formally. When I assess the learners informally I give them class work and homework. Then when assessing the learners formally I give them tests, assignments and projects."* Siphelile states that continuous assessment is about assessing the learners formally and informally. She uses tests, assignments and projects as formal assessment while class work and homework are used as informal assessment.
2. What is the main purpose of assessment?	*"In order to check the progress of the learners."* For Siphelile, the main purpose of assessment is to check the learners' progress as a class.

Siphelile mentions that continuous assessment is based on assessing the learners formally and informally which is contrary to the definition of continuous assessment as per the official documents of the Department of Education (DoE, 2002, p93), which defines continuous assessment as a "continuous, planned process of gathering information about the performance of learners measured against the assessment standards of the learning outcomes." Obviously her concept of CASS is deficient for classroom practice. In her informal learner assessment she uses class work and homework, while tests, assignments and projects are used for formal assessment. According to Siphelile the main purpose of assessment is to check the progress of learners.

4.5.2 Teacher's knowledge of assessment techniques:

Siphelile's responses to the following questions on her knowledge of assessment techniques were as follows

Questions	**Answers**
1. For how long have you been teaching mathematics and Grade7 mathematics specifically?	*"I think it is 20 years since I started teaching mathematics and I have been teaching Grade 7 mathematics I think for 15 years."* Siphelile is an experienced Grade 7 mathematics teacher of about 15 years standing.
2. How would you describe a good assessment task? In other words does that task meet the purpose of math assessment at that level (Grade7)	*"An assessment task is good when it accommodates the needs of all the learners. In our classes we have different learners graded according to their abilities. It needs to cover the levels of all the learners. The task also needs to meet the requirements according to the assessment guidelines for mathematics that we use. So it's good, if a task is standardised."* A good task according to Siphelile must cater for different ability levels of learners and ought to meet the requirements of the policy on assessment which is assessment guidelines for mathematics. The requirements involve amongst other criteria, that assessment should be appropriate for the age and grade of the learners and provide an opportunity for learners to demonstrate their acquired competencies.
3. Which taxonomy do you use if any, and why?	*"In my tasks, I start with the simple questions, and I usually put the difficult or challenging questions at the end of the task. The reason is because if you can start with the challenging questions, it makes the learners waste time doing the same problem. If and when they come to the easy question you find that their minds are tired. They no longer write or do not finish."* Siphelile does not know about the MATH taxonomy and does not use it. So she lacks knowledge of what a taxonomy means. Her taxonomy as it were is based on what she thinks it is, namely, setting questions beginning with the simple to the more complex or

	difficult task. Her reasoning is that learners fail to finish the tasks within the prescribed time, if she begins with the more difficult questions, so taxonomy according to her is a progression from simple to more difficult.
4. May you briefly explain the criteria for the designing of assessment tasks?	*"I use the mathematics RNCS policy document to check whether my task is in line with the assessment standards as reflected in the work schedule, the level of difficulty of the task, then I check how I would allocate marks.* Siphelile uses the mathematics policy document and the work schedule to check content standards, level of difficulty and allocation of marks. In other words the criteria used are not self-developed rather they are policy based.

Siphelile has no knowledge of the MATH taxonomy or any other similar classification. However she did mention that, in setting her questions or mathematics tasks, she starts with the less difficult ones and moves progressively to more difficult ones to ensure that learners' interests are maintained in trying to solve the tasks. This assessment technique is used because she has noted that starting with difficult questions made the learners lose interest and spend much of the time trying unsuccessfully to answer the questions. She makes use of the national policy document in selecting and assigning or designing her maths assessment formal tasks. The document provides guidelines on assessment in the senior phase mathematics. However document analysis using the MATH taxonomy revealed that she her tasks in general were within the range of low order questions (Section 4.10 later in this chapter).

4.5.3 Forms of assessment tasks by the teacher

Siphelile's responses to the following questions on the forms of assessment were as follows:

Question	**Answer**
1. What forms of assessment do you use in Grade 7? Which of these do you use often and why?	*"I use tests, assignments and investigations. The reason for using tests is in order to test their knowledge; the assignments are for research skills."* Siphelile uses different forms of assessment to test for learners' knowledge and inquiry skills. She does not elaborate on what is meant by research skills. Presumably for homework assignments she focuses on enquiry based assessment.
2. Have you generally been used to using the same type of assessment tasks throughout the year? If yes, which one, and give reasons for your answer. If not, name the ones you have been using throughout, and for each give a comment on its success or failure as an assessment technique.	*"We are given the work schedule and assessment programmes which indicate the assessment tasks regarding, when they are going to be written and what form of assessment we are going to use. So I usually give tests, investigations, projects and assignments. I've noticed that with assignments learners do not perform very well. If I give them work to do at home, they don't write it themselves. The best assessment is the test because they write it in the classroom. In assignments and homework they perform very, very, poorly."* Siphelile's school work schedule provides for a variety of forms of assessment including tests, investigation, projects, homework and assignments. She prefers using the test as learners do it in class compared to the assignments and homework which the learners sometimes fail to do at home.

Siphelile uses written tests focusing on learners' content knowledge. These tests ensure that all the learners would have taken part in the assessment. Assignments and homework that are meant to assess learners' enquiry skills do not generally produce the anticipated performance and benefit. Siphelile uses the annual assessment programme that is designed and provided for by the provincial Department of Education's documents to check the dates of assessment

and the forms of assessment to use. Her assertions were confirmed when the researcher analysed Siphelile's documents (see section 4.10 later in this chapter).

4.5.4 The teacher's planning of assessment

Siphelile's responses to the following questions on planning assessment were as follows:

Question	Answer
1. When do you design assessment tasks?	*"I design my formal or scheduled assessment tasks after I have done the informal assessment in the classroom such as classroom questioning, class work and homework to monitor the learners' progress."* Siphelile designs her tasks after she would have gained some insight into the progress or otherwise made by the learners on the content presented.
2. Do you develop tasks for mathematics? Do you consult anyone about your tasks? If so who, if not why?	*"Yes, I do develop tasks for my learners. However if there's something that I don't understand like probability and sampling I consult my senior teacher because he is the one who moderates my work. Some of the things are linked to Grade 8; I go to the Grade 8 teacher to assist me in the design of the tasks.* Siphelile designs the mathematics assessment tasks herself but at times she consults her colleagues, namely the senior teacher and the Grade 8 teacher for assistance.
3. As a teacher who has been teaching the learning area for some time, how regularly do you change your assessment tasks? Please give reasons for your answer.	*"I usually design a new task every year for the content I have covered. I even change the lesson plans, I don't use the previous year's lesson plan. When designing the task I also consider the intelligence quotient (IQ) of the learners. As learners in different grades should be assessed in a progressive manner. A task for Grade 6 is not the same as Grade 7's; at Grade 6 the questions may be simpler but more complex in Grade 7.* She changes the assessment tasks on an annual basis as she takes the learners intelligence quotient (IQ) and the grade into consideration.

Siphelile designs her tasks after she would have gained some insight into the progress or otherwise made by the learners on the content presented. She also confers with her senior teacher to have her tasks moderated. She designs new assessment tasks every year while taking into account the learner's development level.

In summary Siphelile, just like Sipho, was found to have an inadequate knowledge of CASS or the MATH taxonomy. She uses different assessment forms.

4.5.5 The second research question

How do the teachers design different mathematics assessment tasks for Grade 7 learners, and give feedback to the learners after their completion of the assessment tasks?

To answer the second research question the following aspects were considered:

- Sources of assessment tasks
- Meeting the needs of the learners
- Feedback to the learners.

4.5.6 The teacher's sources of assessment tasks

Siphelile's response to the following question on the sources of assessment tasks was as follows:

Question	Answer
1. What are your sources for the assessment tasks that you use in mathematics?	*"I'm using different textbooks, because at our school we don't have access to the internet. If we had I could go into the internet to supplement my tasks. Sometimes I use the Grade 8 textbook for the Grade 7's assessment tasks."* Owing to lack of technological infrastructure Siphelile relies on the mathematics textbooks as the main source for designing her assessment task She sometimes uses the Grade 8 textbook for her learners. None of the tasks are self-developed or designed.

Siphelile's main sources of assessment task items are the mathematics textbooks for Grades 7 as well as Grade 8. She does not develop any of the tasks herself. She has no access to the internet.

4.5.7 The needs of the learners

Siphelile's responses to the following question on the needs of the learners were as follows:

Question	Answer
1. How do you identify and cater for the different needs of the learners in your assessment tasks?	*"I set the questions in such a way that I make sure all the learners understand the questions: in other words the questions as worded are unambiguous. You may find that the question is too vague for the learners to understand. The question must be clear to each and every learner. The wording is very important for the learners' understanding."* Siphelile caters for the different needs of learners by ensuring that the questions are correctly worded; pitched at a level the learners will understand and are unambiguous.

Siphelile claims she uses assessment strategies that take into account the literacy level of her learners in setting her mathematics questions. To this end she takes particular care about clarity of expression in setting her questions using words that are accessible to her learners.

4.5.8 Feedback to the learners

Siphelile's responses to the following questions on feedback to the learners were as follows:

Questions	**Answers**
1. How often are your assessment tasks evaluated by your head of department?	*"Every time I design a task I give it to my HOD for quality control to see whether the task is standardised or not. He also checks the mark allocation for each question."* Siphelile's HOD regularly, as a matter of policy, reviews every mathematics assessment task of hers for Grade level suitability and appropriate scoring or mark allocation.
2. What happens after the evaluation process?	*"I give the learners the task; I mark and take 10% of the marked scripts to the HOD for moderation. Thereafter I do the recording of marks after which I give the scripts back to the learners and we do the corrections together."* Siphelile records the learners' marks; hands back their scripts and do corrections with the learners.
3. How would you assess a task on which the learners have either performed well or underperformed?	*"It's the number of learners who score well that determines whether the learners have performed well or not. I have a class of 55 learners; if 20% of the learners pass it indicates that the learners did not perform satisfactorily. If 50 % of the learners in the class pass the assessment task and achieve 50% and above, I generally think that the learners have performed well. If only 10 % of the learners managed to pass, then I can see that there is something wrong with my task because it does not meet the needs of the learners."* For Siphelile good performance is indicated when 50% of the class achieves an average of 50% and above on the task. While if 20% of the class pass it is

	regarded as underperformance.
4. When and how do you provide learners with feedback on each of their assessment tasks?	*"Immediately after marking I take the scripts to the learners where we do the corrections so that they can see where they made their mistakes or lacked knowledge. If I feel that they did not do well I set another task on the same content for the learners to improve their marks and reinforcement of the content assessed"* Siphelile gives feedback in the form of corrections immediately after marking. She mentions that if learners did not do well on a task, she designs another task based on the same content for possible improvement of marks and reinforcement of the content.

After marking the tasks Siphelile takes 10% of the scripts for moderation by the head of department (HOD) before recording the scores of the learners. She identifies the learners' mistakes and does corrections. Performance according to Siphelile is measured in terms of numbers; she regards a 20% pass rate as underperformance and 50% as a good performance for her pupils, which is actually generally considered as a fairly average standard of performance. When she feels that the learners performed poorly she designs another task based on the same content for improvement on scores and reinforcement.

In summary, Siphelile relies heavily on the textbook as source material for setting her assessment tasks. She chooses her words are carefully in setting questions to cater for the literacy needs of her learners. She constantly gives feedback to her learners and sometimes gives them a second chance to re-do a task.

4.6 CLASSROOM OBSERVATIONS FOR SIPHELILE

To triangulate the data collected on the two interviews lesson observations were done focusing on the aspects listed in Table 4.4.

Two aspects of classroom observation, namely planning and implementation of assessment were focused on during the observation sessions.

1. **Planning assessment:** Data was collected on planning for assessment by checking whether the teacher had actual lesson plans for the lessons presented. It was also checked whether the teacher communicated to the learners at the start of the lesson about the learning outcomes (LOs) and assessment standards (ASs) to be addressed and the mode of assessment.
2. I**mplementation of assessment:** Data based on the provision of learning opportunities to learners and the use of real life situations in lesson presentation as per the conceptual frame work of the study was collected.

Table 4.4: Observation schedule for Siphelile

Teacher's name: Siphelile Grade 7 Number of learners: 72
Content focus (Learning Outcome & Assessment Standards): Calculating time, speed and distance (LO4 AS1)

ASPECT OF ASSESSMENT	CRITERIA	OBSERVATION	OBSERVER'S REFLECTION
PLANNING ASSESSMENT	Availability of lesson plans	Lesson plans were available and were brought to class. In the lesson plan learning outcomes (LOs), assessment standards (ASs), the content integration with other learning areas, the context of the lesson, the content to be taught, the teacher and learner activities, the forms of assessment, the resources, the skills knowledge, values and attitudes to be learned, the expanded opportunities and the teacher's reflection were indicated.	Siphelile brought up-to-date lesson plans to class. Her lesson plans indicated all the aspects listed in the lesson template. She also brought a lesson plan to class for her observed lessons.

	The use of baseline assessment for introducing the lesson	Siphelile used the recently held circuit athletics as an introduction to the lesson. One of the questions she asked was; *what was the time recorded by Thato*[3] *when he won the 100 metre race at the stadium?* She built on the responses of the learners to teach her lesson on mathematical equations or formulas for calculating speed, distance and time. She asked: *"What was Thato's speed when he won the race?"* One learner answered*: "It was 20 seconds.* Siphelile asked the learners: *"Are the units correct?"* Another learner answered: "*No Ma'am."* Siphelile further asked: "*Why is it not correct?"* The same learner answered: "*Because seconds are the units of time."* Siphelile said: *"Very good, then what are the correct units?"* The learners kept quiet and Siphelile told the class: *The correct units are meters per second (m/s).* She further explained that *"speed is the rate at which distance is covered."*	Siphelile used baseline assessment which was the circuit athletic meeting, involving time, distance and speed. Learners gave answers to questions which were a combination of open- ended and closed questions. For example a closed question used was "W*hat was the time recorded by Thato when he won the 100 metre race at the stadium?* An open-ended question was: *"How much time do you think it will it take to reach Hazyview*?"
	Communication of LOs and ASs to the learners	Siphelile communicated the LOs and ASs to the learners as she	Telling the learners what they should know by the

[3] Thato is a Grade 6 learner at the school and was the 100 m race champion in the under 12 category in the circuit athletics event held in 2011.

		alerted the learners as to what they must know by the end of the lesson (calculating speed). Siphelile explained to the class: *"If you want to calculate speed you should know or be given the distance and the time."* She then wrote Speed= $^{\text{Distance}}/_{\text{time}}$ on the board. She used the following problem as an example and emphasised that the units should be indicated at all times. *A bus leaves Pretoria which is 350 km from Nelspruit. The trip takes 3 hours. Calculate the speed.* *Speed*= $^{\text{Distance}}/_{\text{time}}$ = $^{350\text{km}}/_{3\text{h}}$ =*116.7 km/h*	end of the lesson is as good as telling the learners about the LOs and ASs to be addressed. The LO and AS were indicated in the lesson plan as LO4 AS1 which the researcher verified in RNCS Mathematics document and found to be consistent with the content.
	Communication of mode of assessment	Siphelile indicated to the learners as she presented the lesson that she would give class work that consisted of exercises from a textbook and homework at the end of the lesson. The homework as well as the class work was sourced from a textbook.	The mode of assessment was communicated by telling the learners that she would use class work and homework to assess them on that day. She also announced when she was going to give a formal task.
IMPLEMENTING ASSESSMENT	Provision of learning opportunities	Siphelile divided her class into groups of seven before presenting the lesson. In essence she used a cooperative learning structure/ organisation. The learners who appeared to cope well with the content were selected as group leaders when she gave group activities. After she presented the	Learners were given an opportunity in terms of quality time to work on their task. Some of the groups struggled to calculate time and distance as the formulas of calculating them were not given. However, with the

		lesson she gave each group a different problem based on the content taught, and then to report on it to the class during the post activity discussion session. One group was given the following problem to solve: *A lorry travels for 20 km in 2 hour. Calculate the speed of the lorry.* And another group was given the following problem: *How much time will it take a bus that travels from Nelspruit at 50 km/h to reach Hazyview that is 180 km from our school?* The learners worked in cooperative groups guided by their teacher.	guidance of the teachers the learners managed to eventually do the exercises given to their groups. The learners were allowed to make a presentation to the class as to how they completed the exercises.
	The use of real-life situations	Siphelile used an athletics meeting, in which the school had participated, and one of the learners becoming a champion. She also used travelling which included a town (Nelspruit) well know by the learners, to aid their learning.	Real-life situations to aid the learning of the content were used. Athletics is a practical situation that captures the concepts of time, distance and speed.
RESPONDING TO ASSESSMENT	Are learners asked questions throughout the lesson?	She used open-ended questions: some were from the textbook and some she had designed such as: "*How much time do you think it will it take to reach Hazyview*?"…. "*which mode of transport would you use to come to school in the shortest time and why?"* She insisted on individual responses to questions and discouraged chorus responses	The question and answer technique used by the teacher gave rise to increased individual attention, because the questions were randomly directed at any particular individual without prior warning or notice. With enthusiasm the learners competed for attention for

		from the class.	the questions to be directed to them.
	Are tasks relevant to the content given to the learners after presentation of the lesson?	The learners were given two tasks which were considered relevant: a class work activity based only on calculating speed (Figure 4.2) which was marked and corrections were done in class. Thereafter homework was given which involved word problems on speed, distance and time.	Two tasks (class work and homework) relevant to the content taught were given to the learners. The class work was from a textbook. The exercises for the homework were teacher-designed.

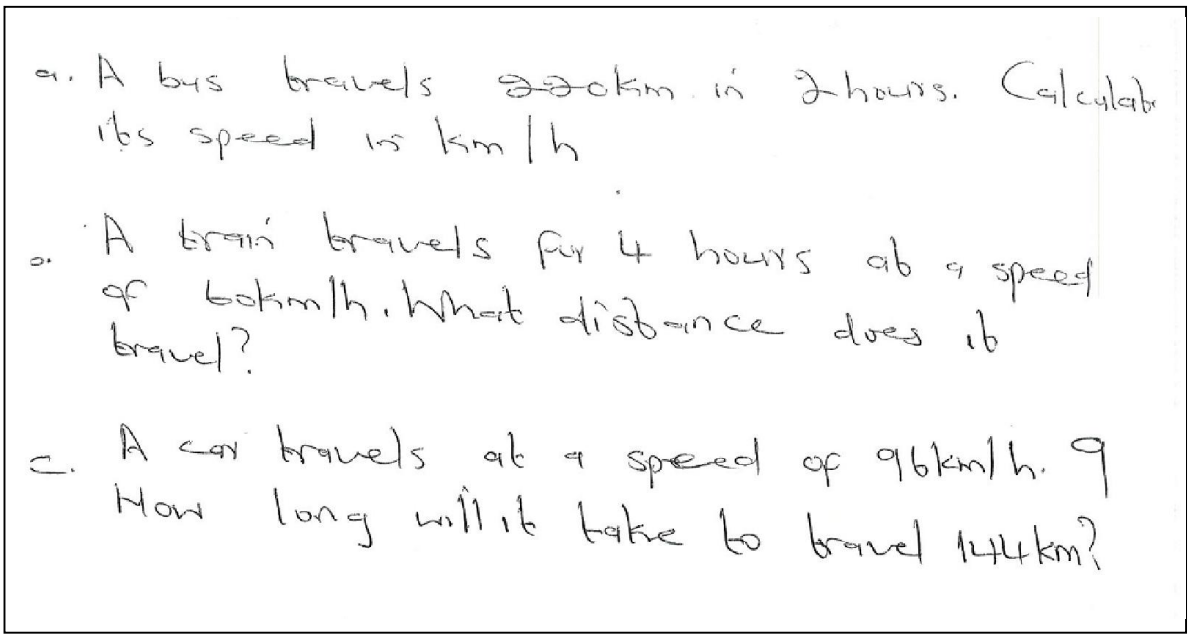


Figure 4.2 ***Siphelile's homework on speed, distance and time***

To summarise, the classroom lesson observations were used to substantiate the data collected through the interviews. In the interviews Siphelile claimed to design or assign tasks sourced from textbooks after she have gained some insight into the progress made by learners on the content presented. The lesson observation confirmed her claim as the learners' mathematics assessment tasks she used were relevant, self designed and some sourced from a textbook. During her teaching she made attempt throughout the lesson to use learners' prior knowledge

to facilitate learning. Her questioning technique was effective enough to determine how well the learners were coping with the content. Her teaching style, grouping of learners, also provided learners with quality time to work on their tasks.

4.7 DOCUMENT ANALYSIS OF SIPHELILE'S LESSON PLANS AND WRITTEN ASSESSMENT TASKS

A document perusal and analysis of Siphelile's lesson plans and three assessment tasks was undertaken to further triangulate the data from teacher interviews and lesson observations regarding the planning and implementation of assessment. The purpose of the analysis was to check whether the identified learning outcomes (LOs) and assessment standards (ASs) were indicated in the lesson plan and whether the designed tasks addressed the LOs and ASs as claimed by the teacher.

4.7.1 Planning of assessment (lesson plans)

The lesson plans were checked to see whether they followed a particular lesson plan format, consisting of the topic, the Grade, the date, the LOs and ASs to be addressed, the teacher and learner activities and their logical sequence of presentation.

After carefully perusing Siphelile's file it was found that Siphelile's lesson plans indicated the duration, date, LOs and ASs, context, content, teacher and learner activities, forms of assessment, resources, skills, knowledge, values, attitudes and expanded opportunities (Appendix P). In one of the observed lessons she was teaching about calculating speed, time and distance and all her lesson plans these aspects were indicated. It can therefore be concluded that the analysis of Siphelile's documents reflects a high standard of planning for assessment.

4.7.2 Planning assessment (assessment tasks)

Siphelile's three designed assessment tasks, an assignment, a test and a class work were evaluated using the MATH taxonomy (Table 4.6). The first task, an assignment, assessed the learners on numbers and exponents. The second task, a test, assessed the learners on integers. The third task, a class work exercise, assessed the learners on polygons. The results showed

that, in the first task, questions demanded factual knowledge, comprehension and routine procedures which are low order, group A of the MATH taxonomy. In the second task, the questions demanded routine procedures, also low order, belonging to Category Group A. The last task also demanded factual knowledge and comprehension which are characteristic of low order Category Group A. A summary results of the analysis of the assessment tasks using the MATH taxonomy (Table 4.6) showed that Siphelile's assessment tasks in Grade 7 mathematics were all within the range of lower order questions (Category A).

Table 4.5: MATH taxonomy checklist for Siphelile

CATEGORY	TASK / MATH	**Siphelile's 1st task Assignment on exponents (Appendix Q)**	**Siphelile's 2nd task Test on integers (Appendix R)**	**Siphelile's 3rd Class work on polygons (Appendix S)**
A	**Factual knowledge**	*Question 1a* *List the factors of 100 in ascending order.*	*Question 1a* *Arrange these integers in ascending order:* *-3;-7;0;9;-10 and* *b) Arrange these integers in descending order:* *-6; 1; 12;-7; 0*	*Question 2* *Naming triangles according to their sides* *Question 3* *Calculating the perimeter of the shapes.*
	Comprehension	*Question 1b(ii)* *"Thapelo buys 120 apples. 15% of them are bad. How many apples are bad?"*	*Question 2 b* *Write ›, ‹ in place of ___ to make each sentence true.* *i) 1 ___ -3* *ii) -2 ___ -7* *iii) -4 ___ 0* *Question3b* *Write the following as a decimal and percentage:* $^{4}/_{5}$ *Question 1c* *The following temperatures were recorded one winter morning:*	*Question 4* *Drawing of shapes.* *Also write one thing that is the same and one that differs for both the square and the rhombus.*

			Johannesburg — *3 °C* *Cape Town* — *0 ° C* *D rb n* — *9 ° C* *Bloemfontein* — *-2 ° C* *Warmbaths* — *10 ° C* *(i) Where is it coldest?* *(ii) What is the temperature difference between Johannesburg and Bloemfontein?* *(iii) Arrange the temperatures in ascending order?*	
	Routine procedures	*Question 1b(i)* *Calculate 9,62×4,85* *Question 2* *Calculate* *a) 4^2+5^2* *b) 6^2-3^3* c) *$3^2+(8^2-2^3)$*	*Question 2a* *Calculate the following;* *i) -6+8* *ii) -5×-3* *iii) -75÷-25* *Question 3c* Calculate *i) 2,134+9,001* *ii) 2,013- 0,666*	
B	**Information transfer**			
	Application to new situation			
C	**Justifying and interpreting**			
	Implication, conjectures and comparison			
	Evaluation			

The pattern observed is that Siphelile's designed assessment tasks are not reflective of all the categories of the MATH taxonomy. The tasks are characterised by Category A namely factual knowledge, comprehension and routine procedures. Category B comprising of information transfer and application to new situations and Category C consisting of items on justifying and interpreting, implication, conjectures, comparison and evaluation are absent. These findings are an indication that Siphelile's skills in designing or assigning Grade 7 mathematics tasks are inadequate.

4.7.3 Document analysis (learners' books for assessment tasks)

To further analyse Siphelile's documents Category D framework (Table 4.6) was used that focuses on the availability of documents such as assessment plan as one way of planning for assessment, checking whether the tasks designed address real life situations. The category D instrument was also used to check whether the teacher analysed learners' scores and gave written feedback on the learners' scripts or books.

Table 4.6: Category D checklist: learner centred assessment framework

D	**Availability of annual assessment plan (planning of assessment)**	Annual assessment plan is available and guided the teacher's assessment; a work schedule is used to guide the planning of lessons by Siphelile.
	Assessment addresses real-life situation	Siphelile's tasks addressed real-life situation such as the calculation of rotten apples, comparing temperature and mathematical shapes that can be associated to structures in the community.
	Analysis of learners marks (responding to assessment)	Siphelile analysed marks in one task only, that is checking in which section the learners performed poorly in order to give meaningful feedback. She gave learners a second chance if they had performed poorly.

The analysis of Siphelile's documents using the Category D instrument revealed that she did have an annual assessment plan that she followed in assessing her Grade 7 learners. This finding was in line with her claims in the interviews that "*We are given the work schedule and assessment programme which indicates the assessment tasks, when they are going to be*

written and what form of assessment we are going to use" (Section 4.8.2). Of the three assessment tasks that were analysed only one question seemed to use a familiar context.

The conceptual framework of this study requires that teachers analyse learners' scores in order to give corrective feedback. Siphelile was observed doing corrections of previously given tasks like class work or homework; and as she indicated in the interviews she does the corrections also with the class "*we do the corrections together" …"If I feel that they did not do well I reset another task on the same content for the learners to improve their marks and for reinforcement of the content assessed" (ref. Section 4.8.3).* Her assertions were found to be partially true when her documents were analysed as learners had two marked scripts per task which were written on different dates. However Siphelile's mark schedule (Appendix O) had no descriptive statistics such as class average, number of learners who wrote the tasks and number of learners who passed/failed the tasks. In essence her analysis of learners' scores appears not to be convincing as she relies on feelings rather than the practical analysis of the learners' scores which can shed some light as to where her learners are having difficulties with the content that was assessed.

To summarise Siphelile's case, the data analysis indicated that Siphelile designed tasks were characterised by Category A items in terms of the MATH taxonomy. She too, like Sipho had no knowledge of the MATH taxonomy. She also relied on textbooks for items of her assessment tasks. Siphelile as well had deficient knowledge and skills for designing mathematics tasks. However her planning for assessment appeared to be of high level considering that her lesson plans were fully planned and sequential. She also used various teaching strategies coupled with real-life examples when preparing her learners for assessment (teaching). She too like Sipho knew the various assessment forms expected to be used in Grade 7 mathematics.

4.8 CONCLUSION

In this chapter the results of the two case studies were presented. Findings on the two teachers' knowledge of continuous assessment, their awareness of assessment techniques, the forms of assessment each teacher used, their planning of assessment, the sources consulted for assessment tasks, recognition of the learners' needs and nature of feedback given to the learners were considered.

CHAPTER 5
DISCUSSION OF RESULTS AND RECOMMENDATIONS

5.1 INTRODUCTION

The findings of this study are based on the similarities and differences that were observed in the two case studies. These are discussed in this final chapter and recommendations made will focus on them as a conclusion to this research study that sought to investigate two South African teachers' design of assessment tasks in mathematics in Grade 7.

For designing tasks for assessment purposes teachers require specific skills and a combination of sound knowledge of the subject, in this case mathematics, and educational theory especially that which relates to assessment procedure. For the analysis of data identified themes derived from the conceptual framework were used. The first group of category of themes discussed are those linked to the first research question that asked *what knowledge and skills do Grade 7 mathematics teachers have in terms of designing mathematics assessment tasks.*

- Knowledge of continuous assessment
- Knowledge of assessment techniques
- Forms of assessment used by the teacher.

Secondly, the last four themes addressed the second research question, *how do the teachers design different mathematics assessment tasks for Grade 7 learners, and give feedback to the learners after their completion of the assessment tasks?*

Planning of assessment

- Sources of assessment tasks
- Learners' needs
- Feedback to learners.

5.2 DISCUSSION OF RESULTS

5.2.1 Knowledge of continuous assessment

This theme within the conceptual framework aimed at finding out about the teachers' knowledge of continuous assessment (CASS). CASS is a form of assessment that underlines and supports classroom assessment of learners and it contributes to 100% of the total

assessment for Grade 7 (Department of Education, 2007). It was therefore necessary to find out what the teachers know about the process as one way of getting to understand how they actually went about designing their assessment tasks.

The Department of Education defines (2002) continuous assessment (CASS) as a process of assessment that is formative in nature, is on-going and that takes place over a long time. Essentially it has to help teachers and learners to check their progress thereby ensuring learners' mastery of the content and associated skills through engaging in meaningful feedback. In short, the characteristics of CASS (according to the Department of Education) that teachers need to be aware of include, amongst others, that it

- takes place over a long time and is on-going
- supports the growth and development of learners and
- provides feedback from learning and teaching.

Foreign scholars like Mwemba and Chilala, (2007) see CASS as an on-going diagnostic, classroom-based process that uses a variety of assessment tools to measure learners' performance. This supports the South African Department of Education's (2002) stance that CASS is to be used by teachers not only to check progress but also provide meaningful feedback to the teacher and the learner Department. It has therefore to be used in an investigative and analytical way finding where the problems are and solving them in constructive purposeful way that comes from understanding their learners. Decisive and creative action has to take place in the classroom to enhance sound learning of basic mathematics concepts, especially at the critically important Grade 7 stage where a firm numeracy foundation has to be laid. Sipho mentioned that continuous assessment is on-going and is meant for determining learners' progress. His definition of CASS contains some elements of the concept as stipulated in the documents from the National Department of Education. However, the omitted aspects are as important. Without properly understanding all aspects of CASS his practice will not be up to speed. For example, classroom lesson observations showed that Sipho hardly used diagnostic questions but mostly closed questions in assessing his learners' progress in the grasping of content. Moreover, the nature of his

assessment practice lacked characteristics that supported neither growth nor development of his learners.

On the other hand Siphelile mentioned that CASS is about assessing learners formally or informally, which is unacceptable given the definition from the Department of Education. However, her practice appeared to be in line with the principle of assessment being on-going as she claimed to be using "informal tasks such as homework as a build-up."

Assessment, being the only way to gauge the progress of the learner, is a powerful tool the teachers ought to use. However, the actions of both teachers, in terms of assessing their learners, appeared to be that of collecting marks rather than being informative or diagnostic. De Lange (2007) suggests that the tasks designed by teachers should be challenging and have the ability to provide real and valuable information about the way learners were thinking. The assessment tasks of both teachers were not challenging enough therefore lacked in-depth understanding of what the learners know and how they think.

This deficiency in assessment procedure on the part of the two teachers could be attributed to the teachers' lack of knowledge and comprehensive understanding of the concept of CASS. The question that it raises suggests a concern generally about competency in assessment of beginning teachers, the quality of in-service training or refresher courses undertaken since the 2002 mandate from the National Education Department for schools to change assessment such that it is criterion referenced.

5.2.2 Knowledge of assessment techniques

Teachers as task designers need to have the skill of designing good tasks. Applying a taxonomy enhances the tasks designed by the teachers. Huntley, Engelbrecht and Harding (2009) mention that taxonomies are used to ensure that examinations contain a mix of questions to test skills and concepts. They also state that the task items that are set should be discriminatory enough to distinguish between the more competent and knowledgeable learners who can manage on their own and the less academically able ones needing help for remediation to correct faults and address deficiencies.

Sipho does not have knowledge of the mathematics assessment task hierarchy (MATH) taxonomy which was used as a framework for this study (ref. 4.2.2). He relied on a self-

determined way of arranging his task items hierarchically, which resulted in his assessment tasks being rated low order tasks when assessed according to the MATH taxonomy. Siphelile indicated that a good task should be standardised and her taxonomy is based on what she thinks is best: setting questions beginning with the simple to the more complex task items. Based on Siphelile's explanation it was obvious that she too had no knowledge of the MATH taxonomy. Her tasks were classified as low order tasks, precisely because a majority of her self-designed task items were classified as category A or B of the MATH taxonomy. Both teachers lacked knowledge of the key item of this study, the MATH taxonomy. The teachers' lack of knowledge of any taxonomy impacts negatively on learners' achievements in mathematics and the teachers' subsequent inferences made from their assessment. Vandeyar and Killen (2007) argue that the prime challenge of assessment is to find approaches that will be fair to all learners and that will provide reliable evidence from which valid inferences can be made about the learning of each learner. Based on this assertion the question was whether the two teachers were able to do that from their assessment techniques. Obviously that was not the case for both teachers. The poor assessment tasks designed by the teachers did not discriminate between the more competent and knowledgeable and the less academically motivated learners. The failure of the tasks to discriminate can be attributed to the fact that the task items involved largely recall. They were mostly closed questions and hardly any open-ended ones. Senk et al. (1997) regard open-ended questions as necessary for successful learning through assessment. The use of oral questions as a technique to ascertain learners' understanding of content varied in both teachers' lesson presentations. Sipho on the one hand failed dismally to use questioning as a formative technique for continuous or formative assessment (ref. table 4.1); on the other hand, Siphelile used open-ended questions more frequently that gave rise to increased individual attention (ref. table 4.5).

The two teachers' failure or lack of ability to use the math taxonomy and effective questioning technique in their teaching, does not augur well for the effective implementation of the ever-evolving forms of mathematics assessment at all educational levels. Huntley et al. (2009) observed that it is no longer appropriate to assess learners' mathematical knowledge using general assessment taxonomies since many of these taxonomies are not appropriate to mathematics. Instead the authors suggest that a taxonomy called *assessment component taxonomy,* adapted from the MATH taxonomy, be used for implementation by mathematics task designers.

Additionally the tasks designed by Siphelile and Sipho did not address contexts familiar to the learners in a varied and inconsistent manner. In Sipho's assessment tasks only one task item in three tasks addressed familiar context (ref. 4.5.3). In each of Siphelile's assessment tasks there was at least one task item that addressed such contexts (ref. 4.10.3). The absence of a familiar context, especially in Sipho's case, is totally against the findings of Vandeyar and Killen (2007) who recorded that it was essential that the learners should be accustomed to the context used in the assessments they have to do as one way of enhancing the learners understanding . Neither of the teachers can be classified as skilful task designers as the tasks they set lacked use of appropriate assessment techniques which includes using a taxonomy in designing their tasks.

5.2.3 Forms of assessment

The Revised National Curriculum Statement (RNCS) (2002) assessment guidelines for Mathematics (Intermediate and Senior phases) recommend that teachers use various forms of assessment such as mathematical investigations, projects, assignments, tests and examinations, class work and homework.

Sipho was able to reel off in theory a list of assessment forms as required by RNCS (2002). He claimed he used a variety of assessment forms, such as class work, homework, assignment, investigations and tests. Document analysis indicated that he was using various forms of assessment when this study was conducted. Sipho used two tests and an assignment as formal assessments (ref. 4.5.2) and mostly homework tasks as informal assessment (see 4.4). Sipho therefore be commended for using sufficient mathematics forms of assessment as expected by the National Protocol on Assessment and Qualifications in the general education and training band.

Siphelile also used tests, assignment and investigations in assessing her learners. She used an assignment, a test and a class work for formal assessment (see table 4.6). In the lessons observed she used both the class work and homework as informal assessment. She was observed giving class work and homework to her learners (ref. Table 4.4). The sampled teachers' had the knowledge of assessment forms as they were able to mention the different forms of assessment. Moreover, document analysis indicated that they used various forms of assessment when assessing the learners.

Both teachers were found to be in the knowledge of and used the forms of assessment to be used in Grade 7 mathematics and these were observed as being used in some form or another throughout the duration of the study. In fact this is the only aspect of CASS in which the teachers were found to be adequate as far as their knowledge of CASS was concerned.

5.2.4 Planning of assessment

The Department of Education (2002) expects teachers to have an assessment plan which is derived from the subject's work schedule. The implication is that teachers need to have and use instruments like the assessment plan, the work schedule and lesson plans. On the other hand, the framework for learner-centred assessment calls for teachers to identify learning outcomes (LOs) and assessment standards (ASs) as a point of departure when planning for assessment.

These LOs and ASs inform what is to be taught, and to be subsequently assessed by the teachers. Assessment, according to de Lange (2007), is an integral part of learning needs to be carefully planned by the teachers. Both teachers used templates like an annual assessment programme, work schedules and lesson plans provided by the Department of Education (ref. 4.10). However, both teachers' planning template for assessment differed. Sipho's lessons had some crucial aspects missing. On the other hand Siphelile's lessons had all the aspects of the template incorporated.

The planning of assessment needs quality assurance by key stakeholders involved in the assessment process. This is usually done by the subject teachers themselves and the respective heads of departments. Both teachers claimed in the interviews that their tasks were sent to their seniors for quality assurance but it was only Siphelile's tasks that were moderated by the head of department, while Sipho's tasks were not. The low educational standard of Sipho's tasks may be perpetuated if no person of authority is designated to quality assure his learner assessment tasks. Therefore the main aspect of planning of assessment that needs to be improved on is the quality assurance of the tasks at classroom and departmental level.

5.2.5 Sources of assessment

It was important to determine whether the teachers used other sources to guide them when they were designing or selecting their assessment tasks. In this case the two teachers mainly sourced material from different mathematics textbooks they could access without any form of modification of the items.

5.2.6 Learners' needs

The framework for learner-centred assessment which was used in this study calls for teachers to consciously cater for the diverse needs of the learners. Sipho depended almost exclusively on the lecture with question and answer strategy to present content to the learners (ref. Table 4.1). His questioning techniques were not efficient and thus ineffective. These findings are much against his claim that he usually thought of his learners' differing cognitive levels when designing assessment tasks. The findings of the study indicate that Sipho did not have the skills to cater for the mixed ability groupings of his mathematics class.

Siphelile, in addressing the learners' needs of her mathematics class tried to use a combination of questioning techniques such as individual questioning, involving probing and open-ended questioning. She further placed the learners in her class in groups of mixed abilities and assisted those who appeared to be struggling with the content (ref. Table 4.4). Her strategy of placing learners in groups seemed to be productive for her and in line with Yule, du Preez and Omar (2005) who advocate that learners interact with their classmates in a manner that is productive to their needs.

In concluding the questioning techniques used by the two teachers were different, with Siphelile appearing to be successful in her distribution of questions to the learners. Her questions were thus used for diagnostic and guided discovery purposes as evidenced in her class observations (ref. Table 4.4). With Sipho it was not the case as his questioning was deficient and ineffective as he mostly used closed questions intermittently which were summative instead of formative.

The needs of the learners were well taken care of by Siphelile; with Sipho the needs were virtually overlooked.

5.2.7 Feedback to learners

According to the RNCS documents (Department of education, 2002) teachers are expected to give feedback to the learners as one way of giving indication of the effectiveness of the learners' learning method and the teacher's teaching method. Feedback is a crucial element in formative assessment. Van den Berg (2004) mentions the following as ways of giving feedback, appropriate questioning, the teacher's oral and written comments on the assessment activity and encouragement to a learner.

Sipho did not use appropriate questioning methods as his lesson presentations were characterised by limited questioning hence they were essentially summative as opposed to being formative (ref. Table 4.2). The workbooks of the sampled learners in his maths class lacked written comments from him that would have served as feedback and/or encouragement to the learners. Siphelile on the other hand used the question and answer strategy effectively in her lesson presentations (ref. Table 4.5). However, she too did not write any comments on the workbooks or assessment scripts of her learners. The two teachers were deficient in giving meaningful feedback to their learners. The inadequacy of the feedback reveals lack of knowledge of the importance of feedback in CASS. The teachers were expected to give frequent assessment feedback that would apply to each learner as an individual according to their strengths and weaknesses, in order to enhance learning and enable them to reach their potential (Bansilal, James, & Naidoo, 2010; Black, & William, 2001).

Furthermore, teachers need to do more than just giving feedback to learners; they need to do remedial work with those learners who need it (Vandeyar & Killen, 2007). Doing remedial work by creating experiences leading to the identified LO and assisting the learners who seemed to be struggling would impact positively on improving assessment skills used in the classroom. But this can only be done if the tasks are properly designed so as to discriminate between the more competent and less gifted ones which again is not the case with both teachers. Neither teacher did much remedial work with their learners in the lessons observed nor on their assessment documents that were evaluated. For both teachers the emphasis seemed more on collecting marks from the assignments than in assisting individual learners where difficulties were encountered. Similar observations of teacher interest in collecting

marks were recorded by Vandeyar and Killen (2007), in a study of Grade 4 mathematics teachers' conceptions and practice of classroom assessment.

When interviewed, both teachers indicated that after each task they analysed learner performance in order to make decisions about their teaching and assessment practices. Through observation it was seen that Siphelile analysed her tasks and responded to the data by giving the learners another opportunity to improve by giving them a fresh task on the same content. Her act of giving the learners a second chance is in line with the assertion of Du Toit & du Toit (2004) that learners need to be given more than one opportunity, if they are not successful in demonstrating that meaningful learning has taken place. However, this exercise proved to be futile as document analysis showed that there were no signs of improvement in the learners' scores after a second chance. On the other hand, Sipho did not analyse the learners' marks (ref 4.5.3); he gave the learners only one chance for assessment and did not respond to the low score achieved by his learners by at least giving them another chance.

Both teachers claimed in the interviews that they analysed learners' scores after marking the scripts in order to identify content problem areas to deal with at a later stage. In the ten lessons observed for each teacher, the corrections done in class did not focus on such problem areas. Learners were not given another opportunity to improve their scores in Sipho's case. Neither teacher attempted to re-teach the content as one way of improving learners' scores. Thus both teachers performed poorly in giving feedback to the learners and in executing the processes that precede it, such as the analysis of marks.

5.3 CONCLUSION

In this study an attempt was made to find out what knowledge and skills two Grade 7 mathematics teachers have about assessment procedures relating to continuous- and criterion-referenced assessment based on a MATH taxonomy and how both of them went about designing mathematics tasks using a specific taxonomy as a frame of reference.

The study effectively investigated the design of Grade 7 mathematics tasks of two teachers regarded as successful educators and whose selection to participate was based on their learners' consistently good performance of a 70% pass rate in the Grade 7 mathematics examination the past three years. A qualitative research approach using the case study method

was used to investigate the problem of the study. The MATH taxonomy and framework for implementing learner-centred assessment (van Aswegan, and Dreyer, 2004) were used as conceptual framework to guide the study and for data collection. The framework focused on three elements of assessment, namely planning, implementing and responding to assessment. Observation protocols, interviews and assessment task analysis were used to gather data about the teachers' approaches to designing their Grade 7 mathematics assessment tasks. The data collected was triangulated by cross-checking information gathered from one-on-one interviews with the teachers, classroom observations and assessment task analysis.

5.3.1 Findings of the study

The findings of the study are presented in relation to the stated research questions. For the first research question, on what knowledge and skills for designing mathematics assessment tasks; the two teachers were found to lack knowledge and comprehensive understanding of the concept of CASS. This was evident in their failure to give a working definition of CASS or a clear understanding of the concept. The two teachers' deficient assessment practice and skills in designing or setting Grade 7 mathematics questions either for class/home works, tests or other assignments were also evident when benchmarked against the MATH taxonomy used as the frame of reference in this study. The teachers were familiar with or able to list various forms of assessment such as class work, oral diagnostic questioning, class room tests and examination for use in mathematics lessons at the senior phase of primary school level but they lacked the skills to design tasks that assessed a range of knowledge competencies as categorised in the MATH taxonomy. According to the MATH taxonomy most of their mathematics questions or task items were low level items involving recall of factual knowledge, comprehension and routine procedures. It is important for teachers to realise that teacher designed tasks and their assessments are the primary sources of learner achievement (Eckert, et al., 2006) and therefore they need to take into account that assessment tasks by their very nature ought to be developmental tools, and not mere measurement tools and (Vandeyar & Killen 2006) as was the case with the two teachers.

For the second research question, concerning how the two teachers designed different Grade 7 mathematics assessment tasks and gave feedback to learners, both teachers were found to use the school mathematics textbooks as the main source of assessment tasks. Both teachers claimed to confer with colleagues in designing their tasks but there was no evidence of

assessment tasks emanating from the teachers themselves. This finding reinforces the advice offered by Artzt, Armour-Thomas and Curcio (2008) when they suggest that teachers should not only assign mathematics problems (questions) from other sources, but also to use their (teacher's) own creativity in designing tasks that are of interest to the learner. The challenge however is with the level of teacher's expertise. To what extent are Grade 7 teachers exposed to criterion reference assessment techniques?

Swan (1993; pp26) has indicated that "the form of recording and reporting must be consistent with the purposes the assessment is designed to serve.....[descriptive] statistics become ends rather than means when the tasks of record keeping overrides the objectives of helping students [learners] learn". The two mathematics teachers although they provided a record of their learners scores, they however did not use descriptive statistics such as means, percentages to analyse learners' individual and collective performance for the purpose of teacher and learner feedback. Especially on how effective the teacher's teaching methods and learners' learning methods were in the context of the mathematics lessons. It is likely that this deficiency in statistical use was as a result of lack of knowledge of use of statistical tools and their interpretation.

The results of the study indicated that the level of lesson planning by the two teachers varied from being fairly adequate with Siphelile to poor with Sipho. Sipho's lesson plans did not always include learning outcomes and assessment standards. Both teachers resorted to using assessment as a process of collecting learners' marks instead of it being a developmental process.

Under those circumstances the teachers could be under the impression that their assessment procedure is adequate as far as learner assessment in mathematics teaching is concerned. The reality however is that both teachers as indicated earlier on apparently view assessment as a means of collecting term marks and not necessarily as a developmental tool. This teacher assessment practice in Grade 7 mathematics could result in poorly prepared learners being promoted to higher grades with its attendant consequences or implications for public examination.

Interestingly enough the claim by the circuit's secondary school mathematics teachers that their primary school counterparts design poor assessment tasks for their Grade 7 mathematics learners with the result that those learners promoted from Grade 7 to Grade 8, even those

with high marks, do poorly at that level, would appear to be confirmed by the findings of the study.

Finally the importance of familiarity with a mathematics taxonomy is absolutely crucial for the class teacher in designing his or her tasks for the purpose of effective learner and teacher feedback. The import here is that the teacher must of necessity seek to assess a range of categories of knowledge such as recall, application, comprehension etc in mathematics especially those requiring higher order thinking. Precisely for this reason among others, it is important that mathematics teachers become familiar with, or be provided with experience in the use of a taxonomy for designing mathematics tasks for continuous assessment. Knowledge of the taxonomy and its use would enhance teachers' skills needed to meet the requirements of the DoE assessment policy (NPAQ, 2007), and secondly for the authentic assessment of learners' capabilities.

5.4 LIMITATIONS OF THE STUDY

The study dealt with only two case teachers. The conclusions drawn from this study are only specific to the sample of the study. Therefore conclusions cannot be made that they represent the situation in Grade 7 Mathematics teaching in all schools in the circuit. The results can therefore not be generalised to other populations or groups of teachers as argued by Vivar, Whyte, and Armayor (2007). However, that the possibility of this situation being found in other schools does exist and, in the interests of education in South Africa, the matter should receive urgent attention from the relevant authorities. Again the results can be used to theorise about the competencies and skills that effective teachers of grade 7 mathematics ought to have as they go about developing mathematics tasks for continuous assessment.

5.5 RECOMMENDATIONS OF THE STUDY

On the basis of the teacher's responses, the analysis of the collected data and the conclusions drawn from the study, the researcher recommends teacher development in the following;

- *Teacher training on CASS; s*chool-based in-service workshops on assessment procedures beginning with the philosophy, and concepts underpinning CASS and assessment techniques

- *Mathematics-specific taxonomies;* mathematics teachers should be familiarised with a mathematics taxonomy in both pre-service and in-service teacher-development programs. The knowledge of mathematics taxonomy has implications for developing criterion-referenced assessment tasks as opposed to norm-referenced.
- *Feedback to learners;* mathematics there should be on-going support for mathematics teachers on the analysis of assessment (item-analysis and statistical-analysis) focusing on the aspect of giving comprehensive feedback to learners in ways that would enhance the way the learners learn and the ways in which teachers teach.

It is hoped that the above mentioned aspects, are going to assist in providing teachers with knowledge and skills which would assist them (teachers) in understanding and improving their own assessment practices as recommended by van den Berg (2004).

5.6 POSSIBLE FUTURE RESEARCH

Teachers' knowledge, attitudes and practices towards learner assessment in mathematics should be further investigated at senior phase level in the form of a questionnaire survey to gain more insight in what they know and do.

REFERENCES:

Airasian, P.W. (2001). *Classroom Assessment*. McGraw-Hill. Boston.

Aldous, C. (2004). Science and Mathematics teachers' perceptions of 2005 in Mpumalanga secondary schools. *African Journal of Research in SMT Education, Volume 8 (1), 65-76.*

Artzt, A.F., Armour-Thomas, E., & Curcio, F.R. (2008). Becoming a reflective mathematics teacher, A guide for observations and self-assessment (2nd edition). Routledge, Taylor & Francis group. New York.

Austin, P., Carbone, R.E., & Webb, P. (2011) Prospective primary school teachers' attempts to pose acceptable word problems on the addition of fractions: some insights from South Africa and the United States of America. *African Journal of Research in MST Education, Volume 15 (2), 168-178.*

Bansilal, S., & James, A., & Naidoo, M. (2010). Whose voice matters? Learners. *South African Journal of Education, Volume 30, 153-165.*

Bansilal, S., & Wallace, J. (2008). National performance assessment in South African context; a case study of issues and classroom implementation and task design. *African Journal of Research in MST education, Volume 9 (2), 81-95.*

Beets, P.A.D. (2007). (Re) positioning assessment in higher education: the case of Geography in South Africa. *South African Journal for Higher Education, Volume 21(4), 577-584.*

Beets, P., & le Grange, L. (2005). "Africanising" assessment practices; does the notion of ubuntu hold any promise*? South African Journal of Higher Education, Volume 19 special issue, 1197-1207.*

Bennie, K. (2005). The MATH taxonomy as a tool for analyzing course material in Mathematics: a study of its usefulness and its potential as a tool for curriculum development*. African Journal of Research in SMT education, Volume 9(2), 81-95.*

Black, P., Harrison C., Hodgen., Marshal, B & Seret, N. (2010). Validity in teacher's summative assessment. *Assessment in education. Principle Policy & Practice, Volume 17(2), 215-232.*

Black, P., & William, D. (2001). Inside the black box, raising standards through classroom assessment. *BERA short final draft, 1-14*.

Bohlam, C.A. (2006). An assessment experiment for mathematics at the University of South Africa. *South African Journal of Higher Education, Volume 20 (4), 391-418.*

Broadfoot, P., & Black, P. (2004). Redefining assessment? The first ten years of assessment in education. *Assessment in Education, Volume 11 (1).*

Chick, H.L., & Harris, K. (2007). Pedagogical content knowledge and the use of examples for teaching ratio. Found on the website www.smartvic.com/smart/research. Accessed December 2012

Chirume, F. (2007). Standards based educational reform and its implications for school based assessment: lessons from Zimbabwean schools. South African Review of Education with education production. *Assessment and Educational issue 13(1), 39-47.*

Clarke, D., & Clarke, B. (2002) Using Rich Assessment Tasks in Mathematics to Engage Students and Inform Teaching. Found on the website www.google.com accessed September 2010

Clifford V.A. (2002). Does the use of journals as a form of assessment put into practice the principle of feminist pedagogy? *Gender and Education, Volume 14 (2), 109-121.*

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education, 6th edition*. Routledge and Falmer. New York.

Combrink, M. (2003). An integrated comparative perspective on outcomes based assessment: implications for South Africa. *Perspectives in Education, Volume 21 (1), 51-66.*

De Lange, J. (2007). Aspects of the art of the assessment design. Assessing mathematical proficiency. *MSRI publications 53*

Department of Education. (1996). *National education policy act 27*. In policy handbook for educators ELRC. Universal Print Group.

Department of Education. (2002). *Revised national curriculum statement Grades* R-9 schools policy mathematics. Pretoria.

Department of Education. (Undated). *National Curriculum Statement*, *Assessment guidelines for mathematics, intermediate and senior phase.* Pretoria.

Department of Education. *National Curriculum Statement*. (2007). National policy on assessment and qualification for schools in General Education and Training band. Pretoria.

Du Toit, G. F., & Du Toit, E.R. (2004). *Understanding outcomes based education (OBE). In outcomes based assessment.* Maree, G.J., & Fraser, W.J. (Eds.) Heinemann publishers. Pretoria.

Eckert, T.L., Dunn, E. K., Codding R.S., Beggeny, J.C., & Kleinmann, A.E. (2006). Assessment of mathematics reading performance: an examination of the correspondence direct assessment of student and teacher report. *Psychology in the Schools, Volume 43 (3).*

Fraser, W.J., Killen, R., & Nieman, M. M. (2005). Issues in competence and service teacher education. Part 1. The assessment of teaching practice. *South African Journal of Higher Education, Volume19 (2), 222-245.*

Frey, B.B., & Schmit, V.L. (2007). Coming to terms with classroom assessment. *Journal of Advanced Academics, Volume 18(3), 402-423.*

Gopal, N., & Stears, M. (2007). An alternative approach to assessing Science competencies. *African Journal of Research in SMT Education, 11 (2), 15-24.*

Gronlund, N.E. (1998). *Assessment of student achievement, 6th edition*. Allyn and Bacon. United States of America.

Horne, T., & Naude, E. (2007). Poor through-put rates of distance learners computing courses: Is continuous assessment the answer? *South African Journal of Higher Education, Volume 21 (2), 267-277.*

Huntley, B., Engelbrecht, J., & Harding, J. (2009). Can multiple questions be successfully used as an assessment for undergraduate mathematics? *Pythagoras, Volume 69, 3-16.*

Khoza, Z. (2004). The extent to which mathematics learning outcomes are reflected in Grade 9 assessment tasks. *Proceedings of the 12th Annual Conference of the Southern African Association for Research in Mathematics and Technology Education, 480-487. Durban.*

Killen, R. (2003). Validity in Outcomes-Based-Education. *Perspectives in Education, Volume 21, (1)1-14.*

Killen, R., & Hatting, S.A. (2004). A theoretical framework for measuring the quality of student learning in outcomes based education. *South African Journal on Higher Education, Volume 18 (1), 72-86.*

Kyriakides, L., & Gagatsis, A. (2003). Assessing student problem solving skills. *Structural Equation Modelling, Volume 10 (4), 609-921.*

Lacey, A., & Luff, D. (2007). Qualitative data analysis. *National Institute for Health Research.*

Lane, S., Liu, M., Ankerman, R.D., & Stone, C. A. (1996). Generalizability and validity of a mathematics assessment. *Journal of Education Measurement, Volume 33(1), 71-92*

Lateral, C.M. (2005). *Math wars. A guide for parents and teachers*. Praeger. London.

Leedy, P.D., & Omrord, J.E. (2010). *Practical research and design 9th edition*. Pearson. New Jersey.

Leyendecker, R. (2006). Quality curriculum assessment in sub Saharan Africa secondary education (CASASE) with particular focus on the sciences and Mathematics. *Proceedings of the 14th annual conference of the Southern African Association for Research in Mathematics and Technology Education, 461-467. Pretoria.*

Louw, W. (2003). My love affair with alternative assessment: integrating quality assessment into OBE courses for distance education. *Progressio, Volume 25, (2), 21-28.*

Lumby, G. (2008). *Teaching towards outcomes and its effect on assessment practices in a GE. Literacy and communication classrooms. (Unpublished) MEd dissertation. University of Pretoria.*

Marais, P., & Meier, C. (2007). Curriculum reform. In Wolhuter, C. C., Lemmer, E.M., (Eds.), *Comparative education. Education and Contemporary Issues*. Van Schaick. Pretoria.

McDuffie, A.R., Akerson, V.L., & Morrison, J.A. (2003). Designing and implementing meaningful field-based experiences for mathematics method courses: a framework and product description. *The Mathematics Educator, Volume 13 (1), 22-32.*

Meier, S.L., Rich, B.S., & Caddy, J. (2006). Teachers' use of rubrics to score non-traditional tasks: factors related to descripences in scoring. *Assessment in Education, Volume 13 (1), 69-95.*

Moon, J., & Schulman, L. (1995). *Finding the connection. Linking assessment and instruction and curriculum in elementary mathematics*. Heinemann. Portsmouth, NH.

Mothata, S., van Niekerk, L., & Mays, T. (2003). Learners' assessment in practice: lessons learnt from the NPDE. *Assessment of Change in Education: special issue 1 Volume 21, 81-99.*

Mwakapenda, W. (2008). Understanding the connections in school mathematics curriculum. *South African Journal of Education, Volume 28, 189-202.*

Mweemba, G., & Chilala, M. (2007). Piloting school based continuous assessment at middle basic level: the Zambian approach. *Southern African Review of Education: Assessment and Educational standards: special issue, Volume 13(1), 31-37.*

Nair, P.A.P., & Pillay, J. (2004). Exploring the validity of the continuous assessment strategy in higher education institutions. *South African Journal of Higher Education, Volume 18 (2), 302-312.*

Onwuegbuzie, A.J., & Leech, N.L. (2007). Validity and qualitative research: an oxymoron? *Quality and Quantity, Volume 41, 233-249.*

Pandey, T. (1990). Authentic assessment. *Practical Assessment, Research and Evaluation, Volume 2 (1).* Retrieved 29 April 2009 from http.//PARE on line/getvx.asp?v=zan=1

Paton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Service Research, Volume 34 (5), part ii.*

Parker, D. (2006). Grade 10-12 mathematics curriculum reform in South Africa; a textual analysis of new National Curriculum Statements. *African journal of research in SMT education, volume 10 (2), 59-73*

Phudi, T. (2006). 'From OBE to C2005 to RNCS'; are we still on track? *Africa Education Review, Volume 3, 100-112.*

Pieterson, J., & Maree, K. (2007). In Maree, M., (Ed.), *First steps in research. Van Schaik. Pretoria.*

Popham, W.J. (2002). *Classroom assessment: what teachers need to know*. Allyn and Bacon. Boston.

Ramoroka, N.J. (2007). *Educator's understanding of the premise underpinning outcomes based education and its impact on their classroom assessment practices.* (Unpublished) MEd dissertation. University of Pretoria.

Ramothlale, E.F. (2008). *An investigation into the appropriateness of the current assessment model continuous assessment (CASS) and common task assessment (CTA) for the general education and training band.* M Ed dissertation. University of Pretoria.

Randall, J., & Engelhard, G. (2008). Differences between teachers' grading practices in elementary and middle schools. *The Journal of Education Research*, Found on the website www.bsrlm.org.uk/IP/ip 27-3/BSRLM-IP-27-3 accessed December 2011.

Randall, S. E. (2008). *Teacher development and change in the context of teaching large under resourced science classes.* (Unpublished) MEd dissertation. University of Pretoria.

Reyneke, M., Meyer, L., & Nel, C. (2010). School based assessment; the leash needed to keep the poetic "unruly pack of hounds" effectively in the hunt for learning outcomes. *South African Journal of Education, Volume 30, 277-292.*

Rizvi, N.F. (2004). Prospective teachers' ability to pose word problems. *The International Journal of Mathematics Teaching and Learning.* Found on *www.cimt.plymouth.ac.uk/journal/rizvi accessed April 2010.*

Romagnano, L. (2001). The myth of objectivity in mathematics assessment. *Mathematics Teacher, Volume 94 (1), 31-37.*

Schurink, W.J., Schurink, E.M., & Poggenpoel, M. (1998). Focus group interviewing and audio-visual methodology in qualitative research. In: De Vos, A.S. (Ed.) 1998, *Research at grass roots. A Primer for the caring professions.* Pretoria: Van Schaik.

Segers, M., Dochy, F., & De Corte, E. (1999). Assessment practices and student profile in a problem based curriculum. *Learning Environments Research, Volume 2, 191-213.*

Senk, S.L., Beckmann, C.E., & Thompson, D.R. (1997). Assessment and grading in high school mathematics classroom. *Journal for Research in Mathematics Education. Volume 28 (2), 187-210.*

Shay, S., & Jawitz, J. (2005). Assessment and the quality of educational programs; what constitutes evidence? *Perspectives in Education, Volume 23 (1).*

Sharod, S.E., Dweyer, J., & Nayaran, R. (2009). Developing science and math integrated activities for middle school students. *International Journal of Mathematical Education in Science and Technology, Volume 40 (2).*

Smith, G., Wood, L., Coupland, M., Stephenson B., Crawford, K., & Ball, G. (1996). Constructing mathematical examination to assess a range of knowledge and skills. *International Journal of Mathematical Education in Science and Technology, Volume 27, 65-77.*

Swan, M. (1993). Assessing a wider range of students' abilities. In: Webb, N.L. & Coxford, A.F (Eds.) 1993, *Assessment in the classroom, 26-39. The National Council of Teachers of Mathematics, Inc.* Virginia.

Van Aswegan, S., & Dreyer, C. (2004). An analysis of ESL teacher educators' assessment strategies. *Journal for Language Teaching, Volume 38(1), 26-43.*

Van den Berg, G. (2004). The use of assessment in development of high order thinking skills. *Africa Education Review, Volume 1 (2), 279-294.*

Vandeyar, S. (2005). Conflicting demands: assessment practices in three South African primary schools undergoing desegregation. *Curriculum Enquiries, Volume 35 (4), 467-481.*

Vandeyar, S., & Killen, R. (2003). Has curriculum reform in South Africa really changed assessment practices, and what promise does the Revised National Curriculum Statement hold? *Perspectives in Education, Volume 21 (1), 119-134.*

Vandeyar, S., & Killen, R. (2006). Beliefs and attitudes about assessment of a sample of student teachers in South Africa. *Educare, Volume 3 (1), 30-47.*

Vandeyar, S., & Killen, R. (2007). Educators' conceptions and practice of classroom assessment in post apartheid South Africa. *South African Journal of Education, Volume 27 (1), 101-115.*

Van Etten, B., & Smith, K. (2005). Learning material in compliance with the Revised National Curriculum Statement: a dilemma. *Pythagoras, Volume 62, 48-58.*

Verhage, H., & de Lange, J. (1997). Mathematics education and assessment. *Pythagoras, Volume, 56 (42), 14-20.*

Vivar, C.G., McQueen, A., Whyte, D.A., & Amayor, N.C. (2007). Getting started with qualitative research: developing a research proposal. *Nurse Researcher, Volume 14 (3), 60-73.*

Welman, J.C., & Kruger, S.J. (2001). *Research methodology second edition.* Oxford University Press. Cape Town.

Wiggins, G. (1998). *Educative assessment designing assessment to inform and improve student performance*. Jossey-Bass. San Francisco.

Wilmot, D. (2003). The inception phase of a case study of outcomes based education assessment policy in the Human and Social Sciences learning area of C2005. *South African Journal of Education, Volume 23 (4), 313-318.*

Yule, D.H., du Preez, K, & Omar, N. (2005). *Oxford successful mathematics: teacher's workbook, Grade 7.* Oxford University Press. Cape Town.

Yin, R.K. (1999). Enhancing the quality of case studies in health service research. *Health Services Research, Volume 34 (5), part ii.*

Appendix A

Interview schedule 1 for the teacher

1. Knowledge and skills on assessment and task design
2. What is your understanding of continuous assessment?
3. What forms of assessment do you use in Grade 7? Of these which do you use more often and why?
4. When do you design assessment tasks?
5. Which taxonomy do you use, if any and why?
6. What are your sources of the assessment tasks that you use in mathematics? How have these been developed?
7. Do you develop tasks for mathematics? Do you consult anyone about your tasks? If so who, if not why?
8. How confident are you in developing the assessment tasks? Very good, satisfactory or find it difficult? Explain.
9. Have you generally been used to using the same type of assessment tasks throughout the year? If yes which one and give reasons for your answer. If not, name the ones you have been using throughout and for each give a comment on its success or failure as an assessment technique?
10. As a teacher who has been teaching the learning area for sometime: how regularly do you change your assessment tasks? Please give reasons for your answer?
11. May you briefly explain the criteria for the designing of your assessment tasks?

Thank you for your time and co operation.

Appendix B

Checklist for the analysis of tasks according to Mathematics Assessment Task Hierarchy (MATH) TAXONOMY

CATEGORY	TASK / MATH	TASK 1	TASK 2	TASK 3
A	Factual knowledge			
	Comprehension			
	Routine procedures			
B	Information transfer			
	Application to a new situation			
C	Justifying and interpreting			
	Implication, conjectures and comparison			
	Evaluation			

Researcher's comments: _____

Appendix C

Category D checklist: learner-centred assessment framework

D	Availability of annual assessment plan (planning of assessment)			
	Assessment addresses real life situation			
	Analysis of learners' marks (responding to assessment)			
	Is there any teacher written feedback on learners' books			

Appendix D

Interview schedule 2

Feedback to learners (Research question 3)

1. How would you describe a good assessment task?
2. What is the main purpose of assessment?
3. How do you identify and cater for the different needs of the learners in your assessment tasks?
4. What procedures do you follow after administering each assessment task to your learners?
5. How often are your assessment tasks evaluated by head of department?
6. What happens after the evaluation process?
7. How would you define a task on which the learners have performed or underperformed? Explain?
8. When and how do you provide learners with feedback on each of their assessment tasks?

Thank you for your time and co operation

Appendix E

Lesson observation template

Teacher's name: _____ Number of learners: _____

Content focus (LO & AS): _____

COMPONENTS OF THE LEARNER-CENTRED ASSESSMENT FRAMEWORK	**ASPECTS TO BE OBSERVED**	**OBSERVATIONS MADE**	**OBSERVER'S REFLECTIONS**
Planning assessment	Availability of lesson plans		
	The use of baseline assessment in the topic to be presented		
	Communication of learning outcomes (LOs) and assessment standards (ASs) to the learners		
	Communication of mode of Mathematics lesson assessment to the learners		
Implementing assessment	Provision of learning opportunities to learners		
	The use of real life situations in lesson presentation		
Responding to assessment	Are learners asked oral questions throughout the lesson and how does the teacher react to the learners' responses?		
	Are relevant informal tasks given at the end of the lesson?		

Appendix F

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

Faculty of Education
Department Of Science, Mathematics and Technology Education
Groenkloof Campus
Pretoria
0002
Tel: (012) 420 5572

==========

12 November 2010

THE HEAD OF DEPARTMENT
MPUMALANGA DEPARTMENT OF EDUCATION
Private Bag X11341
Nelspruit
1200

Dear Sir /Madam

REQUEST TO CONDUCT AN EDUCATIONAL RESEARCH

I hereby request to conduct a research at two public provincial schools. This research is based on the Masters studies I am currently doing with the University of Pretoria.

I have enrolled for a Masters course on assessment and quality assurance, and it dictates that I do a full dissertation on a chosen topic, which is "An investigation into teachers' design of assessment tasks in senior phase mathematics". Data will be collected through interviews, observations (the observations will include videotaping of 5 Mathematics lessons) and document analysis. Confidentiality and anonymity will be guaranteed in this research.

Results of the study will be made available as soon as conveniently possible.

I will appreciate it if my request is granted.

Thanking you in advance.

Yours faithfully

_____

MNISI THABO M. (Mr.)

P O Box 302
Hazyview
1242
Cell: 083 298 6227
EMAIL: thabomnisi@ananzi.co.za

_____

PROF G.O.M. ONWU (SUPERVISOR)
Tel: (012) 420 5572
EMAIL: gilbert.onwu@up.ac.za

Appendix G

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

Faculty of Education
Department Of Science, Mathematics and Technology Education
Groenkloof Campus
Pretoria
0002
Tel: (012) 420 5572

==========

12 November 2010

THE SCHOOL PRINCIPAL

_____

_____

_____

_____

Dear Sir /Madam

REQUEST TO CONDUCT AN EDUCATIONAL RESEARCH

I hereby request to conduct a research at your school. This research is based on the Masters studies I am currently doing with the University of Pretoria.

I have enrolled for a Masters course on assessment and quality assurance, and it dictates that I do a full dissertation on a chosen topic, which is based on Mathematics assessment in Grade 7. Data will be collected through interviews, observations and document analysis. It is of vital importance to note that confidentiality and anonymity will be guaranteed in this research.

It is not only your institution on which the study will be taken, but as already mentioned your details or your participation will only be known by the researcher and your Grade 7 mathematics teacher. Results of the study will be made available as soon as conveniently possible.

I will appreciate it if my request is granted.

Thanking you in advance.

Yours faithfully

_____

MNISI THABO M. (Mr.)

P O Box 302
Hazyview
1242
Cell: 083 298 6227
EMAIL: thabomnisi@ananzi.co.za

_____

PROF G.O.M. ONWU (SUPERVISOR)
Tel: (012) 420 5572
EMAIL: gilbert.onwu@up.ac.za

Appendix H

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

Faculty of Education
Department Of Science, Mathematics and Technology Education
Groenkloof Campus
Pretoria
0002
Tel: (012) 420 5572

==========

DATE: _____

Dear Teacher

Request to participate in a research project

Research project title: "An investigation into teachers' design of assessment tasks in senior phase mathematics; a case study of two teachers"

Please read his document carefully before you decide to participate in the study.

Purpose of the study

The purpose of the study is to determine how assessment tasks in Grade 7 mathematics are designed by teachers and to ascertain whether the required Learning Outcomes and Assessment standards are addressed by the tasks. The knowledge and skills of the teachers will be investigated.

What you will be asked to do in the study:

You will be briefed for 5 to 10 minutes to volunteer to participate in this study through lesson observation. You will be expected to participate in two semi structured interviews. The first interview will be on your general assessment knowledge and the second will be based on your practice of assessment. Your deigned tasks will be analyzed in order to get ideas on how you design your mathematics tasks in Grade 7.

Time required:

At most one hour and at most two sessions will be used for the interviews, each section lasting 30 minutes. And for the observations 2 weeks will be enough as 10 lessons will be

observed. Therefore at least 14 working days will be required for the study. The 14 days can be spread to the convenience of both the researcher and the participants.

Risks and benefits:

Risks; there are no risks to the participants. However the anxiety that is expected with the evaluation on teacher's work may be anticipated. This study is aimed at teacher's design of assessment tasks and the findings will be to the benefit of all involved in the study and the education fraternity as a whole.

Benefits:

Participating in the study will give some indication of the knowledge and skills regarding the design of mathematics assessment tasks and the possible influence they may have on learners' performance. The implications of the study's findings for the for teacher professional development may be made available to the provincial Department of Education and intervention programs based on them will be suggested or recommended. The identified competences of the teachers if any will be shared with others not only in the circuit to which they belong but the other circuits as well.

Confidentiality:

Your participation in this study will be kept confidential because the researcher will adhere to the ethical standards required for research projects as set by the University of Pretoria. The researcher will use code names or pseudonyms when referring to the participants to ensure that the participant's name is not divulged. The researcher will treat all the information supplied by

Voluntary participation:

Your participation in this study is completely voluntary. You have the right to withdraw at any time without any consequence.

PERMISSION FOR RESEARCH
I, _____, hereby give my consent to participate in the study. I am assured of anonymity, and know that I can withdraw if I do not wish to participate any more. Signature: _____ Date: _____

For more information about this research you may contact the researcher at the following numbers

MNISI THABO M. (Mr.)

P O Box 302
Hazyview
1242
Cell: 083 298 6227
EMAIL: thabomnisi@ananzi.co.za

PROF G.O.M. ONWU (SUPERVISOR)
Tel: (012) 420 5572
EMAIL: gilbert.onwu@up.ac.za

Appendix I

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Education

Faculty of Education
Department Of Science, Mathematics and Technology Education
Groenkloof Campus
Pretoria
0002
Tel: (012) 420 5572

==========

12 November 2010

DATE _____

Dear Parent

LETTER OF CONSENT OF CHILDREN TO PARTICIPATE IN THE RESEARCH STUDY

I am an Med student at the above mentioned institution. My research topic is; "An investigation into teachers' design of assessment tasks in senior phase mathematics; a case study of two teachers".

Purpose of the study

The purpose of the study is to determine how assessment tasks in Grade 7 mathematics are designed by teachers and to ascertain whether the required Learning Outcomes and Assessment standards are addressed by the tasks. The knowledge and skills of the teachers will be investigated.

Kindly be informed of the following conditions pertaining to the conducting of the research in your child's classroom;

All participation by your child after obtaining your consent is voluntary.

1. The name of the child will not be revealed in the findings of the study.
2. The child's books and assessment scripts will be analyzed to check for teacher feedback and relevancy of work given.
3. As a parent you can withdraw your child at any time

Should you wish your child to participate, kindly sign the consent form.

PERMISSION FOR RESEARCH
I, _____, hereby give my child _____consent to participate in the study. I am assured of anonymity, and know that I can withdraw my child if I do not wish him/her to participate any more. Signature: _____ Date: _____

For more information about this research you may contact the researcher at the following numbers

_____

MNISI THABO M. (Mr.)

P O Box 302
Hazyview
1242
Cell: 083 298 6227
EMAIL: thabomnisi@ananzi.co.za

_____

PROF G.O.M. ONWU (SUPERVISOR)
Tel: (012) 420 5572
EMAIL: gilbert.onwu@up.ac.za

Appendix J

education
DEPARTMENT: EDUCATION
MPUMALANGA PROVINCE

Private Bag X 11341
Nelspruit 1200
Government Boulevard
Riverside Park
Building 5
Mpumalanga Province
Republic of South Africa

Litiko leTemfundvo · Umnyango weFundo Departement van Onderwys Umnyango weze Mfundo

Enquiries: A.H Baloyi (013) 766 5476

Mr. T.M. Mnisi
P.O. BOX 302
Hazyview
1242
12 November 2010

RE: APPLICATION TO CONDUCT EDUCATIONAL RESEARCH IN SOME OF THE PRIMARY SCHOOLS OF THE PROVINCE.

Your application (Dated 11 November 2010) to conduct educational research on the topic: "An Investigation into Teachers' Design of Assessment Task in Senior Phase Mathematics" was received on the 12 November 2010.

Your detailed research proposal, research questions, purpose and the background gives an impression that your study will benefit the entire department especially the GET mathematics teachers, and more importantly the learners who are aspiring to be successful citizens. Given the motivation and the anticipated report of the study, I approve your application to conduct your research in the institutions of the department.

You are further requested to read and observe the guidelines as spelt out in the attached research manual. The importance of this study cannot be

overemphasized; therefore you are expected to share your findings with the department and to effectively implement your findings. It will be appreciated if you can present your findings in electronic form and make formal presentation to the strategic planning's' research unit.

For more information kindly liaise with the department's research unit @ 013 766 5476 or a.baloyi@education.mpu.gov.za.

The department wishes you well in this important study and pledge to give you the necessary support you may need.

RECOMMENDED/~~NOT RECOMMENDED.~~

PP 12/11/2010

MS G. MASHITENG **DATE**
SENIOR MANAGER: STRATEGIC PLANNING,
RESEARCH & PROJECT COORDINATION.

APPROVED/~~NOTAPPROVED~~:

12/11/2010

MRS MOC MHLABANE **DATE**
HEAD OF DEPARTMENT

Appendix K

TEACHING AND LEARNING ACTIVITY PLAN TEMPLATE

rade: 7 Date: 06 April -

ontent: Geometric figures Context: Solve problems

uration: 10hours length, Perimeter

ore knowledge: _____

Learning Outcomes	Assessment Standards

ocus: _____

esources: _____

tegration: _____

orm of Assessment: _____

ducator and learners activities:

APPENDIX L

ASSESSMENT TASK NO.1 (ASSIGNMENT) 11 February 2011
GRADE 7 MARKS: 66

NAME OF A LEARNER _____ CLASS _____

LO:
AS

Instructions

1. Answer all question on the answersheet
2. Write neat and legible
3. Do not write answers only; unless requested to. Show all your calculations
4. Use your calculator where applicable or when requested to do so.

Question 1

1.1 Use your calculator to convert these common fraction into decimals

a. $\frac{1}{2}$ = ____ b. $\frac{2}{5}$ = ____ c. $\frac{7}{8}$ = ____

d. $\frac{17}{25}$ = ____ 4x1 =(4)

1.2.1 Calculate the following

(a) $\frac{3}{7} + \frac{2}{7}$ b. $\frac{4}{5} - \frac{1}{3}$

(3) (3)

c. $3\frac{2}{3} + 1\frac{1}{2}$

5)

1.2.2 Calculate

(a) $2 \times \frac{3}{8}$

(b) $6 \times \frac{5}{2}$

$3 \times 1 = (3)$

(c) $-2 \times 3\frac{1}{2}$

Question 2

2.1 Simplify

(a) $2\frac{1}{4} + 1\frac{1}{2}$

= _____

_____

_____

_____

_____

_____ (5x1)

(b) $3\frac{1}{3} - 2\frac{3}{4}$

= _____

_____

_____

_____

_____

_____ (4x1)

(c) $2\frac{1}{2} - 5\frac{1}{3} + 1\frac{1}{4}$

(5x1)

(d) $2 - (\frac{3}{5} - \frac{1}{3})$

(e) $\frac{5}{6} \div 1\frac{2}{3}$

(6 x 1)

Good Luck

Appendix M

MATHEMATICS GRADE 7 MARKS 35

ASSESSMENT TASK NO.2 MARCH 2011

QUESTION 1

1.1 Simplify

Use your calculator to get a correct answer

(a) $-5-3=$

(b) $7-9=$

(c) $-5+3=$

(d) $3-5=$

(e) $0-10=$ $(2\times5)=10$

.2 Factorsand Multiples

.2.1 Which of the following, 36 18, 6, 3 and 8

(a) are factors of 12? (4)

(b) is a multiple of 12? (2)

1.2.2 List the set of all factor of 7 (2)

Question 2

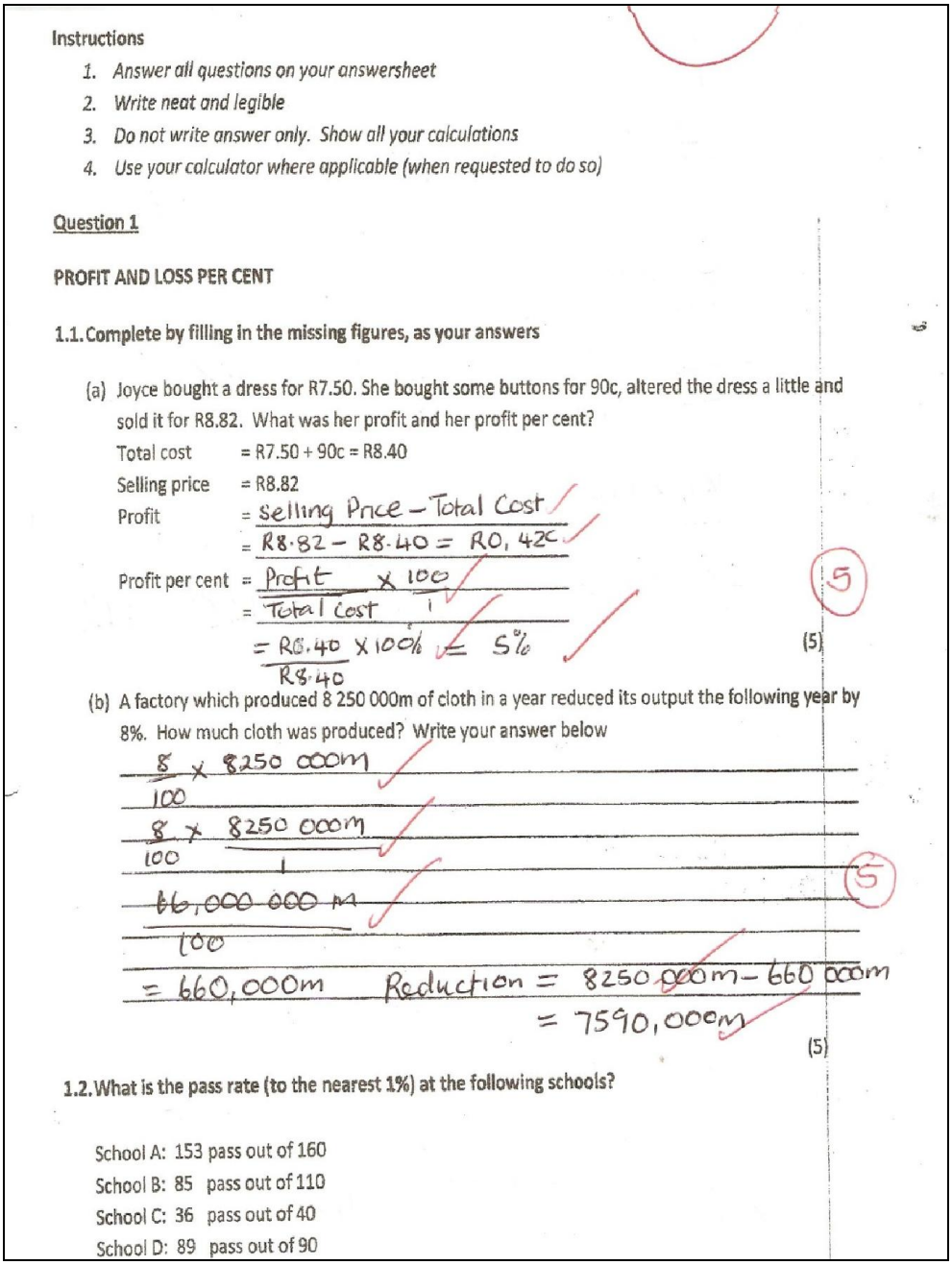
2.1 Calculate

(a) 6% of 1500 (5)

(b) 30% of 4,720 m (6)

(c) 75% of 164 kg (6)

Appendix N



Instructions

1. *Answer all questions on your answersheet*
2. *Write neat and legible*
3. *Do not write answer only. Show all your calculations*
4. *Use your calculator where applicable (when requested to do so)*

Question 1

PROFIT AND LOSS PER CENT

1.1. Complete by filling in the missing figures, as your answers

(a) Joyce bought a dress for R7.50. She bought some buttons for 90c, altered the dress a little and sold it for R8.82. What was her profit and her profit per cent?

Total cost = R7.50 + 90c = R8.40

Selling price = R8.82

Profit = Selling Price – Total Cost

= R8·82 – R8·40 = R0, 42c

Profit per cent = $\frac{\text{Profit}}{\text{Total Cost}} \times 100$

= $\frac{\text{R0.40}}{\text{R8.40}} \times 100\% = 5\%$ (5)

(b) A factory which produced 8 250 000m of cloth in a year reduced its output the following year by 8%. How much cloth was produced? Write your answer below

$\frac{8}{100} \times 8250\,000m$

$\frac{8 \times 8250\,000m}{100}$

$\frac{66,000,000\,m}{100}$

= 660,000m Reduction = 8250 000m – 660 000m

= 7590,000m

(5)

1.2. What is the pass rate (to the nearest 1%) at the following schools?

School A: 153 pass out of 160

School B: 85 pass out of 110

School C: 36 pass out of 40

School D: 89 pass out of 90

Write your answers below

School A: $\frac{153}{160} \times 100\%$

$\frac{153}{160} \times \frac{100\%}{1} = \frac{15300\%}{160}$

$= 95,6\% = 96\%$

(3)

School B: $\frac{85}{110} \times 100\%$

$= \frac{85}{110} \times \frac{100\%}{1} = \frac{8500\%}{110} = 77,27\% = 77\%$

(3)

School C: $\frac{36}{40} \times 100\%$

$= \frac{36}{40} \times \frac{100\%}{1} = \frac{3600\%}{40} = 90\%$

(3)

School D: $\frac{89}{90} \times 100\%$

$= \frac{89}{90} \times \frac{100\%}{1} = \frac{8900\%}{90} = 98,8\% = 99\%$

(3)

Question 2

PERCENTAGE INCREASE AND DECREASE

2.1. (a) Increase the given quantity by the percentage shown in brackets:

1. 320 (5%)
2. R128 (7½%)

Write your answers below

1. $\frac{5}{100} \times 320$

$= \frac{5}{100} \times \frac{320}{1}$

$\frac{5 \times 320}{100} = \frac{1600}{100} = 16$

Percentage increased $= 320 + 16$

$= 336$

(5)

2. $7,5\% = \frac{7,5}{100}$

$\frac{7,5}{100} \times \frac{R128,00}{1}$

$\frac{7,5 \times R128,00}{100 \times 1} = \frac{R960,00}{100} = R9,60^c$

Percentage increase = R128,00 + R9,60c

= R137,60c

(5)

(b)Decrease the given quantity by the percentage shown in brackets:

1. 825 (4%)
2. R48.80 (7½%)
3. 12.300 kg (10%)

Write your answers below.

1. $\frac{4}{100} \times 825$

$= \frac{4}{100} \times \frac{825}{1}$

$= \frac{3300}{100} = 33$

∴ Percentage decrease = 825 − 33

= 792 (6)

(6)

2. $\frac{7,5}{100}$

$\frac{7,5}{100} \times \frac{R48,80^c}{1} = \frac{R366,00}{100} = R3,66^c$

Percentage decrease = R48,80c − R3,66c

= R45,14c

(6)

3. $\frac{10}{100} \times 12,300\,kg$

$\frac{10}{100} \times \frac{12,300kg}{1} = \frac{123\,kg}{100} = 1,23\,kg$

percentage decrease = 12,300kg − 1,23kg

= 11,07kg (6)

GRAND TOTAL {55}

****

APPENDIX O

First Term
Mark Schedule
Mathematics Grade 7A

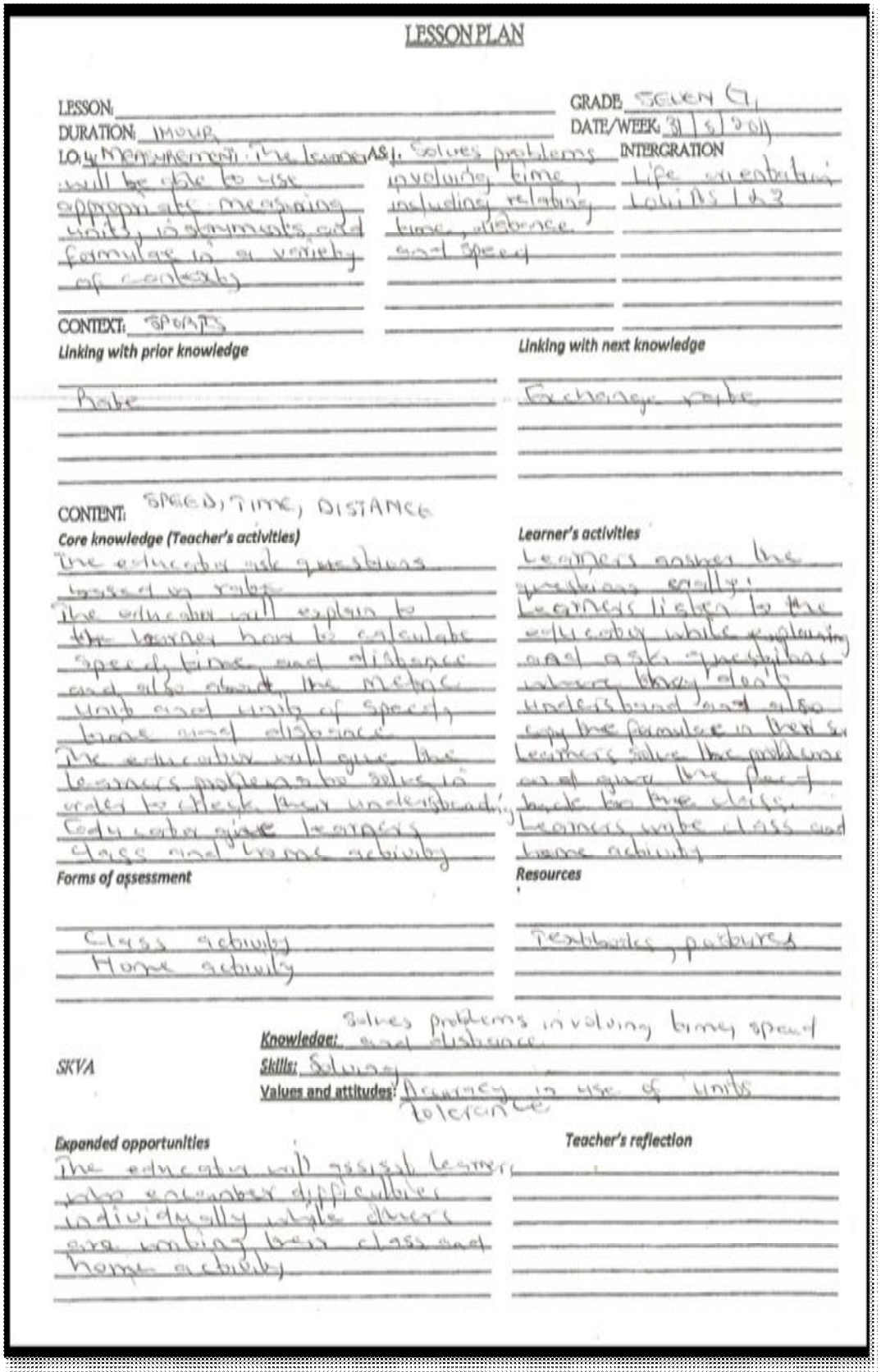
CLASS LIST
GRADE 7A
2011

Term 2

No.	Name			Total		level		4		Exam	Total	6	
		55	66	35	156	100%	1-7	T1		50		50	100%
1	Khoza Buhle	00	15	22	37	24	1	45	90	18	108	54	4
2	Leyane Khulekani B	08	37	27	72	46	3	41	82	10	102	51	4
3	Mabuza Lifa B	20	19	27	66	42	3	38	76	20	96	48	3
4	Mabuza Thulani B												
5	Mabuza Xolani B	07	25	18	50	32	2	41	82	09	101	51	4
6	Mahlangu Calvin B	00	06	12	18	12	1	39	78	09	87	43	3
7	Mahlangu Elsie	01	10	28	39	25	1	40	80	12	92	46	3
8	Maile Thabo B	00	25	25	50	32	2	39	78	13	91	46	3
9	Makamo Patience	00	04	16	20	13	1	29	58	10	68	34	2
10	Makhabane Fortunate	10	03	18	31	20	1	36	72	18	100	50	4
11	Malope Simphiwe	03	21	18	42	27	1	49	98	12	110	55	4
12	Malumane Consolation	00	08	00	08	05	1	39	78	16	94	47	3
13	Maseko Clerence B	02	06	15	23	15	1	35	70	12	82	41	3
14	Mashego Jimmy B	08	05	25	38	24	1	39	78	18	96	48	3
15	Mashego Lindokuhle	02	06	10	18	12	1	40	80	17	97	49	3
16	Mashego Lisane	07	19	29	55	35	2	40	80	10	90	45	3
17	Mashego Lungile	03	19	16	38	24	1	35	70	15	85	43	3
18	Mathebula Thobile	09	02	18	29	19	1	46	92	07	99	49	3
19	Matsaba Pinky	00	10	12	22	15	1	39	78	10	88	44	3
20	Mayinga Lisa	11	00	17	28	18	1	41	82	14	96	48	3
21	Mazibe Cynthia	01	08	21	30	19	1	38	76	13	89	45	3
22	Mhlanga Pennuel/Tyler	00	15	30	45	29	1	40	80	15	95	48	3
23	Mkhabela Innocentia												
24	Mnisi Nomagugu/Camila	01	21	23	45	29	1	41	82	10	92	46	3
25	Mokoena Ntando	01	49	10	60	38	2	41	82	07	99	50	4
26	Mokoena Sibongile	00	07	17	24	15	1	34	68	14	82	41	3
27	Mokoena Themba	00	12	24	36	23	1	41	82	16	98	49	3
28	Mokoena Vanessa	02	46	19	67	43	3	39	78	14	92	46	3
29	Mona Ignetias/Sandile	00	44	28	72	46	3	36	72	12	84	42	3
30	Moyo Mathews	31	04	24	59	38	2						
31	Ndimande Mthokozisi	08	21	29	58	37	2	44	88	17	105	54	4
32	Ndlovu Nothando												
33	Ndubane Thobeka	03	19	23	45	29	1	44	88	11	99	50	4
34	Ngomane Mbongeni	00	03	08	11	08	1	37	74	18	92	46	3
35	Ngutshane Sibusiso	00	11	25	36	23	1	32	64	18	82	41	3
36	Nkosi Nozwelo	14	10	26	50	32	2	36	72	18	90	45	3
37	Nkosi Thembisile												
38	Nkuna Sibusiso	26	10	27	63	40	3	45	90	20	110	55	4
39	Nobela Bongile	00	02	02	04	03	1	40	80	18	98	49	3
40	Ntuli Hlengiwe	00	48	19	67	43	3	32	64	16	80	40	3
41	Nukeri McDonald	22	34	28	84	54	4	48	96	20	116	58	4
	Ngomane Mlungisi	04	30	12	46	29	1	31	62	18	80	40	3

							level		T1			Total /200	Prom	level
	Sayizi Sonia	02	00	04	06	04	1		35	70	10	80	40	3
43	Seerane Zweli	00	09	24	33	21	1		41	82	14	96	43	3
44	Songo Success	02	06	04	12	08	1		35	70	10	80	40	3
45	Sono Mpendulo	-	14	-	14	09	1		38	76	15	91	46	3
46	Tembe Nicholus	20	25	25	70	45	3		35	70	05	85	43	3
47	Themba Mncedisi													
48	Tsela Phumla	02	04	30	36	23	1		43	86	14	100	50	4
49	Zitha Tswarelo	02	07	19	28	18	1				05			

APPENDIX P



LESSON PLAN

LESSON: _____ GRADE: SEVEN (7)

DURATION: 1HOUR DATE/WEEK: 31/5/2021

LO: MEASUREMENT: THE LEARNER WILL BE ABLE TO USE APPROPRIATE MEASURING UNITS, INSTRUMENTS AND FORMULAE IN A VARIETY OF CONTEXTS

AS: SOLVES PROBLEMS INVOLVING TIME, INCLUDING RELATIVE, DISTANCE AND SPEED

INTERGRATION: LIFE ORIENTATION LO 1 & 3

CONTEXT: SPORTS

Linking with prior knowledge

RATE

Linking with next knowledge

EXCHANGE RATE

CONTENT: SPEED, TIME, DISTANCE

Core knowledge (Teacher's activities)

THE EDUCATOR ASK QUESTIONS BASED ON RATE

THE EDUCATOR WILL EXPLAIN TO THE LEARNER HOW TO CALCULATE SPEED, TIME AND DISTANCE AND ALSO ABOUT THE METRIC UNITS AND UNITS OF SPEED, TIME AND DISTANCE

THE EDUCATOR WILL GIVE THE LEARNERS PROBLEMS TO BE SOLVED IN ORDER TO CHECK THEIR UNDERSTANDING

COPY WORK GIVE LEARNERS CLASS AND HOME ACTIVITY

Learner's activities

LEARNERS ANSWER THE QUESTIONS ORALLY.

LEARNERS LISTEN TO THE EDUCATOR WHILE EXPLAINING AND ASK QUESTIONS WHERE THEY DON'T UNDERSTAND AND ALSO COPY THE FORMULAE IN THEIR BOOKS

LEARNERS SOLVE THE PROBLEMS AND GIVE THE PAPER BACK TO THE EDUCATOR.

LEARNERS WRITE CLASS AND HOME ACTIVITY

Forms of assessment

CLASS ACTIVITY
HOME ACTIVITY

Resources

TEXTBOOKS, PICTURES

SKVA

Knowledge: SOLVES PROBLEMS INVOLVING TIME, SPEED AND DISTANCE

Skills: SOLVING

Values and attitudes: ACCURACY IN USE OF UNITS, TOLERANCE

Expanded opportunities

THE EDUCATOR WILL ASSIST LEARNERS WHO ENCOUNTER DIFFICULTIES INDIVIDUALLY WHILE OTHERS ARE DOING BOTH CLASS AND HOME ACTIVITY

Teacher's reflection

APPENDIX Q

FORM OF ASSESSMENT : ASSIGNMENT
DATE : 4 MARCH 2011
MARKS : 20
LEARNING OUTCOME : 1
ASSESSMENT STANDARD : 3, 7

1a. List the factors of 100 in ascending order. (1)

b. Calculate:

(i) 9,62 + 4,85 (1)

(ii) Thapelo buys 120 apples. 15% of them are bad. How many apples are bad? (4)

c. Calculate the following:

(i) 5^3 (1)

(ii) 12^2 (1)

2. Calculate:

a. $4^2 + 5^2$ (2)

b. $6^2 - 3^3$ (2)

c. $3^2 + (8^2 - 2^3) \times 4^3$ (4)

d. $\sqrt{100 - 36}$ (2)

e. $\sqrt{100} + \sqrt{64}$ (2)

APPENDIX R

TERM ONE GRADE 7 MATHEMATICS

TASK 1

FORM OF ASSESSMENT : TEST
DATE : 8 MARCH 2011
MARKS : 30
LEARNING OUTCOME : 1
ASSESSMENT STANDARD: 3; 4; 7

1. a. Arrange these integers in ascending order:
(i) $-3; -7; 0; 9; -10$ (1)
(ii) $5; -2; -3; 0; 8$ (1)

b. Arrange these integers in descending order:
(i) $8; -4; 3; 0; 11$ (1)
(ii) $-6; 1; 12; -7; 0$ (1)

c. The following temperatures were recorded one winter morning:

Johannesburg	3°C
Cape Town	0°C
Durban	9°C
Bloemfontein	-2°C
Warmbaths	10°C

(i) Where is it the coldest? (1)
(ii) What is the temperature difference between Johannesburg and Bloemfotein? (1)
(iii) Arrange the temperatures in ascending order (1)

2. a. Calculate the following

(i) $-6 + 8$ (1)

(ii) -5×-3 (1)

(iii) $-75 \div -25$ (1)

(iv) $165 - 345$ (1)

b. Write $>$ or $<$ in place of $\square$ to make each sentence true:

(i) $1 \square -3$ (1)

(ii) $-2 \square -7$ (1)

(iii) $-4 \square 0$ (1)

3. a. Write the following decimal fractions as common fractions:

(i) 5) 131 (1)

(ii) 6) 797 (1)

b. Write the following as decimal and percentage:

$\frac{4}{25}$ (1)

c. Calculate

(i) 2) 134 + 9) 001 (1)

(ii) 2) 013 − 0) 666 (1)

4. Calculate and write your answer in its simplest form:

a. $\frac{1}{2} + \frac{2}{3}$ (2)

b. $\frac{7}{8} - \frac{1}{2}$ (2)

c. $\frac{7}{10} + \frac{2}{5}$ (2)

Corrected

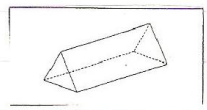
04/02/2011

APPENDIX S

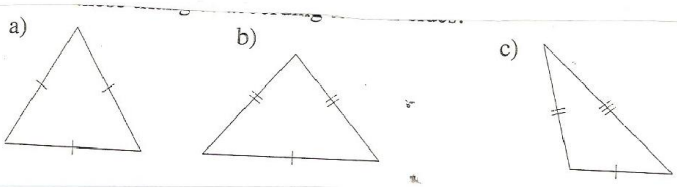
TERM TWO TASK NO 4 MATHEMATICS GR7

FORM OF ASSESSMENT : CLASS WORK
DATE : 17 MAY 2011
MARKS : 20
LEARNING OUTCOME : 3 ; 4
ASSESSMENT STANDARD : 1; 2; 2, 5

1. Complete the table. (4)

Solid	Number of faces	Number of vertices	Number of edges	Name of polyhedron
				

2. Name these triangle according to their sides. (3)

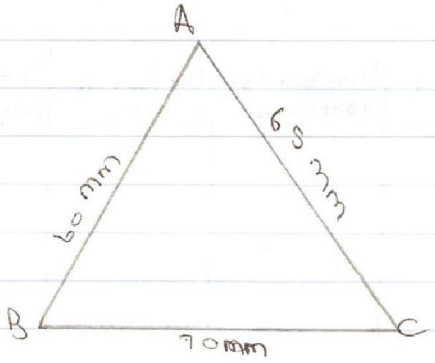


3. Calculate the perimeter of the following shapes:

a.

(3)

b.



(3)

4. Draw each of the following shapes. Also write down one thing that is the same and differ in both. Square and rhombus both. (4)

5. Are these pairs of lines perpendicular or parallel?

a. A pair of horizontal lines.
b. A pair of vertical lines.
c. A horizontal and vertical line that meet at a point.

Controller
16/05/2014

APPENDIX T

TASKS	1	2	3	G. Total	%	Level	Comments
Total mark				110			
Date of Assessment							
LO(s)							
Assessment standards							
Form of assessment used							
NAMES	1	2	3	G. Total	%	Level	Comments
37. Mkhabela Thapelo	04	-	05	09	8%	1	
38. Mkhombo Gloria	03	08	0	11	10%	1	
39. Mnene Tebogo	02	14	13	29	26%	1	
40. Mnisi Prudence	04	12	05	21	19%	1	
41. Mnisi Sphiwe	05	09	10	24	22%	1	
42. Mogale Valencia	03	08	14	25	23%	1	
43. Mohlala Thobile	11	10	08	29	26%	1	
44. Mokoena Keletso	-	08	08	16	15%	1	
45. Mphangane Cynthia	04	10	06	20	18%	1	
46. Msume Witness	16	04	13	33	30%	2	
47. Ncongwane Philile	02	03	04	09	8%	1	
48. Ndlovu Yvonne	05	09	16	30	27%	1	
49. Ndubane Martha	05	03	04	12	11%	1	
50. Ngobe Terminator	04	10	11	25	23%	1	
51. Ngobe Thokozani	03	11	08	22	20%	1	
52. Ngomane Boni	0	08	02	10	9%	1	
53. Ngomane Karabo	07	06	05	18	16%	1	
54. Ngomane Monica	09	05	06	20	18%	1	
55. Ngomane Xolani	03	05	04	12	11%	1	
56. Nkosi Louisa	04	16	08	28	25%	1	
57. Nkuna Thembeka	07	09	11	27	25%	1	
58. Ntini Nomonde	04	03	13	20	18%	1	
59. Nyalunga Nolwazi	03	-	13	16	15%	1	
60. Nyathi Bonani	03	02	03	08	7%	1	
61. Phiri Josephine	11	04	02	17	15%	1	
62. Phiri Mzwakhe	10	-	08	18	16%	1	
63. Rabio Siboniso	02	10	05	17	15%	1	
64. Sedibe Kgaugelo	15	17	09	41	37%	2	
65. Shakoane Thulani	04	05	06	15	14%	1	
66. Shakoane Victor	21	17	14	52	47%	3	
67. Shiba Nomathemba	04	12	16	32	29%	1	

TASKS	1	2	3	G. Total	%	Level	Comments
Total mark							
Date of Assessment							
LO(s)							
Assessment standards							
Form of assessment used							
NAMES	1	2	3	G. Total	%	Level	Comments
68. Shiba Zine	01	07	01	09	8%	1	
69. Shongwe Lebogang	04	07	12	23	21%	1	
70. Sibiya Freddy	06	04	04	14	13%	1	
71. Sithebe Vusi	11	19	11	41	37%	3	
72. Thibela Pontso	05	03	12	25	23%	1	
73. Tiwala Mbuso	03	0	18	21	19%	1	
74. Mokoena Pretty	-	-	-	0	0%	1	
75.							
76.							
77.							
78.							
79.							
80.							
81.							
82.							
83.							
84.							
85.							
86.							

EDUCATION SPECIALIST
Mr C.E. NGWENYA
HAZYVIEW 1242
072 753 7 867
Controlled

EDUCATOR MALABA . M. M ..... SIGNATURE ..... DATE .....

HOD/PRINCIPAL ..... SIGNATURE ..... DATE .....

MODERATOR ..... SIGNATURE .....

APPENDIX U

MPUMALANGA DEPARTMENT OF EDUCATION

PROGRAMME OF ASSESSMENT

GRADE 7

(2011 – 2012)

Task	**Date**	**Form of assessment**	**Knowledge and concepts**	**Minimum Marks**
1	07-11 Feb. 2011	Test	❖ Integers (comparison, representation) ❖ Decimals (to at least three decimals) - representation • Compare and use the equivalent form of rational numbers • Multiple operation with integers • Addition, subtraction of common fraction with different denominators • Multiplication of proper fractions by mixed fraction • Addition and subtraction of positive decimals to at 2 decimal places	30
2	28 Feb-04 March 2011	Assignment	• Multiplication of positive decimals to at 2 decimal places • Finding percentages • Solve problems involving exponents through expansion • factors including prime factors of 3-digit whole numbers; • Numbers in exponential form including ❖ Squares of natural numbers to at least 12^2 ❖ Cubes of natural numbers to at least 5^3 And their square roots and cube roots.	20

3	14 March	Quarterly	Equivalence of numeric and	50

	2011	Test	geometric patterns looking for a relationship or rules (in words, flow diagrams and tables) • Not limited to sequences involving constant difference or ratio **NB: Plus all the other knowledge and concepts taught for the whole term.**	
4	03-06 May 2011	Classwork	• Polygons (similarities and differences) • Solids • Properties of polygons ❖ faces, vertices and edges ❖ sides and angles of polygons with focus on triangles and quadrilaterals ❖ parallel and perpendicular sides • Calculates, by selecting and using appropriate formulae ❖ Perimeter of polygons	20
5	23-27 May 2011	Project	• Area of triangles • Solves problems involving: ❖ Volume and surface area of rectangular prisms. • Properties of polygons looking at: ❖ faces, vertices and edges ❖ Parallel and perpendicular • interrelationships between ❖ Perimeter and area of geometric figures, ❖ surface area and volume of geometric • Uses a pair of compasses, ruler and protractor to accurately construct geometric figures for investigation of own property and design of nets. • Designs and uses nets to make models of geometric solids studied up to and including this Grade.	30

6	13 June 2011	Half yearly Exam	• Solve problems based on ❖ Profit and loss, budget including drawing personal budget ❖ Accounts (interpretation) ❖ Loans including advantages and disadvantages ❖ Simple interest, hire purchase and exchange rates • Solve problems that involve ratio and rate, including problems involving time, distance and speed. **NB: Plus all the other knowledge and concepts taught in this semester**	100
7	01-05 Aug 2011	Test	• Draw and interprete graphs / situations (height of a roller – coaster over time , the speed of a racing car going around a track) • Locates positions on co-ordinate systems and maps using: ❖ Horizontal and vertical change ❖ Compass directions • Use transformations (rotations, reflections and translations) and symmetry to investigate properties of geometric figures.	50