

TEACHER ASSESSMENT PRACTICES: A CASE STUDY OF
THREE GRADE 9 MATHEMATICS TEACHERS IN THE
NORTHERN REGION OF KWAZULU-NATAL PROVINCE

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ABSTRACT

The research project explored the Grade 9 mathematics teachers' assessment practices in the context of the National Policy on Assessment and Qualifications for Schools in the General Education and Training Band in South African Schools. The research project also explored the mathematics teachers' understanding of the assessment policy in Mathematics and the impact of teachers' understanding of assessment on their assessment practices. The research project was a case study of three Grade 9 Mathematics teachers from three schools in Obonjeni District in the Northern Zululand Region in KwaZulu-Natal Province. The data was collected through observations of teachers teaching Grade 9 Mathematics lessons, analysis of teachers' planning and assessment documents and teacher interviews. Each teacher was observed teaching his/ her lessons five times. Based on the results obtained it was concluded that: (a) teachers have different understandings of the same assessment policy and this resulted in teachers implementing the assessment policy differently. (b) teachers are using some of the assessment practices that are recommended in the assessment policy. and (c) teachers' understanding of assessment does not influence their assessment practices. Finally, recommendations made concerning assessment practices, could lead to teachers' better understanding of assessment.

DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.



Michael Msawenkosi Thabethe

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CHAPTER 1: THE STUDY IN CONTEXT

1.1 INTRODUCTION

The political, social and economic changes in South Africa over the past 15 years have been accompanied by considerable changes in the education system. One of the key imperatives of the new curriculum in South Africa was the implementation of an effective assessment system for providing relevant and timeous information to all roleplayers for use in improving learning in schools (Kanjee, 2009). In particular, the development of assessment systems at the classroom level for addressing the needs of teachers was a key priority (Department of Education (DoE), 1998, 2007). The development of assessment systems at classroom level has a number of challenges (Kanjee, 2009). Specifically, assessment systems that support teachers in addressing the learning needs of learners, have been found wanting as evidence by the range of different studies on this matter (DoE, 2000; Pryor & Lubisi, 2002; Ramsuran, 2006; Vandeyar & Killen, 2007; Kanjee, 2009).

With the introduction of the new curriculum and its philosophy of outcomes based education (OBE), a number of assessment related policies and guidelines that placed greater emphasis on classroom assessments were introduced. Specifically, these were the Assessment Policy in the General Education and Training Band, Grade R to 9 and Adult Basic Education and Training (ABET) (DoE, 1998), the interim policy framework for the assessment and promotion of learners in Grade 9 (DoE, 2003), and the national protocol on assessment for schools in the General and Further Education and Training Bands, Grades R to 12 (DoE, 2005b). Most recently the 1998 assessment policy was revised to align it with curriculum changes implemented in the National Curriculum Statements for General and Further Education and Training Bands (Kanjee 2009). The new assessment policy (DoE, 2007) placed greater emphasis on classroom assessment by outlining the range of assessment information available to teachers, specifying the frequency and types of assessment information required for reporting on learner performance at the different grade levels and providing templates for recording and reporting the performance of

learners, for example, learner profiles. However, Vandeyar and Killen (2007) note that while the revised policy makes several major advances in simplifying assessment in South African schools, there are no guidelines that would enhance the validity and reliability of the information that will be reported. Similarly, Kanjee (2009) notes that only limited learning and teaching resources are available to specifically assist teachers in improving their classroom assessment practices.

This introductory chapter will now briefly highlight literature on assessment policy, teachers' understanding of assessment and struggles that teachers have with the implementation of the policy. This review includes the background and purpose, the critical questions and rationale for the study. The chapter, finally, gives the organisation of the report.

1.2 BACKGROUND OF THE STUDY

South Africa has embarked and is still embarking on radical curriculum change. The curriculum change has been stimulated by major political changes which occurred in the country during the 90's. This political change brought about the abolition of apartheid and the production of a democratic South Africa. Throughout the 90's education debates focused on lifelong learning and increased mobility for learners. A new curriculum, the National Curriculum Statement (NCS), was developed by the National Department of Education and implemented in 2003.

A distinguishing feature of the NCS is its up-front political agenda. The NCS is a vehicle for restructuring South African society along democratic principles. This is captured in the introduction to the National Curriculum Statement. The curriculum is seen to be at the heart of the education and training system. In the past the curriculum has perpetuated race, class, gender and ethnic divisions and has emphasized separateness, rather than common citizenship and nationhood. It is therefore imperative that curriculum reconstruction should reflect the values and principles of our new democratic society (DoE, 1997).

A new curriculum, which has been developed over the past 15 years and is currently being implemented in schools, is often presented as a complete break from the past, as the antithesis of the apartheid curriculum (see table 1). Table 1 represents a dichotomous picture of the old and new classrooms; they are either of one type of the classroom or the other. It is not surprising that most teachers prefer the image of the new, particularly when the old is presented as a manifestation of apartheid.

OLD CLASSROOM	NEW CLASSROOM
Passive learners	Active learners
Rote-learning	Critical thinking, reasoning, reflection and action
Syllabus is content-based and broken down into subjects	An integration of knowledge; learning relevant and connected
Textbooks/worksheets bound and teacher-centered	Learner-centred; teacher is facilitator; teacher constantly uses group work and team work
Teachers responsible for learning; motivation dependent on the personality of the teacher	Learners take responsibility for their learning; learners motivated by constant feedback and affirmation of their worth
Content placed into rigid time-frames	Flexible time-frames allow learners to work at their own pace

Table 1: The old and new classroom according to Curriculum 2005 (DoE, 1997; pp.6-7)

The new curriculum for South African schools is characterized by its Outcomes Based approach presenting educational reform, driven by policy (National Curriculum Statement Grade (NCS) R-9, 2002). The vision for the NCS was improving all learners' learning outcomes (DoE 1998). The National Department of Education (DoE) produced assessment policy documents that focuses "on the achievement of clearly defined outcomes" (DoE, 2007, p. 5).

knowledge, The Outcomes Based Education (OBE) approach represents a new paradigm in education that aims “to equip all learners with the knowledge, skills and orientation needed for success” (DoE, 2002, p. 2) after schooling. According to DoE (1998, p. 9) “OBE is an approach that embraces the capacity of learners to respond to wise guidance by teachers”

As part of the curriculum reform process, it is necessary for assessment strategies and techniques to be reviewed. Changes to assessment have always been recognized as an important means of achieving curriculum change (Pretorius, 1998; Clarke, 1996; Noona & Renihan, 2006).

Traditionally, in South African schools, many teachers assessed learners’ mathematical understanding through tests and examination. Assessment, only in the form of tests and examinations, was a practice associated with the old curriculum. The DoE’s assessment policy document (2007) offers a new dimension to assessment in South Africa. This policy (DoE, 2007) stresses that the main purposes of assessment are individual growth and development of the learner. This document also stresses that to achieve this individual growth and learner development; teachers must use a variety of appropriate assessment strategies that adequately assess learner achievement and development of skills for lifelong learning. For that reason, this research will explore teachers’ understanding of assessment, their (teachers) perceptions about assessment policy in Mathematics and the influence of these perceptions on teachers’ assessment practices.

The National Policy on Assessment and Qualifications for Schools in the General Education and Training Band document (2007) states that “teachers have the responsibility to assess the progress of learners in achieving the expected outcomes” (DoE, 2007, p.7). Furthermore, it states that “assessment instruments and procedures must be appropriate to the intensity and the nature of the support needed by a learner” (ibid., p. 7). It also emphasizes the purpose of assessment as:

Assessment is the integral part of teaching and learning and should be planned for when developing ...lesson plans. The strategies and forms of assessment used

should be appropriate for the skills and the range of competencies being assessed as well as for the ...developmental needs of the learner. (DoE, 2007, p .6).

Mathematics assessment is a mechanism for the construction of learners' Mathematics competence (Clarke, 1996). The aim of assessment is to promote "learners' Mathematical growth and competence" (DoE, 2007, p. 7). Thus teachers' assessment strategies are crucial to the construction of learners' Mathematical competence (DoE, 2007). This study however focuses on the teachers' understanding of assessment and how teachers use assessment strategies.

1.3 PURPOSE FOR THE STUDY

The NCS policy documents advocate an approach that sees assessment as being integrated with teaching and learning. This approach in which assessment is "inextricably linked" to teaching and learning (DoE, 2007, p. 20) indicates a shift in emphasis from a summative to a formative purpose of assessment, with feedback to learners as one of the mechanisms of promoting formative assessment.

As a Mathematics subject advisor, it is the researcher's view that new assessment policies as outlined in the assessment policy of the DoE (2007), aim to change teachers' assessment practices in Mathematics. Good assessment practices are crucial to sound construction of Mathematics knowledge. As a crucial element in the assessment, teachers' assessment practices are sometimes ignored. The Department of Education's assessment policy is reticent about teachers' assessment practices. Therefore, issues around teachers' assessment practices need to be foregrounded in order to improve the effectiveness of assessment. The new assessment policies introduced an entire new set of demands that most teachers found difficult to address. Vandeyar and Killen (2007) describe how the three Grade 4 Mathematics teachers still held very strong teacher-centred conceptions of assessment, and that this was manifested in their classroom practice which conflicted with the outcomes based approach to assessment. They conclude that teachers need to be trained in the new pedagogy since teachers "cannot use assessment strategies that they do not understand or for which they lack the skills..."

(p.112). Similarly Hariparsad's (2004) comparative case study of two Grade 8 science teachers showed how the respondents had a surface understanding of the new assessment policies and were unable to reconcile it to their own deep rooted assessment beliefs and capacities. This led them to privilege the traditional examinations and tests in their practice. Sokopo (2005) mirrors the above findings on teachers' lack of understanding and their struggles with implementation, and notes that teachers have essentially believed that classroom assessment was merely for the accumulation of marks, and thus, they reduced the curricular outcomes to a checklist.

Lubisi (2000, p. 4) points out that "there is very little research based on assessment practices of South African teachers located in various school contexts". Vandeyar & Killen (2007, p.111) assert that "many teachers in South African schools are unable to adapt their assessment practices according to the changing demands of the workplace". Kanjee (2009) notes that, in South Africa, there is a shortage of resources to assist teachers in improving their assessment practices. With this background in mind and with the emphasis on integration of assessment with teaching and learning as it is required in the National Assessment Policy (DoE, 2007), the researcher has decided to explore the Mathematics teachers' assessment practices in the classroom context.

The purpose of this research project was to explore Grade 9 Mathematics teachers' assessment practices in general. To accomplish the purpose of this study, the following research questions were developed:

1. What are the Grade 9 Mathematics teachers' understandings of the assessment policy in Mathematics?
2. What classroom assessment practices are used by Grade 9 Mathematics teachers?
3. What impact does teachers' understandings of the assessment policy in Mathematics have on their classroom assessment practices?

The researcher considers that this research project is beneficial to policy makers in making sense of the assessment practices used by Mathematics teachers in the Senior

Phase of the General Education and Training Band (GET) against the background of continued major change in the South African education system. The results of this study will benefit policy makers, subject advisors and teachers. The results of the project could provide insight into Mathematics teachers' understanding of assessment and assessment practices so that policy makers could consider these insights in reflecting on and developing policy. Furthermore the findings of the research project will provide Mathematics subject advisors with a research basis for use in their planning and carrying out of support for Mathematics teachers in various school contexts. Additionally, the findings of this study would provide Mathematics teachers with data which could inform their reflections on their own perceptions about assessment and classroom assessment practices.

1.4 THE RATIONALE FOR THE STUDY

The researcher has been a Mathematics teacher in Secondary School, a Mathematics lecturer at a College of Education in KwaZulu-Natal and a Mathematics subject advisor in the past twenty years. From the researcher's informal discussion with teachers, one of the challenges in fulfilling the aspirations of the new assessment policy (which is that assessment is there to improve learning), is that there is an increasing pressure on teachers to use a variety of assessments strategies. Observations from school visits by subject advisors, particularly in Mathematics, reveal that teachers are experiencing problems with planning of different assessment activities. The provision of resources, the establishment of a culture of teaching and learning, the management of assessment, equity and access, and the lack of discipline are some of the issues and problems that are very pertinent in assessment practices (Kotze, 2002). According to Kotze (2002), "a good practically manageable system of education is necessary to address the problems to meet the needs of the intended audience as diversified at present as South Africa" (p.77).

Assessment as portrayed in the NCS (DoE, 2007) should be integrated with learning and teaching. The NCS recognizes that assessment should concentrate on the process of learning rather than on the product. Therefore, the way assessment is conceptualized by

Mathematics teachers becomes crucial in the teaching and learning of Mathematics. It is through this crucial conceptualization of assessment by Mathematics teachers and the researcher's involvement in Mathematics that the researcher embarked on this study.

A number of reasons for the manner in which teachers engaged with assessment are noted. Vandeyar & Killian (2007) found that the teacher's approaches to assessment were influenced by their backgrounds, and their capacity to implement the curriculum. Working with six Grade 7 and 9 teachers (respectively), Van Laren & James (2008) however found that teachers had a limited understanding of the new assessment policy. Van Laren & James (2008) further note that the assessment policies were perceived by some teachers as an externally mandated change in which the individual teacher does not feature. It is in the light of the above literature that this study aims at exploring Grade 9 Mathematics teachers' understanding and practice of assessment.

1.5 ORGANISATION OF THE REPORT

The report is made up of five chapters, which are divided into several sections and subsections according to various issues. The following is a description of what is contained in each chapter.

The first chapter introduces the study and gives a brief background of the study. The purpose of the study is discussed. The research questions that are central to the study are stated. The rationale for the study is also given. The chapter, finally, gives brief descriptions of the chapters contained in the research report.

The second chapter contains the review of the literature related to assessment and assessment practices. The purpose and conceptions of assessment is discussed. Issues related to teacher practices and assessment, the new policy on assessment in Mathematics and continuous assessment in the Mathematics Learning Area are also discussed. The chapter then gives the review of curriculum change theory as the theoretical framework upon which the study is based.

The third chapter is dedicated to a discussion of the methods and procedures. The design of the study, the context and the selection of sites, the process of collecting data and the methods of collecting data are discussed in the third section of the chapter. The last section of the chapter is dedicated to the analysis of data and the limitations of the study. The chapter also considers the rigour and the ethical issues of the study. The chapter ends with a summary.

The fourth chapter gives the analysis of the results as they emerged from the data collected. The analyses of the results are presented in case form. Firstly three individual cases are presented and followed by the cross case analysis of the three participants. Finally a summary of the three cases is provided.

The fifth chapter gives the synthesis of the findings of the study. It is in this chapter that the critical questions that guided the study are answered. The recommendations, suggestion and implications for future research are presented in this chapter. Finally, the conclusion of the report is provided.

CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

It was indicated in the previous chapter that, the National Assessment Policy document(DoE, 2007) emphasizes that teachers have the responsibility to assess the progression of learners in achieving the expected learning outcomes. Assessment was traditionally regarded as an afterthought and was not integrated into the teaching and learning process. Assessment was mainly done in the form of tests and examinations. However, the introduction of the NCS shifted the ways of assessing learners from traditional ways to an outcomes-based approach. The outcomes-based approach to assessing learners emphasize that assessment should be an integral part of teaching and learning.

This chapter presents a review of literature related to assessment. In order to understand the conceptions of assessment, the discussion first addresses the meaning and the purpose of assessment. This will be followed by a detailed account of the conceptions of assessment, both historical and contemporary. The issues surrounding teachers' classroom assessment and assessment practices will be discussed next. The new assessment policy and the notion of continuous assessment in Mathematics will be discussed. Finally a detailed conclusion of the assessment issues is given in the chapter.

2.2 THE MEANING OF ASSESSMENT

If assessment is to play a powerful role in conveying information clearly and directly to learners about their learning and to teachers about their teaching (DoE, 2002; DoE, 2005), and is to be an integral part of education that is linked to all learning activities and is to be at the heart of educational endeavor (Clarke, 1996) then the question is: What is assessment?

Schafer (1994, p. 4) defines assessment as “.... to make a decision about something, to examine or test the performance of individual; to evaluate or judge on the basis of criteria such as correctness, validity and empirical evidence; the process and outcome of assessing- an assessment”. Similarly, McMillan (2007) defines assessment in the classroom context as “the gathering, interpretation, and use of information to aid teacher decision making” (p.5). Gardner (1992) cited in Clarke (1996, p.17) defines assessment as the “obtaining of information about the skills and potentials of individuals, with dual goals of providing useful information to individuals and helpful data to the surrounding community”. According to Black & William (2004), the information obtained through assessment is used to offer learners information to be used to modify their learning activities. In this study, assessment is used to refer to the process of collecting evidence of achievement by one or a number of means (methods) and making judgments of the evidence in order to make inference about an individual learner’s Mathematical competence (DoE, 2007).

According to Lubisi (2000, p. 133), “practice refers to what teachers do in their daily professional life in school and classroom”. Practice is therefore here (in this research project) conceived as that which can be observed by another person. Lubisi (2000) asserts that assessment practices refer to what teachers do in their daily professional lives in the school and classrooms to acquire evidence about learner’s competence.

In this study the term ‘assessment practices’ will be understood in terms developed by Black & William (2004). Assessment practices refer to all the activities undertaken by teachers and learners which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged. It would appear, as James & Van Laren (2006) point out, that exploration of teachers’ assessment practices could give critical insight into what teachers’ understand about assessment.

2.3 THE PURPOSE OF ASSESSMENT

Since this study sought to explore teachers' understanding of assessment the purpose of assessment will be investigated in this study. The reason for focusing on the purpose of assessment is because teachers have the responsibility to assess the progress of learners in achieving the expected outcomes and to report to parents, and other role players, on the levels of achievement acquired by learners during the learning process (DoE, 2007).

The issue of the purpose of assessment is central to educational reform. Clarke (1997) sees assessment as having three fundamental purposes; to model, monitor and inform. Stating its purpose as to 'inform' is a reference to the results of assessment (what is often referred to as feedback). At its roots, assessment is a communication process informing learners, parents and other role-players about what learners have learnt. Assessment is "a continuous communication process between teachers and learners" (Livinchevski, Kutcher & Olivier, 1999, p. 3). A similar notion is presented by Clarke (1997) when he defines assessment as "an opportunity for mutual feedback and a source of investigations for actions" (p. 2). This research project will focus on only one purpose of assessment, which is 'to inform'.

2.4 CONCEPTIONS OF ASSESSMENT

This review of literature is organized into three main sections: (1) historical and contemporary conceptions about assessment, (2) teachers and classroom assessment; (3) teachers' assessment practices. Section one, historical conceptions about assessment, begins with the beginnings of educational assessment and concludes with modern assessment practices in South African education system. Section two focuses on the research on teachers and assessment in Mathematics. Section three focuses on teachers' assessment practices. The third section of the chapter ends with the voice of the Assessment Policy in the Mathematics Learning Area

2.4.1 Historical conceptions about assessment

Assessment in education has a long tradition in developed and in developing countries. There has never been a time in the history of public schools without some form of assessment in place (Cuban, 2004). There have been oral examinations during colonial time in the American public schools (Congress of the United States, 1992). In 1845, Horace Mann convinced the Boston School District to replace oral quizzes with written test in the United Kingdom (Gerberich, 1963). In South Africa, up to the early 80s , assessment was driven by authoritarian concerns for learning, by rote, what had been canonized by apartheid education bureaucrats as worthwhile knowledge in all subjects. Adherence to routine and reliance on testing and examinations as assessment methods were associated with the ideology of teaching and learning in South Africa.

Despite the dominance of testing and examinations on assessment, particularly in Afrikaner and African schools, not all teachers in these schools subscribed to (or even practiced) this ideology of teaching and learning. In South Africa, progression through schooling was based on passing year by year from one grade to another until one passed the Senior Certificate examinations, which doubled as a school-leaving certificate and university entrance qualification (National Education Policy Initiative (NEPI), 1992).

Early in the 1970's, 'ability' differentiation was introduced into South African schooling. Here learners could follow different curricular packages according to their 'abilities'. These packages not only entailed differences in terms of some subject content, they also entailed differences in the level of difficulty. In the junior secondary phase (Grade 4 to 10), learners could offer subjects at 'Ordinary' or 'Lower' Grade. At Grade 11 and 12, learners could offer subjects at 'Lower', 'Standard' and 'High' Grades. In order to obtain a matriculation exemption, learners had to take a certain number of subjects at Higher Grade.

As indicated above, progression through schooling was based on passing year by year from one grade to another until one passed the Senior Certificate examination (National

Education Policy Initiative, 1992, p.25). Certification for the university entrance was associated with the South African Joint Matriculation Board (JMB). The JMB was established in 1916 to conduct matriculation (university entrance) examination for the University of South Africa, Cape Town and Stellenbosch (Trumpelmann, 1991). There was a relationship between what the JMB did and the political development of the South African state at the time. When JMB was founded, it had the sole right to run the matriculation examination.

The interesting point in this study about mathematics assessment is how teachers are expected to make sense of learner's written work through marking, given the dominance of written work in assessment in general, and in mathematics in particular. The DoE assessment bulletin (1989) puts emphasis on the need for 'objectivity/ and consistency in marking. For these purposes it stipulates a method of marking which uses 'method' (M), 'accuracy' (A), and 'accuracy consistency' (AC) marks to assess learners test responses. A method mark is awarded if a learner used a correct method at a particular step of the solution. An accuracy mark is awarded if a learner's answer is accurate at a particular step of the solution. An accuracy consistency mark is awarded if a learner's answer at a particular step is accurately consistent with an answer at an earlier step of the solution. The accuracy consistency mark was largely designed to reward learners who might have made calculation errors earlier, but carried those early inaccuracies consistently as they went through the rest of the problem (that is, a learner should not suddenly get the correct accurate answer from early inaccurate answers). This method of marking has been used in the marking of Grade 12 mathematics final year examination scripts.

In summary, one can conclude that assessment in mathematics in South African schools might be perceived to have been largely dominated by a view of mathematical competence as an ability to understand and apply mathematical concepts (in some cases, formulae) in fairly routine problem solving situations. Written tests, exams and textbook exercises appear to have been the dominant methods of assessment. Given the influence of Grade 12 school exams, it could be argued that assessment has been dominated by summative purposes. Within this broad categorization, however, one has to keep in mind

that there is a spectrum of conceptions and practices which could be associated with different teachers in the same school or in different schools.

2.4.2 Contemporary conceptions about assessment

This section of the literature review is organized into three sections. In the first section, general assessments are discussed, then in an attempt to categorize; formative, summative and official assessments are defined. The next section will include major studies and literature reviews on the impact of the teacher and classroom assessment. Finally, teachers' assessment literacy will be defined and explored.

According to Airasian (2000) there are three different types of assessments: formative, summative and official. "Formative assessments are used to change or improve ongoing classroom processes while learning is still in progress". "Summative assessments are used to evaluate the outcomes of teaching and learning and take the form of tests, projects, and examinations" (Airasian, 2000, p.94). Formative and summative assessments take place in the classroom; therefore, they are also called classroom assessments. Official assessments are formal and systematic tests that are required by school and departmental officials for purposes such as "testing learners, grading learners and learner placements" (Airasian, 2000, p.95).

Lambert and Lines (2000) defined assessment as "the process of gathering, interpreting, recoding, and using information about learners' responses to educational tasks" (p. 4).

They suggest that the four purposes of assessment are: a) to provide information about the level of learners' achievement at points during and at the end of the school, b) to provide feedback to teachers and learners about progress to support future learning, c) to contribute to the information on which judgments are made concerning the effectiveness or quality of individuals and institutions in the system as a whole.

The purposes of assessing vary considerably across many groups of people within the education community (Matthews, 2007). Nagy (2000) suggests that there are three roles

of assessment; gatekeeping, accountability, and instructional diagnosis. For example, policymakers use assessments to monitor the quality of education and to formulate policies. Administrators identify programme strengths and weaknesses to plan and improve programmes. Teachers use assessment to perform individual diagnosis, monitor learner progress, carry out curriculum evaluation, and determine grades. Finally parents and learners use assessments to assess learner strengths and weaknesses, determine school accountability, and make informed educational and career decisions (North Central Regional Educational Laboratory (NCREL), 1991).

Assessing for different purposes and for different groups of people can result in intense stress for all involved. Barksdale-Ladd & Thomas (2000) interviewed 59 teachers and 20 parents in two large states in the United States that have standards, benchmarks and standardized tests to assess learners on the standards. They found that teachers and parents were unanimous about the intense stress, the undermining of meaningful instruction and learning, and the high stakes in involved. Interestingly, teachers did not want to see a total dismissal of assessment practices. Barksdale-Ladd & Thomas encouraged best practices in assessment, including: a) providing feedback to help learners improve their learning; b) making assessment a part of a learner's work, which can go into a working portfolio; c) using data to inform instruction and help teachers to improve instruction; and e) using more than one type of measurement for assessing learners' learning (Barksdale-Ladd & Thomas, 2000). Additionally, Shellard (2005) suggests that teachers use frequent assessments of learner performance. The data produced from these assessments can be used to determine how well learners are doing and identify areas where intervention or changes in instruction are needed.

This situation is similar in South African where there are assessments standards upon which learners are to be assessed for the attainment of learning outcomes. There are standardized Common Tasks for Assessment (CTA's) for the Grade 9 that involve: a) "gathering and collecting evidence of learner achievement; b) evaluating this evidence against the outcomes; c) recording the findings of evaluation; d) and using this

information to understand and thereby assist the learner's development and improve the process of learning and teaching" (DoE, 2007, p.5).

To summarize, assessments are a judgment of learner's achievements. There are different purpose and types of assessments, which are used for varying reasons to inform different groups of people. Although assessments can cause stress to learners, teachers, and parents, teachers tends to recognize the benefits of assessment when administered using best practices.

2.5 TEACHERS AND ASSESSMENT

This section is subdivided into two parts. The first one will be teachers and classroom assessment and it will be followed by teachers' assessment practices.

2.5.1 Teachers and classroom assessment

While many studies have focused on large-scale standardized testing programmes, classroom assessment, (both formative and summative), has received increasing attention (Airasian, 2000; Black & William, 2004; Crooks, 1998; Popham, 2002; Stiggins & Conklin, 1992; Stiggins, 2001; Matthews, 2007; Kanjee, 2007, 2009). Teachers spend vastly greater amounts of time preparing and designing classroom assessment activities than standardized examinations; therefore, a greater impact is made through classroom assessment (Crooks, 1988; Stiggins & Bridgeford, 1998). In fact, teachers spend at least one third of their professional time on assessment activities that inform a variety of decisions made daily and those decisions directly influence learners' learning experiences (Stiggins & Cronklin, 1992). Reviews of the research by Natriello (1996), Crooks (1998) and Black & William (2004) have demonstrated that substantial learning gains are possible when teachers introduce new classroom assessment strategies, particularly formative assessment strategies.

Natriello (1996) provided a conceptual framework in which the steps of classroom assessment process were divided into eight steps. The eight steps are: a) establishing purpose for evaluating learners; b) assigning task to learners; c) setting criteria for learner performance; d) setting standards for learner performance; e) sampling information on learner performance; f) appraising learner performance; g) providing feedback to learners' performance; and h) monitoring outcomes of the evaluation of learners (p. 156). Each of the stages of the model suggested features that teachers must attend to because they may have an impact on learners.

Crooks (1998) review of literature from 14 specific fields of research focused on relationships between classroom assessment practices and learner performance outcomes. The primary conclusion was that classroom assessment has a powerful direct impact. For instance, a classroom assessment guides learner judgments about what is important to the learner, while it also affects learners' motivation and self-perceptions of competence. Crooks also concludes that grades, considered a summative function of assessment, have been too dominant and that more emphasis should be given to using classroom assessment formatively to assist in learning. The feedback given to learners should focus "on the task; should be given regularly and while still relevant, and should be specific to the learning task" (Crook, 1998, p. 45).

Black & William (2004) used Natriello (1996) and Crooks (1998)' review of the literature as a baseline for their seminal review in an effort to build on previous work. In their synthesis of studies on classroom assessment they concluded that the use of formative assessment by teachers had typical effects on learner achievement. They stressed that no reform or policy aimed at improving classroom assessment through official testing will be successful because "learning is driven by what teachers assess in the classroom" (Black & William, 2004, p. 140). Suggestions for classroom assessment practices included enhancing feedback, adjusting instruction and re-teaching. They concluded that the primary difficulties teachers had with classroom assessment centered on three issues: effective learning, the negative impact of classroom assessments, and the managerial role of assessments. Effective learning from assessments diminished because

teachers encouraged rote and superficial learning practices, while practice such as questioning and classroom discussions have not been critically reviewed in relation to classroom assessment. Assessments typically left a negative impact on learners due to the approaches used by teachers. Black & William reiterated Crooks' (1998) thoughts on grading, stating that it was overemphasized, while useful feedback to learners by teachers was underemphasized. In addition, teachers tended to create a competitive atmosphere through comparing learners with one another, causing low-achieving learners to believe that they cannot learn. Teachers used assessment to fulfill a managerial role to fill a grade book, rather than to diagnose learner difficulties. Finally, classroom assessment typically looked like official standardized tests and the results are not addressed once they were recorded (Black & William, 2004).

The reviews of literature have presented evidence that there is a positive relationship between teachers using classroom assessment strategies and the impact on learner achievement through various measures. Knowledge of assessment and proficiency in assessment are important among classroom teachers. This concept is generally referred to as assessment literacy (Matthews, 2007). Assessment literacy refers to a teacher's knowledge about the basic principles of sound assessment practices, including terminology, the development and use of assessment methodologies and techniques, and familiarity with standards of quality in assessment. Increasing this knowledge includes familiarity with alternatives to traditional measurements of learning (Hearne, 2001).

Assessment-literate teachers choose appropriate formats to assess different achievement targets and clearly understand the strengths and weakness of each of those formats (Stiggins & Conklin, 1992). Examples of teacher-created assessments are teacher-developed tests, classroom discussions, questioning, homework and teacher-developed topics for projects. Additionally, assessment literate teachers match item with course objectives and instruction to ensure content validity (Black & William, 2004). Such teachers provide opportunities for learners to express their understanding through authentic assessments, because they know this will ensure the interaction necessary for learning to occur (Black & William, 2004).

Stiggins & Conklin (1992) administered questionnaires to teachers about their levels of concern about quality of teacher-made assessments. They found that the quality of classroom assessment varied with grade levels and slightly with subject areas. For example, Mathematics and Science teachers were more concerned about the quality of the tests they produced than were writing teachers.

Another suggestion for teacher-made assessment is to tap into high-order thinking skills only after teachers have presented a solid base of knowledge of what they are teaching. Stiggins (2001) encouraged teachers to use higher order questions in classroom assessment. For example, in a study on measuring thinking skills in classroom assessment, Stiggins & Griswold (1989) analyzed writing assessments written by a group of 36 teachers from grades 2 through to 12. Utilizing the Quellmalz taxonomy (Stiggins, Rubel & Quellmalz, 1986) – recall (Knowing), comparison (using Routine procedures in familiar situations), analysis (use of Multi-step procedures in unfamiliar situations), inference and evaluation (Reasoning and Reflection) - the researchers found that across the grades questions of recall (Knowing) and comparison (using Routine procedure) dominated in classroom assessment while analysis (using Multi-step procedure) and inference and evaluation (Reasoning and reflection) were rare. It should be pointed out that, in this study, these categories were used for the classification of skills in the analysis of data from observations and document analysis. Stiggins (2001) declared that the foundation of academic competence rests on knowledge and understanding. Teachers cannot write higher-level questions without establishing a foundational knowledge base in mathematics.

Teachers develop the majority of their assessment methods, or they adapt assessment methods from a text-based format. It is imperative that they have the knowledge to design, develop, use and value methods for assessing learners. Teachers must know how to match teaching objective with assessment items, as well as use the appropriate assessment format (Black & William, 2004). When assessing, teachers must be sure to establish a solid knowledge base, but it is also important to push learners into higher-

order thinking. An easy way to accomplish higher levels of thinking is through performance assessments (Black & William, 2004).

While research indicates that there are many resources that identify strategies for improving assessment literacy, it has also illustrated weaknesses among practising teachers in the area of improving assessment literacy. Brown (2004) administered a 50 item survey to 525 New Zealand primary school teachers. One of the concerns of the survey was improvement of teaching and learning. The findings of Brown's (2004) research indicated that all teachers that participated in the survey agreed with the improvement conception.

A study of teachers' perceptions about assessment in the United States (U.S), revealed teachers' underlying beliefs about assessment. The findings may help explain the struggles in changing assessment practices. Hargreaves (2005) surveyed 83 teachers asking them for their definition of "assessment" and "learning". Two categories emerged from their definition of "assessment": measurement and inquiry. Measurement relates to the final judgment of learners' work, and inquiry relates to assisting learners discover what they know about content. The first category, assessment-as-measurement, was the prevalent definition by teachers in the study. Similarly, two related conceptions about "learning" were learning-as obtaining-objective and learning-as-construction of knowledge. The first conception, learning-as-obtaining objectives, was predominant, once again demonstrating teachers' beliefs that assessment should be used as an end product only.

In addition to teachers' beliefs about assessment, a lack of professional development and training may explain teacher's lack of assessment literacy. For instance, Plake, Impara & Fager (1993) in United States, developed a survey based on the Standards for Teacher Competence in Educational Assessment of Students. The standards addressed a number of broad areas in assessment. Among others they addressed: a) choosing assessment methods appropriate for instructional decisions; b) developing assessment methods appropriate for instructional decisions; c) administering, scoring, and interpreting the

results of assessment methods; d) using assessment results when making decisions about planning teaching, developing curriculum improving learner performance; e) communicating assessment results to learners, parents and other stakeholders. The results of the survey were that teachers were very poor in communicating assessment results.

Numerous studies focused on the severe lack of training on assessment practices that teachers receive (Black & William, 2004; Cizek & Fitzgerald, 1996). These studies revealed that teachers who have taught for several years still lack in assessment practices, thus teachers do not tend to acquire skills in this area of their work through “on the job” training (Cizek & Fitzgerald, 1996 p. 170). The studies, nevertheless, also found that teachers believed that it was important to do whatever would help learners succeed. McMillan (2007) agreed with Cizek & Fitzgerald (1996), but demonstrated that external factors- like departmental policies and classroom realities- like absenteeism and disruptive behavior, created tensions that influenced teachers’ decision-making in their assessment practices.

Research literature has also described training for teachers on assessment with indications of success. Lukin (2004) reported on the findings on two programmes that were designed to provide training to experienced teachers. The evidence from the programmes suggested that all training models had a positive impact on teacher confidence, knowledge, and skills in key areas of assessment.

Teachers’ assessment literacy is a vital key in classroom practices. Teachers with strong assessment literacy possess a working knowledge of when and how to design, develop, use and value a wide variety of methods for assessing learner achievement (Stiggins & Conklin, 1992). The majority of research illustrated that teachers lacked assessment literacy skills, however, there is growth in teacher training and professional development in this area in South Africa (McMillan, 2007; Adler, Pournara & Graven, 2000).

Based on extensive literature reviews (Crooks, 1998; Natriello, 1987; Black & William, 2004) and the studies on teachers and classroom assessment (Rogriguez, 2004; Black & William, 2004; Bloom 1984), numerous strategies are listed as non-negotiable in

classroom assessment. In this view, the strategies are broadly addressed as (1) assessment strategies used during instruction, (2) teacher adaptation of instruction per assessment data, (3) teacher feedback per assessment data, (4) teacher development of peer and self-assessment strategies, and (5) the formative use of summative assessments.

Integration of summative and formative assessment is perhaps the key factor to successful use of classroom assessments. Teachers take summative data but rather than use it to make a final judgment about learner performance, it is used formatively to provide learners with the information they need to improve achievement. Beck & Murphy (1993) defined summative assessment as “assessments given at the end of units, term, and at the end of a course, which are designed to judge the extent of learning in the course” (p. 117). They contrasted these with formative evaluations, which elicit evidence that yields interpretations that form the basis for successful action in improving performance (Black & William, 2004). To integrate formative and summative assessment practices, teachers take summative assessment data and use it to make instruction decisions to improve learner performance (Black & William, 2004). The integration of summative and formative assessments will assist teachers in giving feedback.

Parents’ opinions about teachers’ feedback influence learner’s thoughts on assessment and their performance. Teachers need to be trained in writing feedback with a focus on keeping the feedback descriptive rather than evaluative (Black & William, 2004). Feedback should be more than giving a letter grade or number. It should be given frequently in a nonjudgmental manner. The purpose of feedback is to close the gap between where a learner should be and where they actually are performing. By providing feedback, learners are invited to think about their learning along with teachers.

An important feature about feedback is that it should be used to close a gap, referring to the level at which the learners are performing and the desired level of achievement. If information is simply “recorded, passed to a third party who lacks either the knowledge or the power to change the outcomes, or is too deeply coded to lead to appropriate action,

the control loop cannot be closed, and ‘dangling data’ is substituted for effective feedback” (Sadler, 1989, p.125).

2.5.2 Teachers’ assessment practices

According to Morgan (2006), Ruthven (1987) and Watson (1998), mathematics teachers’ assessment practices are influenced by factors such as past historical context and experience, ways in which they were assessed as learners themselves and conditions and constraints present in schools.

Assessment in Mathematics must be developmental (DoE, 2005b, 2007). The development of assessment tasks should recognize that learning is developmental in nature. If a learner is assessed relative to his/her level of development, then teachers have to look at learner achievements relative to him/her as opposed to specified norms or performances of other learners. This will mean assessing a learner in terms of what he/she is ready to do/can do, rather than in educators’ set standards (Gipps, 1994).

Fairbrother (1989) argues that assessment practices will have to explore evidence of the development of processes or procedure, while also recognizing understanding of mathematical context. Hodson (1993) claims that classroom assessment should promote learning.

Classroom assessment practices take place during the classroom interaction between the teacher and the learner. Classroom discourse plays a significant role in this interactive activity. The Standards for Teaching Mathematics (National Council of Teachers of Mathematics [NCTM], 1991) addresses the learners’ role in discourse and learning environment of mathematics classroom. The NCTM (1991, p. 45) states that “teachers should promote classroom discourse in which learners listen to, respond to and question the teacher and one another”. Classroom discourse must help teachers to identify, diagnose and address problems and misconceptions that learners possess (Korze, 2002). The NCTM (1991, p. 57) documents also emphasise that “teachers should create a

learning environment that fosters the development of learner's mathematical power by respecting and valuing learners' ideas and ways of thinking".

According to Fairbrother (1989) cited in Kotze (2002) theories on learning modes and assessment methods need to be brought together. Shepard (2000) notes that curriculum must provide a close link between instruction for meaningful learning and meaningful assessment. Formative (classroom-based) assessment offers such a link by providing learners with opportunities to improve their learning. Learners receive meaningful information that will help them to see what they do well and what they need to work on more (Shepard, 2000).

This study explored the Grade 9 mathematics teachers' assessment practices within the New Assessment Policy (DoE, 2007) in South African schools. The policy expects teachers to assess learners using a range of assessment procedures, which are based on Outcomes Based Education (OBE) principles (DoE, 2002). Assessment is described in the National Protocol for Assessment (DoE, 2005a, p. 3) as "a process of collecting, synthesizing and interpreting information to assist teachers, parents and other stakeholders in making decisions about the progress of learners". It goes on to say that: "classroom assessment should provide an indication of learner achievement in the most effective and efficient manner by ensuring that adequate evidence of achievement is collected using various forms of assessment." This process of collecting evidence entails making sense of a learner's knowledge, skills and attitudes in a direct or indirect human interaction process. In short, one of the key purposes of assessment is to inform the teacher about the knowledge and skills of the learner so that the teacher can plan appropriate instruction and, where necessary, intervention activities for those learners who are not performing at the level that is expected of them. In other words, effective assessment shapes classroom practice – it determines how teachers plan and execute their instruction in response to the needs of their learners. The knowledge and skills that learners should attain at each grade level in the mathematics learning area are listed in the Assessment Standards of the Subject Statement. The Assessment Standards and /or combinations of Assessment Standards determine and describe the knowledge and skills

that must be assessed. In conducting this important task, teachers need to use an objective manner of classifying their assessment tasks / or questions in using the Assessment Standards to assess the knowledge and skills.

In this research report “assessment” will refer to the process of acquiring evidence by one or a number of means (methods) and making judgments of the evidence in order to make inferences about an individual learner’s mathematical competence.

According to Lubisi (2000, p. 133), practice refers to “what teachers do in their daily professional life in school and classroom”. Practice is therefore here (in this research project) conceived as that which can be observed by another person. In view of what Lubisi is saying, assessment practices refer to what teachers do in their daily professional lives in the school and classrooms to acquire evidence about learner’s competence.

In this research project report, the term assessment practices will be using the meaning that Black & William (2004) developed. Assessment practices refer to all the activities undertaken by teachers and learners which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged. It would appear as James & Van Laren (2006) point out that exploration of teachers’ assessment practices could give critical insight into what teaching and learning occurs in the classroom. The Subject Assessment Guidelines for Mathematics Senior Phase (DoE, 2005b, p.29) recommends the following forms of assessment for mathematics learning area: Mathematical Investigations; Projects and Assignments; Test and Examinations; and Classwork and Homework. In this research project, these forms of assessment will be used to classify the assessment practices for data analysis purposes.

The Subject Assessment Guidelines for Mathematics (DoE, 2005b) uses Bloom’s taxonomy to classify assessment tasks into different levels of cognitive demands. The Trends in Mathematics and Science Survey (TIMSS) programme (Mullis, Martin & Smith, 2001) has developed a description of what they have called Mathematics Cognitive Domains. This characterization gives useful levels that not only provide a

description of each of the levels but also a detailed list of the skills that are required for performance at each level. According to the Subject Assessment Guideline for Mathematics (DoE, 2005b) these levels are: knowing, applying routine procedures in familiar contexts, applying multi-step procedures in a variety of contexts and reasoning and reflection. These levels, for the purposes of this research project report, will be used to classify the levels at which skills and processes will have to demonstrate by learners to indicate the achievement of learning outcomes and attainment of assessment standards. Brookes (1994, p.3) points out that “assessment is integral to teaching and learning”. It is therefore important to understand the context in which the teachers’ assessment practices takes place.

The complex and problematic nature of classroom assessment, as addressed by James & Van Laren (2006), is evident from Bhika’s (2004) view that it comprises of three non-linear, inter-related points as a triangle with each point represented by teaching, learning and assessment. Lubisi (2002, p. 20) extends this view by stating that classroom assessment manifests itself in various modes, techniques and the principle of the integration of teaching, learning and assessment blurs the boundaries between these three processes, thus posing a greater challenge for researching classroom assessment.

Teachers in South Africa, when assessing learners, are expected to use various assessment practices but according to Bhika, (2004):

“Teachers’ assessment practices could be based on their past historical context and experiences, in other words what they are familiar with, by following the existing traditional practices present at schools and by the present conditions, opportunities and constraints present in the classroom and school. In other words they will use assessment in a linear, sequential manner, mostly for grading and promoting students rather than connecting it to teaching and learning” (p. 27).

This point is also confirms what Lubisi (2002) who said that ‘perceptions about behaviour, work habits and mathematical ability mediate teachers’ assessment practices’.

Teachers often have both little confidence and little competence using varied assessment practices in the classroom (Bhika, 2004). It is in this light that James & Van Laren (2006) suggest that it is necessary to recognize the individual, personal and educational needs/constraints that teachers experience in their use of assessment practices in order to develop the understanding of teachers' assessment practices.

2.6. THE NEW POLICY ON ASSESSMENT IN MATHEMATICS IN SOUTH AFRICA

The Assessment Policy document states that a 'paradigm shift' is needed in assessment practice in South Africa. This shift is characterized as a "move from the judgmental to the developmental role of assessment" (DoE, 2007, p. 4). 'Continuous' assessment (abbreviated in the document as CASS) anchored on formative assessment is said to be the tool through which this 'paradigm shift' is to be achieved. The document advocates the use of different methods of collecting assessment evidence, stating "CASS should not be interpreted merely as being the accumulation of a series of traditional tests" (p. 8).

The Assessment Policy document states that assessment in the National Curriculum Statement (NCS) has to be linked to the five Learning Outcomes for Mathematics at a specific Grade and has to be "integral to teaching and learning" (p.2).

2.6.1 Learning Outcomes and Assessment Standards

The Learning Outcomes (LOs) and Assessment Standards (ASs) in the Mathematics Subject Statement have been selected with the needs of the learner as a citizen in mind. Knowledge, skills and values are organized through five Learning Outcomes in Mathematics. Teachers must understand how the knowledge and skills are organized in Mathematics when they design their design their assessment tasks.

Teachers must understand that the purpose of the Mathematics is to equip learners to participate in and contribute to the world in which they live. This approach to Mathematics should be reflected in teacher's assessment which needs to be relevant and where possible be practical with learners developing through the experience, acquiring knowledge skills and values that are necessary for living in a democratic and changing society.

Teachers must understand that the wording of Assessment Standards often gives an indication of the most appropriate form of assessment to be used to gather evidence of learning performance. For example, the Grade 9 (LO3) Assessment Standard, below, is well suited to be assessed by means of an investigation and/or project:

“Investigates and compare (alone and /or as a member of a group or team) two-dimensional shapes and three-dimensional objects studied in this grade according to properties listed be above by:

- Making models of geometric objects using polygons they have cut out;
- Cutting open models or geometric objects (e.g. boxes) to trace their nets;
- Drawing shapes on grid paper” (DoE, 2005b, p. 3).

It is, however, important for teachers to understand that the form of assessment to be used to assess the various Assessment Standards is neither prescribed nor fixed. Teachers should make use of their own professional judgment to select the form of assessment that is most appropriate for the purpose of assessment. It should be noted, however, that the policy is not specific about the meaning of professional judgment.

“Apart from the Assessment Standards, there are other factors that influence the choice of the assessment: a) time available for the assessment; b) available resources; c) point of departure (where are you with the work) for example if you are starting to develop a new concept, give an investigation, or if learners have already mastered a concept, then give an assignment or a project” (DoE, 2007, p. 3).

It is also worth mentioning at this stage that teachers must understand that Assessment Standards do not prescribe the content to be taught to learners. Learning Outcomes (LO's) need to be assessed in each assessment task. One assessment activity might focus on LO1, another on LO2, etc. The annual assessment programme should reflect the weighting of LOs. Having said that, the Assessment Policy document recommends that “assessment should where possible, address the Assessment Standards in an integrated way” (DoE, 2007, p. 3).

2.6.2 Continuous Assessment in the Mathematics Learning Area

It was argued elsewhere above that ‘continuous’ assessment anchored on formative assessment was the tool through which the ‘paradigm shift’ in assessment was to be achieved. It is also asserted that assessment is an integral part to teaching and learning in Mathematics.

According to the Policy document for Assessment (DoE, 2007) Continuous Assessment (CASS) in Mathematics covers all the outcomes-based education assessment principles. These principles are covered to ensure that assessment: a) “takes place over a period of time and is on-going; b) supports the growth and development of learners; c) provides feedback from learning and teaching; d). allows for integrated assessment; e) uses strategies that cater for a variety of learners need; and f) allows for summative assessment” (DoE, 2007, 4). These purposes of assessment must be clearly understood by teachers so that they can design and implement their assessment strategies with these assessment purposes in mind.

A simplified continuous assessment (CASS) framework illustrating the differences in assessment between Grade 9 and the other Grades in the Intermediate and Senior Phases is provided in Table 2 below. For purposes of the study, only the framework for Grade 9 will be pursued since the study focused only on Grade 9 mathematics classroom assessment practices.

Grade	CASS component	Common Task for assessment (CTA)
	School-based	Externally set
Grades 4 to 8	100%	Not applicable
Grade 9	75%	25%

Table 2. CASS framework (adapted from Assessment Guidelines for Mathematics-Intermediate and Senior Phases Document (DoE, 2007, p. 4)

From Table 2 it can be seen that for Grade 9, the CASS component consists of (a) internal school-based tasks undertaken during the school year which together make up 75% of Grade 9 mark or level of achievement and (b) externally set assessment tasks or Common Tasks for Assessment which make up the other 25% of the final Grade 9 mark or level of achievement. The marks that arise from the formal Assessment Programme which comprises various forms of appropriate assessment in Grade 9 should be reflected in the teacher and learner portfolios. In addition to the formal tasks, it is expected that teachers will conduct informal assessment on a day-to day basis throughout the year.

The Assessment Guidelines for Mathematics document (DoE, 2007) stipulates that these formal assessment tasks that can be given to learner can take any of the following forms of assessment in the Mathematics Learning Area:

- Mathematical investigations
- Projects
- Assignments
- Test and Examinations
- Classwork and homework

There are other forms of assessment that can be useful in the assessment process and these include:

- Structured Questions
- Presentations

- Interviews
- Observations (oral)

The formal CASS programme in Mathematics in Grade 9 consist of nine tasks, that is three tasks per term for each of the first three terms, as well as the CTA which will be administered during the fourth term. The following Table 3 below summarizes the number of tasks per term that must appear in the formal CASS programme for Grade 9 in Mathematics.

Term	1	2	3	4
No. of tasks	3	3	3	CTA

Table 3: Formal CASS programme for Grade 9

(Adapted from Assessment Guidelines for Mathematics – Intermediate and Senior Phase document – 2005b, p. 50).

The Common Tasks for Assessment (CTA) is an external assessment tool intended to sample learner performance against the Assessment Standards of the Learning Outcomes. The CTA, in mathematics, should consist of both performance-based tasks and pen-and-paper tasks. The pen-and paper task will be conducted under controlled conditions and schools will follow a national timetable. The performance-based tasks should be designed in such a way that they are completed over a period of time and not a once-off event.

The performance-based tasks form an integral part of the normal teaching and learning school programme. They could be done in the classroom or as homework and can include projects, orals, pen-and paper activities, etc. Learners should also be required to do tasks as individuals, in pairs and some in groups. All Grade 9 learners in schools will be assessed through the CTA in mathematics during the fourth term.

2.7 THEORETICAL FRAMEWORK

“Change” in the Cambridge Advanced Learner’s Dictionary (2003) is defined as to exchange one thing for another. Change can be viewed (James, 2000) as a process where the existing is replaced by a different structure. Change does not take place in a vacuum, i.e. it is in response to something, and for example change in educational systems could be in response to changes in the country and global community. Educational change (Hargreaves, 2004) is not a self-evident, commonly agreed or technically straightforward process. While many change theorists argue that change is part of a general movement in society towards complexity and conditions of constant change (Fullan, 2005), Hargreaves (2004, p. 6) sees change as “an external force whose agency and authority rested in governments and bureaucracies”. According to Hargreaves (2004) there are two meanings of educational change, i.e. positive change and negative change. Positive change is self driven, connected to teaching and learning and professionally current. Conversely, negative change is seen to be driven by governments and bureaucracies who not only failed to understand classroom practice but also actively withdrew support from it in order to implement other non-educational agendas (Hargreaves, 2004).

Vithal & Volmink (2005, p.5) assert that “successive curriculum reforms may be characterized as waves of change each bringing in a tide of new ideas and practices, taking some away, leaving some behind, and changing some”. This study draws on change theory (Fullan, 2005). The new assessment policy that Grade 9 teachers are expected to implement is part of the change in the curriculum. Implementation of the new curriculum involves change in teacher roles and teachers’ ‘ways of doing’ (Graven, 2005). It is evident from the above quotation by Vithal & Volmink (2005) that the changes in the curriculum will result in teachers developing new ideas about curriculum issues such as assessment. Teachers will have to develop or improve on their assessment practices. Some of the teachers may accept the change while others may resist the change.

The concept of 'change' in any social system as perceived by Dalin (1998), involves 'innovations'. Dalin (1998, p. 94) states that 'innovation' "involve an improvement of the system". This is encapsulated in Dalin's definition of 'innovation' that innovation is "a well considered attempt at improving practice with respect to stated goals". According to Fullan & Hargreaves (1993, p. 1) "effective implementation of innovations consists of alterations of practices, beliefs and understanding of the past on the part of teachers. Implementation of innovations involves change". Successful change involves learning to do something new. The notion of change is taken further by Graven (2005) when she argues that successful curriculum change is based on the assumption that teachers need to change their existing beliefs, knowledge and practice. The process of change of practices by teachers involves forming new strategies as strategies are formed to guide and support implementation (Fullan, 2005).

Change does not take place in a vacuum, i.e. it is a response to something, for example change in the educational system and particularly in the curriculum. Changes in the curriculum include the knowledge, skills, values and attitudes that inform teaching and learning and how these are taught and assessed. One of the changes in the South African education systems was the introduction of the National Curriculum Statement in the General Education and Training Band. These curriculum changes, particularly in assessment, are viewed in this study as a radical move from the old assessment system which was examination driven, often entailed learning parrot-fashion and characterized by a syllabus that was content-based to a system that cater for active learners, is driven by outcomes and continuous assessment, and entails learning which involves thinking and creativity and characterized by the development of learning that is integrated with assessment (James, 2000). All these curriculum changes (Savage, 1998 cited in James, 2000) should be incremental, participatory and focused on human development, be systematic, reflect classroom realities and be sustainable.

The reasons for curriculum change as discussed by Fullan (2005) are economic, social, or political. Literature on how teachers experience change and the capacity for teachers to change in developing countries such as South Africa does not give clear insights into

such issues as: the ways teachers think about change; what happens to teachers during the change process and how teachers endeavor to either fulfill the expectations of the new curriculum particularly assessment practices or resist the change of the new curriculum (assessment practices).

Teachers are expected to prepare learners for global markets, and develop their national cultures and identities by implementing the new curriculum (James, 2000). In order for teachers to implement the new curriculum they experience change. This change could be change in their beliefs about learning and learners, their way of teaching and assessing. Over and above the changes that teachers are expected to undergo are complex, non-negotiable innovations on teachers' time and opportunities to reflect and their capacity to cope. These are evident in the large classes and poorly resourced schools that South African teachers are presently faced with while they are also expected to implement the new curriculum and new assessment policy at the same time. Savage (cited by James, 2000, p. 22) considers that "teachers have a key role to play in making curriculum decisions and they should be empowered through participation in the change process".

This study was guided by the conceptual frameworks that are evident from the literature about curriculum change in both developing and developed countries, where different perspectives on curriculum change are addressed. The concept of curriculum change can have two meanings, i.e. subjective and objective meanings (James, 2000). The subjective meaning of curriculum change deals with the 'subjective reality of teachers' (Fullan, 2005). This subjective reality of teachers looks at the situation of teachers, the impact of change on teachers the teacher's capacity for change and ignorance of the imposed change. The objective meaning of curriculum change deals with the different dimensions of the change. Change can be seen as change in peoples' beliefs about how curriculum activity should be implemented, or it can be seen as a change in policy imposed from outside. For the purposes of this study, the change that teachers experience was looked at in terms of the implementation of the new assessment policy in practice. This incorporates both meanings of curriculum change.

This curriculum change is concerned with new or revised teaching approaches; new materials; and possibly the change of beliefs. Fullan (2005) argues that all three aspects of change are necessary because they together represent the means of achieving a particular educational goal. In this study the researcher was looking at teachers' understanding of the new assessment policy; the assessment practices that teachers use to assess their learners and the impact of teachers' perceptions in their assessment practices in the Grade 9 Mathematics classroom context.

The purpose of this study is to explore the Grade 9 mathematics teacher's assessment practices in the context of the shift from the traditional way of assessing to the new approach. This shift from traditional way of assessing signals a changes in teachers' assessment perceptions, and these changes in assessment perceptions require teachers to alter their ways of thinking about assessment and the way in which they have been conducting assessment in practices (Fullan, 2005; Rogan, 2004).

In this project, the researcher is interested in exploring teachers' assessment practices and their perceptions about the assessment policy in mathematics. This report presents an analysis of the changing assessment practices of mathematics teacher, together with conflicts and struggles that these changes brought up for the teachers. The researcher argues that teachers' assessment practices shift between the old and the visions of teaching and assessing learners, and that to take up the new is a process that requires substantial time and a developmental shift.

On the basis of this need for teachers to change their assessment practices within the context of curriculum reform, this study uses curriculum change as a theoretical framework.

2.8 CONCLUSION

The literature review on classroom assessment has shown that many teachers are inadequately trained and ill-prepared to develop, and interpret the results of various types

of assessments (e.g. Stiggins & Conklin, 1992; Wiggins, 1989). Teachers who were less prepared and skilled in developing authentic assessments perceived them to be more difficult to develop than traditional paper-and-pencil tests. Moreover, teachers' assessment practices were not well aligned with their instructional goals. Many teachers were also not good judges of the quality of their own assessment tasks (Bol & Strage, 1996). The National Board certification in USA provided teachers with professional development experiences in using rigorous assessment and teaching standards. Sato, Wei & Darling-Hammond (2008) found pronounced changes in teachers' use of variety of assessments and the way assessment information was to support learning. Their results indicated that effective professional development strategies, as in the case of the National Board Certification, are essential for improving teachers' assessment practices.

Literature review also indicated that most teachers have a low level of assessment literacy and expresses the need for improving their knowledge through specific courses in classroom assessment and evaluation. Studies also suggested that ongoing support and professional development opportunities should be given to in-service teachers in the application of effective assessment practices in the school context. The literature review also suggests that teachers need professional help and support in designing intellectually challenging assessment tasks in their assessment practices.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This research study focuses on exploring teachers' understanding of assessment and the influence of teachers' understanding of assessment on their assessment practices. It should be pointed out at this stage that the NCS sees assessment as an integral part of teaching and learning.

At the outset, this chapter will present the research methodology including the design of the study. Secondly, it discusses the approach that was adopted for this research project, together with the critical questions upon which this study was based. Thirdly, this chapter examines the context of the study and provides an explanation of the process of selection of participants. Finally, the design of the study and data collection instruments is described.

3.2 RESEARCH DESIGN

The purpose of the study was to explore teachers' assessment practices and their understanding of the assessment policy in mathematics and the extent to which their understanding of the assessment policy influence their assessment practices.

The paradigm most suited to this case study research is that of a naturalist inquiry with emphasis on interpretive dimensions where the goal of the researcher is to understand reality (Cohen, Manion & Morrison, 2000, p. 181). Glaser & Strauss (1997, cited in Cohen et al., 2000) state that interpretive researchers "set out to understand the subjects' interpretations" (p.23) of reality. Hence, this study is located in the interpretivist paradigm. Cohen et al. (2000) maintain that the "interpretive research paradigm assumes that people's subjective experiences are real, and that we understand them and that the qualitative research techniques are best suited for this task. The understanding of the individuals' interpretation's... has to come from inside, not outside" (Cohen et al., 2000,

p. 20). In this study, the researcher aimed at exploring teacher' assessment practices and their perceptions about the assessment policy in mathematics and how teachers' understanding of assessment influence their assessment practices.

As an interpretive researcher, aimed to explore teachers' assessment practices and the teachers' understanding of the assessment policy in mathematics, in keeping with Neuman's (1997) view that the interpretive researcher wishes to determine what is meaningful to the people being studied. More importantly, he draws attention to the interpretive approach, acknowledging that people experience the world differently. They may or may not share the same meaning or interpretations regarding teachers' assessment practices and teachers' understanding of the assessment policy in mathematics. The researcher therefore believes that his role is appropriate to that described by Neuman (1997) because he is exploring the teachers' assessment practices.

Pertinent to this study is the researcher's intention to explore teachers' assessment practices and teachers' understanding of the assessment policy in mathematics. Lincoln & Guba (1985) maintain that the naturalistic researcher "elects to carry out research in the natural settings" (p. 39). The researcher views this study as naturalistic inquiry since the field is a natural setting with teachers in their own schools and classes. In the naturalistic paradigm, the researcher aspires to understand reality from the participants' perspective and in the contexts within which they occur. Furthermore, naturalistic enquirers as well as other human beings (the teachers) are used as data sources (Cohen et al., 2000; Lincoln & Guba, 1985).

The reason for the use of case studies in this research is informed by Hitchcock & Hughes (1995). They asserted that case studies offer most to teachers, because they can be used to "test existing practice" (p. 323). Case studies incorporate a full range of formal and informal instruments (interview questions, observation schedules). A case study tends to be a method of immersion; therefore the researcher has to be directly involved in the field. As defined by Yin (2003, p.14) case study "is part of a contemporary phenomenon the data has to be collected in phases so that the researcher is present as a

major events occur”. It was for this reason that the researcher spent three months visiting schools to collect data. This means that the researcher hoped to have enough data-based evidence to permit drawing of valid conclusions. The study was conducted in three phases (document analysis, observations and interviews) to explore and capture a major picture of each teacher’s perception about the new assessment policy. These phases will be explained in the section entitled ‘data collection process’.

A qualitative case study approach provided the researcher the opportunity to concentrate on a specific instance or situation (Cohen et al., 2000), namely the administration of assessment in the classroom. The researcher chose a case study in order to explore Grade 9 Mathematics teachers’ understanding and assessment practices. Since the researcher sought to understand and interpret the teachers’ assessment practices and their understanding of the assessment policy in mathematics, a qualitative case study approach was valuable. A qualitative case study is characterized by “detailed descriptions of situations, events, people interactions... from people about their experiences, attitudes and thoughts” (Patton, 1980, p. 20) about a situation.

Since this study focuses on individual teacher cases, it is worth noting how Merriam (1988) defines the case study. Merriam (1988), working in the context of education states, “a case can be defined in a number of ways: as a person, a programme, a group of people, and a movement” (p. 153). Furthermore, a case is a “single bounded system or instance of a class of phenomena” (Merriam, 1988, p. 153). According to Denscombe, (2003) a case study “focuses on just one instance of the thing that is to be investigated” (p. 30). In this research the case is subdivided into three case studies of teacher’s assessment practices and each teacher’s understanding of the assessment policy in mathematics.

In addition, the researcher found the qualitative case study approach of great value since in qualitative research, the researcher selects a particular case, rather than a variable, enabling the researcher to gain an understanding of broader phenomenon. Cohen et al. (2000) acknowledge a benefit of case studies as taking place “in real context, recognizing

that context is powerful” (p. 181). A case study approach therefore suits this research; in that its ‘real context’ is that of teachers providing assessment practices and perceptions about assessment policy in mathematics.

Stake (1995) identifies the roles of researchers in case studies. Appropriate to this study are the roles of ‘teacher’ and ‘interpreter’. He notes that in the case of researcher’s role as a ‘teacher’, “the intention of research is to inform” (p.91). Through this study, the researcher explored and informed teachers’ assessment practices. Furthermore, the case researcher as an ‘interpreter’ “recognizes and substantiates meaning” (Stake, 1995, p. 97). In this study the researcher aimed to recognize and understand teacher’s assessment practices and understanding of the assessment policy in mathematics so as to improve practices.

In keeping with the purpose of this study (as set out in Chapter One) Cohen et al. (2000) explain why case studies are ‘a step to action’: “Case studies begin in a world of action and contribute to it. Their insight may be for direct interpret and use; for staff or individual self-development, for within institutional feedback; for formative evaluation for educational policy making” (Cohen et al., 2000, p. 184).

3.3 CRITICAL QUESTIONS

The critical questions that were investigated within this study are:

1. What are Grade 9 Mathematics teachers’ understandings of the assessment policy in Mathematics?
2. What classroom assessment practices are used by Grade 9 Mathematics teachers?
3. What impact does the teachers’ understanding of the assessment policy in Mathematics have on their classroom assessment practices?

3.4 CONTEXT OF THE STUDY

The study was conducted in the province of KwaZulu-Natal, in the district of Obonjeni in the Northern Zululand Region. This district is about 85 km north of Empangeni and it includes areas such as St. Lucia, Kosi Bay and Sodwana Bay. This is a deep rural district with communities that are poverty stricken. Two of the schools that participated in the study are within a 30 km radius from the small town called Jozini across the Lebombo Mountains. The third school that participated in the study is within the small town called Mkhuze which is 55 km from Hluhluwe towards Pongola. All the schools are Black public schools that formerly belonged to the KwaZulu Department of Education of the apartheid era.

As much as all the three schools are from deep rural areas, they all have electricity supply, they are fenced, and they have such basic resources which as a photocopying machine and a computer. According to the departmental classification, they are all quintile one schools. According to the DoE (2006, p. 3) this refers to “the poverty index” that is used to classify schools. In this regard, schools are classified as quintile one up to five. Schools are classified as quintile one up to quintile five depending on their socio-economic conditions. The schools that were used in this study are within poor communities; hence they are classified as quintile one schools.

3.5 SELECTION OF SCHOOLS

Brown & Dawling (1999) prefer to use the term ‘sampling’, to describe the choice of cases to study, but Yin (2003) prefers to use the term ‘replication’ (Lubisi, 2000). Yin (2003) describes the logic of replication in the following way:

“Each case must be carefully selected so that it either (a) predicts similar results (a lateral replication) or (b) produces contrasting results for predictable reasons (a theoretical replication)” (p. 96.) This study uses lateral replication. When the term sampling is used in this study, it will be used with Lubisi and Yin’s replication logic in mind.

Sampling for qualitative evaluation requires the selection of information rich cases (Lubisi, 2000). Thus in the present study three schools, providing in total three teachers as the units of analysis were sampled to yield information rich cases. This study has followed Yin (2003) and Lubisi (2000) logic of replication in order to achieve a thick description of information.

Schools were selected based on their functionality (Nkabinde, 2004). Functional schools are characterized by the following features:

- A focus on learning and teaching to be a central activity of the school.
- A culture of concern and sense of responsibility within the school.
- A school able to achieve good matric results regardless of adverse conditions within the community.

The selection of schools was influenced by the researcher's familiarity with schools that are functional. At the beginning of the research the initial three schools sampled had to be changed due to difficulties in gaining access to schools, and to teachers. The original choice of schools had to be changed due to difficulties in gaining access to schools, and to teachers. Some of these schools were far from where the researcher works and some did not have professionally qualified teachers teaching Grade 9 Mathematics. Of the three originally identified, only one was used as a research site. The researcher was compelled to choose two other schools. My familiarity with the school principals and teachers facilitated easy access to the three chosen schools. The reason for the choice of these schools was that it was convenient for me to undertake this study close to where I work. All the three schools present characteristics of functionality.

It has to be noted that the modification of the research site bears no significant adverse impact on the validity and reliability of data, given the fact that the unit of analysis remains the teacher, not the school. A combination of schools provides the potential for providing information rich cases and to trace replication that might exist, in order to reach a thick description of data.

The teachers who were selected as participants were all Grade 9 Mathematics teachers. The choice of the Grade 9 teachers was influenced by the fact that Grade 9 is the exit point of the General Education and Training Band (GET). This is the grade where there is an external component of assessment in the form of the Common Task for Assessment (CTA). Teachers were selected on the basis of having at least one year experience of teaching Grade 9 Mathematics and also being qualified Mathematics teachers. The influence of the teacher's gender, race, nationality and age were not taken into account.

3.5.1 Gaining access

Hornsby-Smith (1998) reminds us of the need to differentiate between physical access and social access. The process of gaining access, Hornsby-Smith (1998) argues: "involves continuous negotiation, bargaining, and establishing trustful relationships with the gate keepers and those being studied" (p. 45).

Brogdan & Biklen (1992) raise the need to know something about the hierarchy and rules of a particular school, the need to develop rapport with participants and the need for a researcher to explain his or her intentions in the field. The researcher had to negotiate access through the levels of bureaucracy of the schools (i.e. from school principal to the Head of Department) to gain access to various schools and to the participants.

An official letter requesting permission to conduct this study was sent to the District Manager and the Circuit Manager for all the three schools (see Appendix 1). Official letters were also sent to the school principals and their School Governing Body Chairpersons requesting access to the schools (see Appendix 2). A letter was also sent to the participants (see Appendix 3). These letters briefly explained the purpose and the nature of the study. The researcher further explained the purpose and the nature of study to the participants in their first meeting. The researcher handed all the letters personally to these different departmental officials. The letters to the Chairpersons of the School Governing Bodies were given via the school principals.

3.6 DATA COLLECTION PROCESS

The process of collecting data in the study entailed three phases as shown in the Table 4 below. Table 4 provides a description of tasks that the researcher had undertaken together with the activity that arose from each of the tasks.

Table 4 Three phases of data collection

PHASE	TASK	ACTIVITY
1	Collection of assessment documents.	Analyzing teacher's assessment documents.
Time frame	Three hours over five days.	Ten hours over five days.
2	Planning interviews.	Selecting participants for interview through sampling
Time frame	Three days	Three days.
3	Setting and conducting interviews.	Transcription of interviews from tape recordings
Time frame	3 hours	40 hours

In his role as a case study researcher, during the first phase, the researcher collected teachers' planning assessment documents to be analyzed. Over the same period the researcher observed teachers presenting their lessons. Thereafter, the researcher took learners' classwork books, home work books, test exercise books, projects and assignment exercise books for further analysis.

Having read and analyzed the teachers' assessment documents and observed lesson presentations, the researcher identified areas that required further probing and clarity. After this the researcher undertook phase two and conducted phase three, the individual interview with the three participants.

3.7 METHODS OF COLLECTING DATA

This study uses methodological triangulation using data gathered from classroom observations, documents analysis, and teacher interviews. Cohen et. al. (2000) support this approach of triangulation as they argue that the more methods contrast with each other, the greater the researcher's confidence in findings confirmed by such methods.

3.7.1 Document analysis

The purpose of analyzing assessment documents was to seek evidence of teacher's assessment practices in the classroom. Each teacher's assessment and planning documents were collected to capture what the teacher applies in practice. Analysis of the teacher's assessment documents had the potential to verify the findings from observations of classroom assessment practices. Eisner (1999) contends that documents and artifacts provides a kind of operational definition of what teachers value, and help the researcher to understand the context within which teachers do their work.

Creswell (1994) argues that documents may be regarded as protected or private information unavailable to public, and therefore inaccessible. The rapport and trust established in gaining social access to the participants overcame this limitation. The researcher had no difficulty in accessing the teachers' assessment documents, such as written projects, assignments, class and controlled tests, and class exercises that may have been regarded as private.

Document analyses enabled the researcher to obtain what participants had to say in their own language and words (Creswell 1994). As written evidence, documents saved the researcher the time and expense of transcribing. A wide range of assessment documents provided rich information and thick description of teachers' classroom assessment practices.

3.7.1.2 Document analysis instrument as a research tool.

Cohen et al (2000, p 35) argue that observed behaviour is in fact “inferred”. It was on this basis that a wide range of individual teacher’s assessment documents were analyzed in detail, in order to support inferences about teacher’s assessment practices that were made during observations. The document analysis instrument was developed using Quellmalz’s taxonomy of measuring skills in the classroom (See Appendix 4). These levels range from knowing, applying routine procedures in familiar context, applying multi-step procedures in a variety of context, and reasoning and reflection. The assessment documents that were analyzed were class and home exercises/activities, tests, projects and assignments, and mathematical investigations. All these types of assessment are required by the NCS document, Assessment Guidelines for Mathematics (DoE, 2007).

3.7.2 Observations

Classroom assessment events were observed with the aim of understanding the explanation the teacher gave for his or her assessment practices. Since the focus of the study is on assessment practices in the classroom settings, observations were focused on how assessment tasks are designed and what is being assessed. The researcher was interested in the perceptions the teachers had about the new assessment policy and the extent to which these perceptions inform teachers’ assessment practices. In the light of the above, a structured observation schedule was used. The categories in the observation schedule were worked out in advance in order to facilitate the capturing of necessary data. The observation schedule was developed using Bloom’s taxonomy of the levels of cognitive demands ranging from Knowing, applying Routine procedures in familiar context, applying Multi-step procedures in a variety of contexts and Reasoning and Reflection (see Appendix 5). The observation schedule was designed with the description of each skill observed from the teacher’s assessment tasks.

The researcher was aware of the limitations that might be inherent in this instrument. For example, there was a possibility of considering an observed event as providing evidence of underlying thinking and perception that might lead to misinterpretation of information and data. Cohen et al. (2000, p. 304) argue that “there is an assumption that observed behaviour provides evidence of underlying feelings”. The researcher countered the problem of misinterpretation by using interviews and document analysis instruments.

Creswell (2004) argues that while “private” information may be observed that the researcher cannot report, the researcher can record information as it occurs and explore topics that the information may be uncomfortable with. A structured observation schedule facilitated an observation focus (see Appendix 5). The observation schedule was presented to teachers before the actual observation for discussion and clarification in case there were issues that needed clarity.

Researchers use a structured observation schedule to capture information in a live situation that the participant may be uncomfortable with. In the context of this study the researcher wanted to capture critical incidents that might be regarded as private information by the informants to come to the true perspective of teacher’s perceptions of assessment practices in Mathematics. The researcher wanted also to observe teacher’s assessment practices in the informal classroom situation; therefore the researcher found it necessary to use classroom observations.

3.7.2.1 The observation schedule as a research tool

A maximum of three lessons where teachers were presenting lessons to learners was observed per teacher. Cohen et al. (2000) argue that:

“If we know in advance what we wish to observe, i.e. if the observer is concerned to chart the incidence, presence and frequency of elements, or may be wish to compare one situation with another, then it is more efficient in terms of time to go into a situation with an already designed observation schedule” (p. 36).

It was in this light that a structured prior-prepared observation schedule was used during observation. The observation schedule was developed using Blooms' Taxonomy of cognitive skills ranging from knowing to reasoning and reflection (see Appendix 5). A description of each skill served as an indicator of each skill. A tick used in the schedule served as evidence of the skill.

Every assessment opportunity was analyzed during each observation using a rating of "evident" and "not evident". The category rated "not evident" does not mean deficiency of skill. It simply means that this category might not have been important to the teacher to integrate in his or her teaching at that time. Again, it has to be noted that the researcher was interested in assessment practices as having an educational value. The assessment practices had to facilitate Mathematics learning during the lesson. In the previous chapter it was argued that assessment practices must be educative with a view to promote learning, by engaging learners with interesting and challenging experiences, aimed at developing further insights and understanding.

The researcher was aware of the limitations of the schedule. Cohen et al. (2000) argue that while structured observations have the potential to provide useful data, they tend to be behaviourist, and the individual's subjectivity might be lost to an aggregated score. To counter this limitation, the researcher had to verify what was observed by asking the teacher questions about what happened in the classroom.

3.7.3 Interviews

Eisner (1999) advises against the use of formal inflexible structured interviews. He writes:

"Conducting a good interview is in some ways like participating in a good conversation, listening intentionally and asking questions that focus on concrete examples and feelings rather than on abstract speculations, which are not likely to provide meaningful information" (p. 119).

It is for this reason that semi-structured interview questions were perceived to be most appropriate for the interviews in this study. The researcher envisaged that this kind of interview would capture a detailed comprehensive picture of the subjective meaning of teachers' assessment practices and in-depth information on why things are done in a particular way. Interviews were used, as pointed out by Cohen et al. (2000), to validate other methods of data collection or go deeper into the motivation of respondents. In adopting open-ended questions the researcher hoped to elicit useful insight into what informed teachers' assessment practices. It is imperative, as contended by Goodson (1993), to listen to teachers' voices because they carry the exact tone and feelings that are conveyed by the way the teacher speaks. The tape recorder was used to record the interviews in order to capture teachers' voices.

Interviews, as recommended by Eisner (1998), should focus on things that are done by the interviewee. It is often useful for the researcher to ask teachers to explain something they said in class. It was in this light that the researcher adopted open-ended questions.

The researcher was aware of the limitations inherent in using an interview as a data collection instrument. The interactive nature of interviews allows 'adaptability' while on the other hand it can lead to subjectivity and possible bias. To counter for subjectivity the researcher developed a semi-structured interview schedule, which focused on the conversation (see Appendix 6).

3.7.3.1 Interview schedule as a research tool

An interview schedule was designed to capture each teacher's beliefs and understanding about mathematics learning and assessment practices. Questions that captured teachers' biographies, teachers' beliefs about learning of mathematics knowledge and skills were also included in the interview schedule.

A tape recorder was used to record the interviews. These audio recordings were later transcribed and captured electronically. The use of the tape-recorder has some disadvantages as the participants may be reluctant to give personal information when they know that they are being recorded. The researcher overcame that by first explaining the purpose of the interview and the recording to the respondents so as to gain their confidence (Creswell, 1994). The researcher established the 'mutual trust' with the respondents. The use of a tape-recorder reduces the tendency for the interviewer to make an unconscious selection of data that favour his or her own biases.

3.8 DATA ANALYSIS

This section is divided into two (2) sections. The first section addresses the analysis of data from observation schedule and the assessment documents. The second one is the analysis of the transcribed data from the interviews.

3.8.1 Analysis of data from observation schedule and assessment documents.

In the analysis of data from observations of teacher's lessons and teacher's assessment documents the following four levels of skills will be used. The first level is the Knowing level, where the task requires a learner to do a simple calculation or use the appropriate formula or vocabulary or read the answer directly from the table. The second level is that of Routine procedures which is used in familiar contexts to solve the problem. At this level the task requires a learner to perform well-known procedures in familiar contexts. For example, solving an equation by means of trial and error, to improve on algebraic processes. The third level is that of Multi-step procedures that are applied in a variety of contexts. A task at this level requires a learner to decide on the most appropriate procedure to solve the question and may have to perform one or more preliminary calculations before determining a solution. The fourth level is the Reasoning and Reflection level where the learner is required to interpret or critique the solution and even make generalizations about the answer.

For purposes of analysis, the controlled and class tests were combined as they constituted the formal assessment. Worksheet/class activities/class exercises were combined as this constituted informal assessment. Likewise, projects and assignments were combined together as they are lengthy written, activities. The researcher added the total number of question items asked per skill, and converted this number into a percentage. In addition, a second analysis delivered a percentage weighting based on the marks allocation of each skill. Thus, even though a skill was tested in only 1% of the items, it might be given more significance in the assessment and be allocated 10% of the total marks. The latter weighting is used in the discussion as the researcher thought that this weighting was more important than the former. It is only in the charts that represent the data from observations that the weighting was not used, as the data from observations obviously does not give marks to teacher's practices.

3.8.2 Analysis of the transcribed data from interview schedule.

The tape-recorded data were transcribed in preparation for analysis. The transcripts were read thoroughly in order to discover emerging themes. A number of thorough readings of the transcripts was done in order to check for irrelevant data and to facilitate the organization of the data into meaningful chunks of information. A "coding" system of data was developed in order to organize data. Jessop (1997) defines coding as a complex process in which the researcher labels units of meaning or categories according to a system of codes, usually developed through a close reading data. Thorough reading of data was done and questions asked in the interview schedule were organized into meaningful topics/codes. The topics identified were the participant's description of his/her understanding of assessment in mathematics, understanding of the assessment policy in mathematics, and the influence that the teachers' understanding of assessment policy has on their assessment practices in mathematics.

3.9 LIMITATIONS OF THE STUDY

The problem of constructing questions for the interviews can be seen as a limiting factor, as it is recognized that asking the 'right' questions is an 'art', which potentially grows with practice (Cameron, Doidge & Rollnick, 2003). While the recording of assessment practices of mathematics teachers is a relatively straight forward process, it is very important to recognize that it is very difficult for people to explain why they do something the way they do it, and why they might change their minds about something.

This study was limited to three Grade 9 Mathematics teachers in the Obonjeni District and in only two circuits. The schools were located only in rural areas, and were disadvantaged in terms of resources. The documents analyzed covered only the work covered by teachers in three months and only three lessons were observed in each school. No generalization can be made from this study because only three schools with one Grade 9 Mathematics teacher in each formed the sample.

3.10 RIGOUR OF THE RESEARCH STUDY

According to Denzin & Lincoln (2000) the use of multi-method (triangulation) "reflects the attempt to secure an in-depth understanding of the phenomenon in question" (p. 5). Triangulation was used as an alternative to validation. This study used methodological triangulation by using data from classroom observations, document analysis, and interviews with teachers to strengthen the validity of the research. This was done to verify consistency of the participants' answers and also for clarification of some issues. Some of the data from the classroom observation resulted in some informal interviews for clarification and the testing of consistency at the end of the classroom lesson observation. The researcher observed one teacher three times presenting learning experiences in the classroom situation. This was done to observe the collaborative activity of the teacher in the classroom context.

Triangulation is used in qualitative studies as the act of combining methods and design. Denzin & Lincoln (2002) use this term based on the assumption that any bias inherent in particular data, source, investigation and method would be neutralized when used in conjunction with other data sources, investigation, and method. For example, Cohen et al.

(2000, p. 233) contend that “triangulation in social science attempts to explain more fully the richness and complexity of human behaviour by studying it from more than one standpoint, often by making use of qualitative data”

Rigour in the research was achieved by the criteria suggested by Lincoln & Guba (1985): “credibility, transferability, dependability and confirmability” (p. 233). This research addressed these criteria as indicated in the table that follows (Table 5):

Table 5 Rigour criteria in this study

STRATEGY	CRITERIA	APPLICATION
Credibility	Prolonged engagement in the field; Member checking	Reading assessment documents; lesson observations. Engaging with participants to verify comments given
Transferability	Dense description	Verbatim quotes from documents analysis and lesson observations.
Dependability	Triangulation Dependability audit	Document analysis, lesson observations and interviews; transcripts
Confirmability	Triangulation Confirmability audit	Document analysis; lesson observations and Interviews Checking of transcripts.

3.11 ETHICAL ISSUES

The autonomy of the participants was protected through the use of an informed consent form, which was written in the language that participants understood. The letter explaining the purpose and the nature of the research project (see Appendix 7) was sent to the school principals, chairpersons of the governing bodies and the participants themselves. The principals of schools signed letters of consent. The letter to the participants indicated clearly that participation was voluntary and that each participant’s

identity was to be confidential. The letter also stated that participants were free to withdraw from the research at any time without any negative or undesirable consequences to themselves. Participation of the teachers was voluntary. No coercion was used to convince teachers to participate in the research. Teachers willingly and freely read and signed the consent forms. A template of the consent form given to teachers is present in the appendix (see Appendix 3).

3.12 CHAPTER SUMMARY

In this chapter, the researcher outlined the main aspects of the research methodology and design used in this study. Herein the data collection techniques as well as how data was analyzed are included. The merits as well as the constraints of the methods are given. In addition, triangulation measures undertaken is also explained.

CHAPTER 4: PRESENTATION OF DATA ANALYSIS

4.1 INTRODUCTION

The National Curriculum Statement (NCS) for Grade R – 9 requires the use of a variety of appropriate assessment strategies that adequately assess learner achievement and develop skills for lifelong learning (DoE, 2007). These requirements of the NCS have made it incumbent on Mathematics teachers to apply strategies and forms of assessment that are appropriate for the knowledge, skills and the range of competencies being assessed as well as for the developmental needs of the learners.

Furthermore, as discussed in the previous chapters, with the introduction of the NCS in South Africa, teachers are challenged to change their thinking on what constitute Mathematics classroom assessment. In this chapter the researcher presents the analysis of data findings to the main questions that were formulated. To accomplish the purpose of this study, the following research questions were developed:

1. What are the Grade 9 Mathematics teachers' understandings of assessment policy in Mathematics?
2. What classroom assessment practices are used by Grade 9 Mathematics teachers?
3. What impact do teachers' understandings of the assessment policy in Mathematics have on their classroom assessment practices?

As this is mainly a qualitative case study, in the analysis each of the three cases will be discussed separately. A cross case analysis of the three cases will follow the individual case analysis. The cross case analysis will be done in order to illustrate the commonalities and differences in the teachers' understandings of the assessment policy, teachers' assessment practices and the impact those understandings have on teachers' assessment practices. The data collected from each of the three teacher's assessment documents and

observation of three lessons (as described in Chapter Three), together with transcripts of the interviews will be used in both individual and cross case analysis.

4.2 CASE STUDIES

The following is the analysis of the individual case studies. Each case study begins with a brief profile of each teacher. In the profile, the teacher's qualification in Mathematics teaching experience is given. In each case study, the analysis of data, and the quotations from transcripts of the teacher's interviews are used. The data analysis from interviews is given first followed by the data analysis of the lesson observations and document analysis. The data analysis of the lesson observations and document analysis is presented in the form of graphs. After each graph, a brief description of the information contained in each graph is given. Lubisi (2002) states that classroom assessment manifests itself in various modes and techniques. As this study focuses on teachers' assessment practices, the researcher had to observe classroom assessment events where the focus was on how teacher's assessment tasks are being designed and what is being assessed.

4.2.1 Case 1: THABANE

Thabane teaches at a poorly resourced rural school. It has one computer, one photocopying machine and it has electricity. This school presented some characteristics of being well managed and teaching and learning is taking place in the school. Thabane has a Secondary Teachers Diploma (STD) as an academic/professional qualifications respectively. At College level, he majored in Mathematics and Physical science. Mathematics and Physical Science were his favourite subjects in school. He is 22 years old and has three years of teaching experience of teaching Grade 9 Mathematics in a rural school.

4.2.1.1 Thabane's understanding of assessment in Mathematics.

The interview reveals that while Mathematics and Physical Science were Thabane's favourite subjects at school, Biology was least favoured. Being analytical, engaged with

logical tasks, getting things right and interrelated facts learning were Thabane's favoured types of learning. This was supported by Thabane's description of his school education experience, in response to the following questions:

Researcher (R): Tell me about the subject you liked the most while you were at school.

Thabane (T): At school most Mathematics.

R: Why did you like this subject the most?

T: I think I liked it because it made sense to me, and everything that is logical makes sense to me. I like reasoning, like in Mathematics you have to reason all the time.

Thabane's description of his understanding of assessment in Mathematics is that of testing reasoning and interrelatedness of facts. This statement is supported by the following responses from Thabane:

R: When assessing, what do you consider more important between the ways in which the answer has been arrived at and the final answer?

T: The way in which the answer has been arrived at. It shows that the learner understands all the steps that lead to the answer. The steps indicate how the learner is reasoning in a particular sum or problem. It also indicates how the different steps relate to one another. I think how you arrive at the answer must make sense to me because if it is a string of unrelated facts that makes no sense to me.

The interview also revealed that Thabane's assessment practices are targeted at assessing reasoning skills and interrelatedness of knowledge. This was captured from Thabane's

account he gave on assessing a range of mathematics knowledge and skills simultaneously. A response like the following provides supporting evidence:

R: What are your views on assessing a range of mathematics knowledge and skills simultaneously? Is it important?

T: Yes, it is very important because Mathematics is a logical subject. When you assess a range of knowledge and skills you are testing if the learner can think logically and can see connections between things.

R: What evidence would you look for to ensure that the learner is progressing in his/her learning in mathematics?

T: The marks they obtain and when the learner can explain how he/she get the answer. I'm not sure how to respond specifically to this question.

4.2.1.2 Thabane's understanding of the assessment policy in Mathematics.

With reference to the assessment policy in Mathematics, the interview revealed that the Thabane does not understand the requirements of the policy. Responses like the following provide supporting evidence:

R: In terms of the assessment policy, do you think learners are developed to be critical thinkers or need spoon feeding?

T: Learners want to be told every thing.

The response does not show that Thabane's perceptions are in accordance with the promotion of critical thinking from the learners as a requirement of the policy. This is further evident from the following response:

R What in your view can be done to motivate learners such that they are critical thinkers in Mathematics?

T: Tell them the importance of maths they study.

However, it is important to note that Thabane perceives the assessment policy as an important document to use when assessing learners. This was captured from the following response:

R: When assessing learners, what criteria do you use to determine how well learners are able to achieve the Mathematics Learning outcomes?

T: Assessment standards and assessment criteria.

R: When assessing your learners, do you organize the assessment standards in any order of importance?

T: I follow the assessment policy document; I organize them as they are organized in the policy document.

Furthermore, the interview reveals that Thabane does use the variety of assessment methods when assessing learners to accommodate their differences in learning. This was captured from his response to the following question:

R: How often do you give your learners the assessment tasks that intend identifying and addressing learners' weakness and can you give an example of such a task?

T: I give them daily class work and home work.

4.2.1.3 Thabane's assessment practices

Lubisi (2002) states that classroom assessment manifests itself in various modes and techniques. As this study focuses on teachers' assessment practices, the researcher had to observe classroom assessment events where the focus was on how the teacher's assessment tasks are being designed and what is being assessed. The information recorded during each lesson is presented in Fig. 1 below.

4.2.1.3.1 Oral Assessment (Observations)

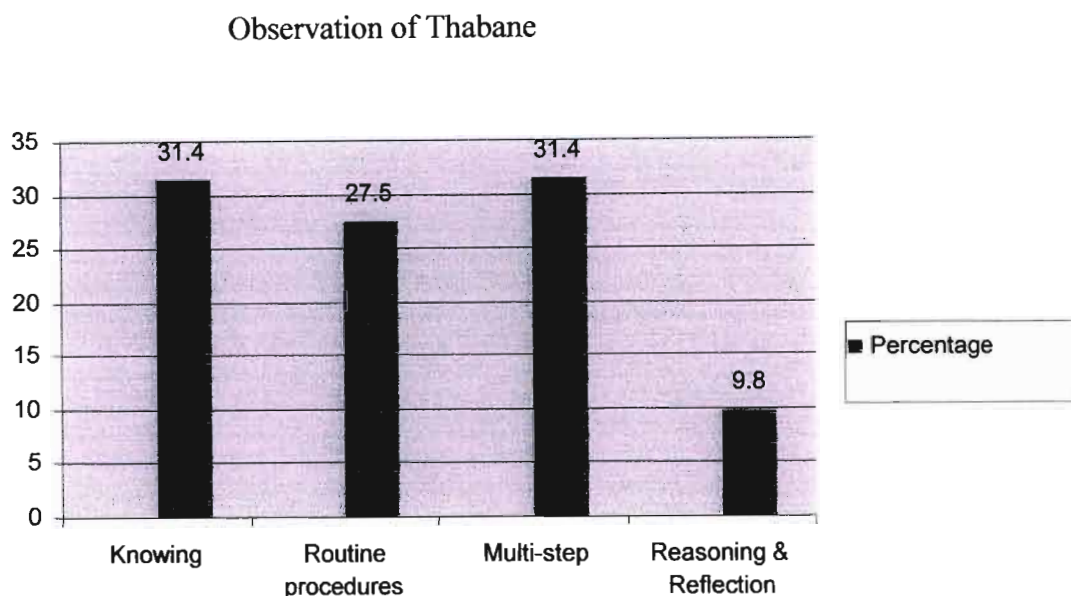


Fig. 1: Frequency of assessment levels

In total, 51 question items were analyzed from three hours of observations. From Fig. 1, it is clear that the most frequently asked question items could be Knowing or Multi-step procedure categories during the classroom interaction. The next highest category was Routine procedures. Very few questions were asked in the Reasoning and Reflection category. The following example illustrates the type of a question which tests the Knowing skill: Factorize: $2a + 4b + 6$. In this example the learner need to know that

he/she must take out 2 as a common factor and get $2(a + 2b + 3)$ as the expected answer. The following is an example of a Multistep procedure type of a skill: Draw the graph of $y = 2x - 2$ using the intercepts method. In this example, the learner must first find the y-intercept by letting $y = 0$ and get $2x - 2 = 0$, then solve the linear equation to find $x = 1$. In this case the learner has used the skill learned from solving linear equations to be able to draw the straight line.

4.2.1.2 Written Assessment

Thabanes' assessment documents were analyzed to verify the information obtained from observations of classroom assessment practices. The information recorded from assessment documents analysis is presented in Fig. 2 – Fig .4 below.

(i) Controlled/Class Test

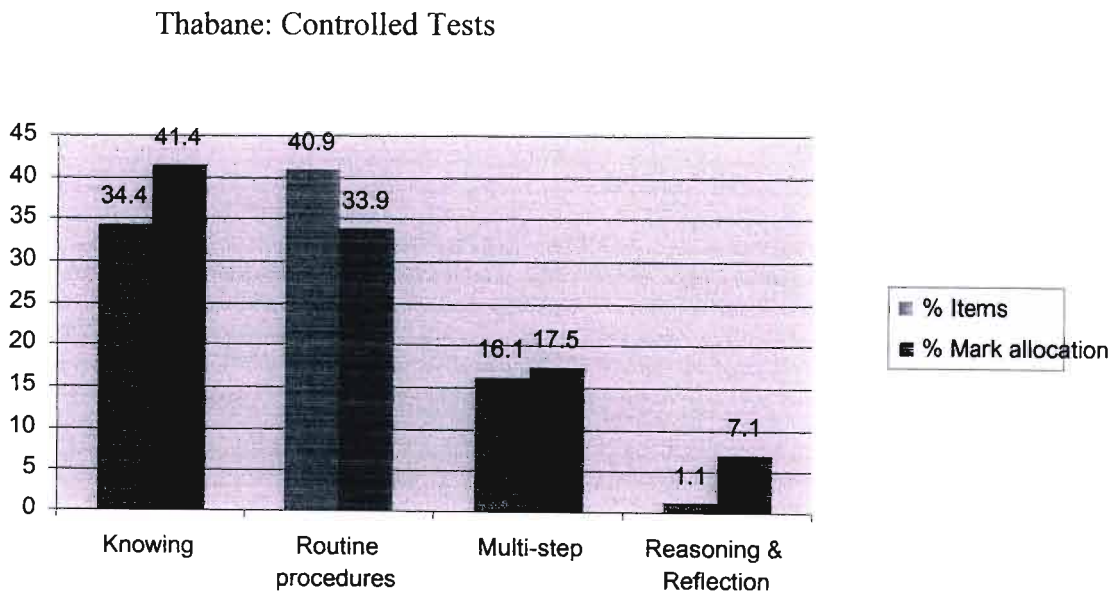


Fig. 2: Frequency of assessment levels in skills for controlled tests

In total, 93 question items were analyzed from five controlled tests. Fig. 2 shows that most question items could be assigned to Knowing and Routine procedures categories. These categories together accounted for about 75,3 % of the marks allocated in controlled

tests. There were 17 question items that were assigned to Multi-steps and Reasoning and Reflection. These categories could be accounted for about 25 % of the marks allocated in controlled tests.

(ii) Worksheets/Exercises/Activities

Thabane: Classwork exercises and worksheet activities

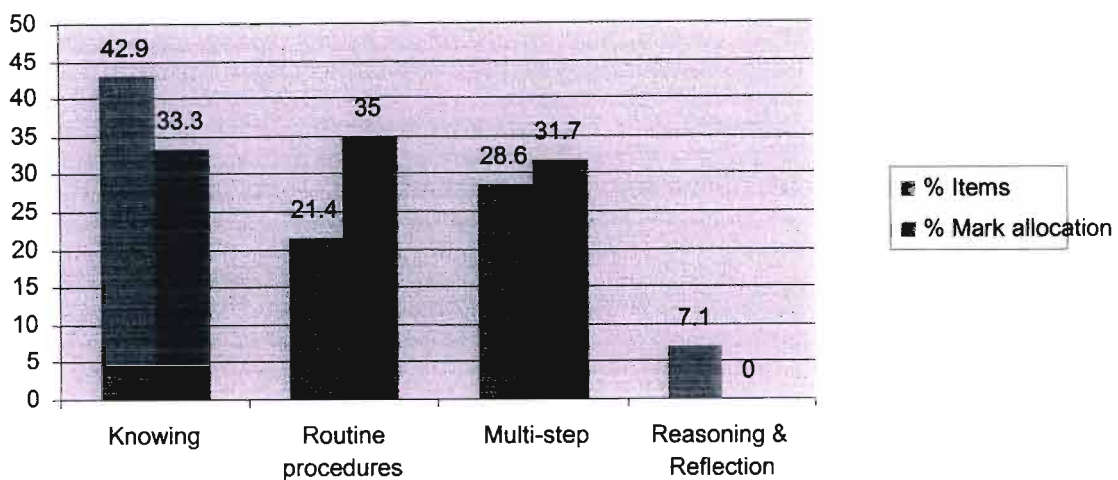


Fig. 3: Assessment level for classwork exercises and worksheet activities

Three worksheets were analyzed, comprising a total of 14 question items. Fig. 3 reveals that the highest proportion of question items (42,9%) fell in the Knowing category, accounting for 33,3% of the marks. The next highest proportion (28,6%) fell in Multi-step procedures category and accounted for 31,7% of marks. The question items (21,4%) assigned to Routine procedures accounted for 35% of the allocated marks. The Reasoning and Reflection were asked (7,1%) with no mark allocation. It should be emphasized that the left column in the bar graph refers to the number of items and the right column refers to the weighting of mark allocation and it is felt that the latter is more appropriate for comparison purposes.

(iii) Projects/ Assignments

Thabane: Projects and assignment

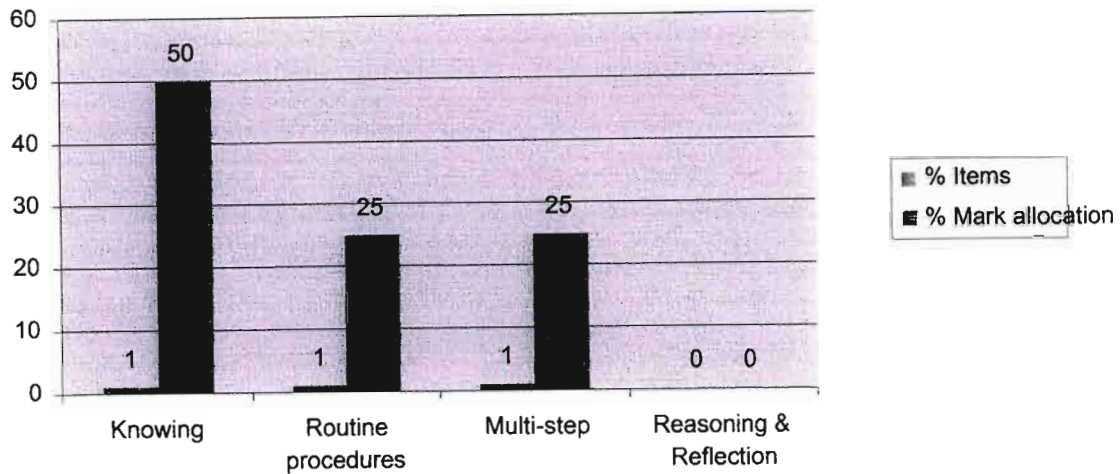


Fig. 4: Weighting of skills for projects and assignments

In total, three question items were analyzed. Fig. 4 reveals that the question items fell in Knowing, Routine procedures or Multi-step categories equally. The Knowing question category accounted for a higher percentage (50%) of the marks than Routine procedures and Multi-steps, which accounted for 25% respectively. There were no question items that could be assigned to Reasoning and Reflection skills.

4.2.1.4 General Comments

Thabane's overall assessment strategy is that Knowing, Routine procedures questions are assessed more than Reasoning and Reflection. This is evident in both oral and written assessment techniques. For example, in oral assessment (observation), out of 51 question items that were analyzed, 46 question items could be assigned to Knowing, Routine procedures and Multi-step procedures. The remaining five question items could be assigned to the Reasoning and Reflection category.

In written assessment the highest percentage (34,4% in worksheets, 42,9% in controlled tests) was assigned to Knowing questions. Similarly, the frequency weighted by mark allocation were highest for Knowing questions in controlled tests and worksheets respectively at 41,4%; 42,9%. The Knowing questions received 41,4% of marks in controlled tests and 42,9% of questions in the worksheets were from the Knowing questions. It is important to note that very little attention was given to Reasoning and Reflection in all written assessment tasks

4.2.1.5 The influence of Thabane's understanding of assessments on his assessment practices.

The interview, observation and document analysis provides a clear picture that Thabane's perceptions of assessment in mathematics inform his assessment practices. This was captured from the following responses:

R: What kind of mathematics tasks do you use in assessing learners?

T: I use tasks that test creative thinking from my learners. I give them investigation tasks such as the 'Packaging 4 tennis balls problem'. This problem is about investigating the different possibilities you need to consider the economy of the packaging in terms of both materials used to package the balls and spaces taken up by the packaging. (This is an example given in the Assessment Guidelines for Mathematics-Intermediate and Senior Phase document)

R: What kind of questions can you rank as knowledge questions?

T: The why questions

R: What kind of questions do you ask to establish that the learner has reached the high thinking level?

T: I ask those questions where they must explain what they have done and why they have done it.

The above responses are in line with Thabane's perceptions that mathematics is a logical subject where facts are interrelated. The above responses suggest that Thabane's assessment practices are related to his perceptions about assessment in Mathematics. His assessment tasks are intended to promote reasoning from the learners. This is suggested by the fact that Thabane asks his learners to explain what they have done and why they have done that.

4.2.2 Case 2: MANDLA

Mandla teaches at a fairly well resourced rural school. This school presented evidence of a reasonable management, teaching and learning environment. Mandla has a Bachelor of Science (BSc) degree qualification in Mathematics and an Advanced Certificate in Mathematical literacy. He also has a Secondary Teachers Diploma (STD) in Mathematics as a professional qualification. At College level, Mandla majored in Mathematics and Physical science. Mathematics and Physical Science were Mandla's favourite subjects in school. Mandla is 43 years old and has experience of teaching in rural schools and has taught mathematics for 14 years. He has taught Grade 9 Mathematics for six years.

4.2.2.1 Mandla's description of his understanding of Assessment in Mathematics.

The interview reveals that Mathematics was Mandla's most favourite subject at school. Doing calculations and getting answers was preferred to reading. This is evident from Mandla's description of his school experiences, as in the example below:

Researcher(R): Tell me about the subject you liked the most while you were at school.

Mandla(M): The subject I liked the most while I was at school was mathematics.

R: Why did you like this subject the most?

M: In the majority of the cases I liked the subject because to me it was a matter of calculations and not reading too much because reading was not interesting to me. Sitting down and calculating was interesting to me and that is why I liked this subject. I enjoyed the challenges of solving x and y and that is why I liked the subject.

Mandla's understanding of assessment in Mathematics is that of finding answers. The responses that Mandla gave to the following question, supports this statement.

R: When assessing, what do you consider more important between the ways in which the answer has been arrived at and the final answer?

M: Yahh...in the majority of the times I consider the answer and very few cases where I consider the method how does the learner arrive at the answer.

The interview reveals that as much as Mandla is emphasizing the finding of the answer in his assessment, his assessment practices are also showing that mathematics has connections from one step to the next. This was captured from his account given on assessing the range of knowledge and skills simultaneously. The response like the following provides the evidence:

R What are your views on assessing a range of mathematics knowledge and skills simultaneously? Is it important?

M: Yahh... at grade 9 level they are supposed to integrate things as they will be expected to do at the Further Education and Training (FET) band. I consider it very important to start integrating two or three concepts at a time.

The interview further reveals that although Mandla's assessment is looking for the answer, there should be evidence that the learner understands how to arrive at that answer. This was captured from the response to the following question:

R: What evidence would you look for to ensure that the learner is progressing in mathematics?

M: The evidence will be the learner's script where the learner indicates or show steps that are leading to the answer.

4.2.2.2 Mandla's understanding of the assessment policy in Mathematics

With reference to the assessment policy in Mathematics, the interview reveals that Mandla is not very clear about the requirements of the assessment policy. This was evident from the responses to the following questions:

R: Do you think learners are critical thinkers or need spoon feeding?

M: The majority of learners need to be spoon-fed.

R: In terms of the assessment policy, do you think learners are creative thinkers or need spoon feeding?

M: They need spoon feeding.

R: When assessing learners, what criteria do you use to determine how well learners are able to achieve the Mathematics Learning Outcomes?

M: I use my marking memorandum. If they give answers that are wrong according to my memorandum, then they are not achieving the Learning Outcomes.

R: When you assess your learners, do you use the assessment standards?

M: Well...no. When I assess, I assess achievement of the Learning Outcomes.

Mandla's responses to the above questions do not suggest that he uses the assessment policy in his assessment of learners. One of his responses to the use of assessment standards as the criteria for achievement of Learning Outcomes (LOs) indicates that he does not use assessment standards. This is an indication that he is not very familiar with the use of the assessment policy.

4.2.2.3 Mandlas' assessment practices

As with the first participant, this section will assess first the observation of Mandla's teaching. The information recorded during each lesson is presented in Fig. 5 below.

4.2.2.3.1 Oral Assessment (Observations)

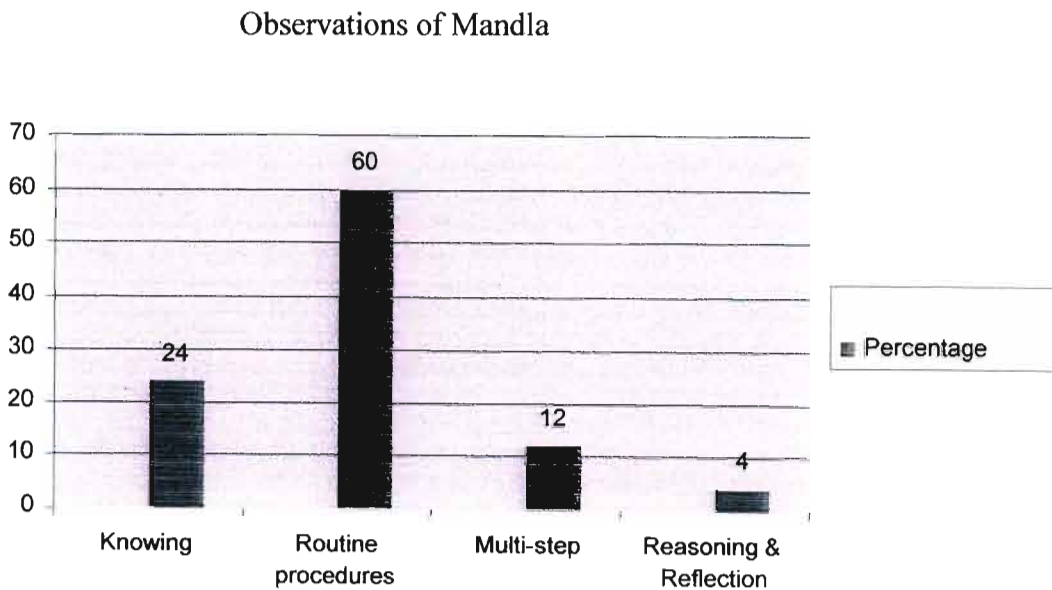


Fig. 5: Frequency of assessment levels

In total, 25 questions were analyzed in three hours of observations. From Fig.5, it is clear that Mandla asked questions about Routine procedures (60%) more frequently than any other category during classroom interaction with learners. The next highest category was Knowing (24%), with few questions in Multi-step procedures and Reasoning and Reflection categories.

4.2.2.2 Written assessment

Mandla’s assessment documents were analyzed to verify the information obtained from observations of classroom assessment practices. The information recorded from assessment documents analysis is presented in Figures 6, 7 and 8.

(i) Controlled/ Class tests

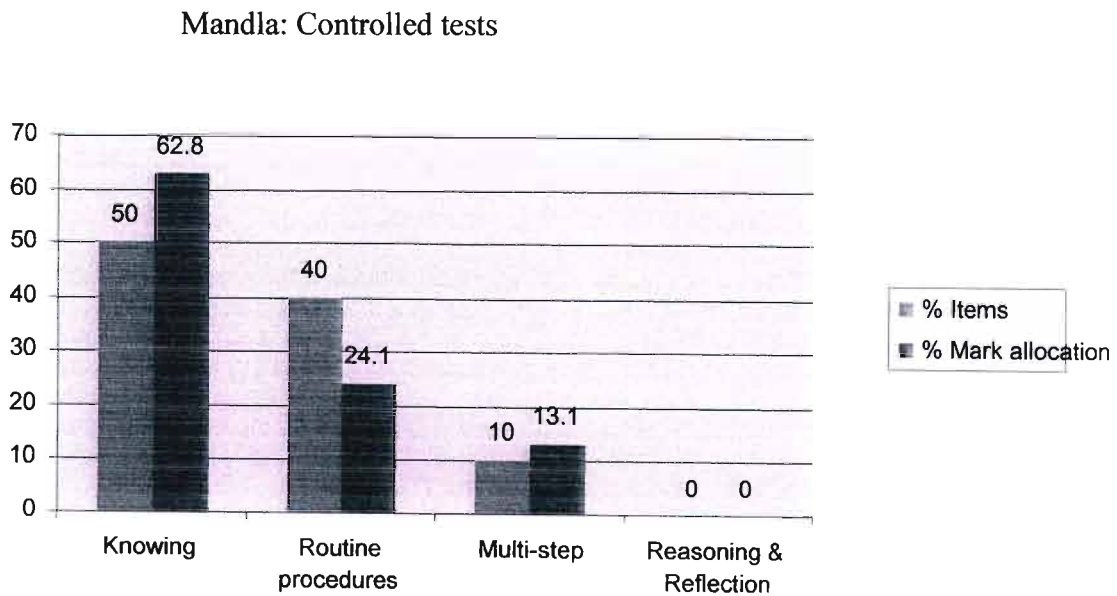


Fig. 6: Frequency of assessment levels for controlled tests

Twenty question items were analyzed. These were predominantly Knowing questions. Fig. 6 shows that most of the question items (86,9%) could be assigned to Knowing or Routine procedures. Those two categories accounted for about 87% of marks allocated in

the controlled test. About (13%) of the question items were assigned to Multi-step procedures and no question items were assigned to Reasoning and Reflection.

(ii) Worksheets/Class/ Activities/Exercises

Mandla: Classwork and worksheet activities

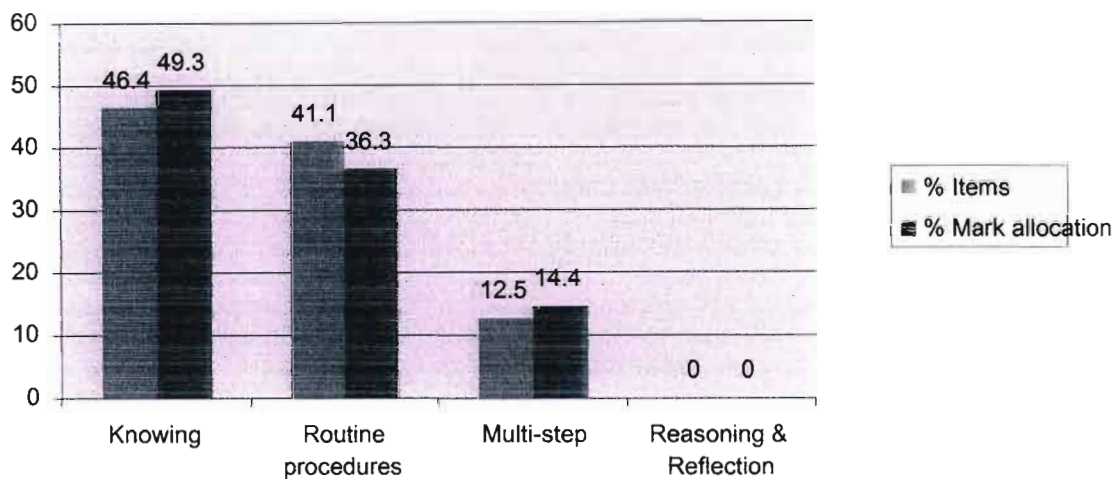


Fig. 7: Frequency of assessment levels for classwork and worksheet activities

A total of 56 questions from 13 worksheets was analyzed. Fig. 7 shows that most of the question items (87,7%) fell in the Knowing or Routine procedures categories, accounting for 85,6% of the marks. There were no questions in the Reasoning and Reflection category, and a small number in Multi-step procedures, accounting for 14,4% of marks.

(iii) Projects/Assignments

Mandla: Projects and assignments

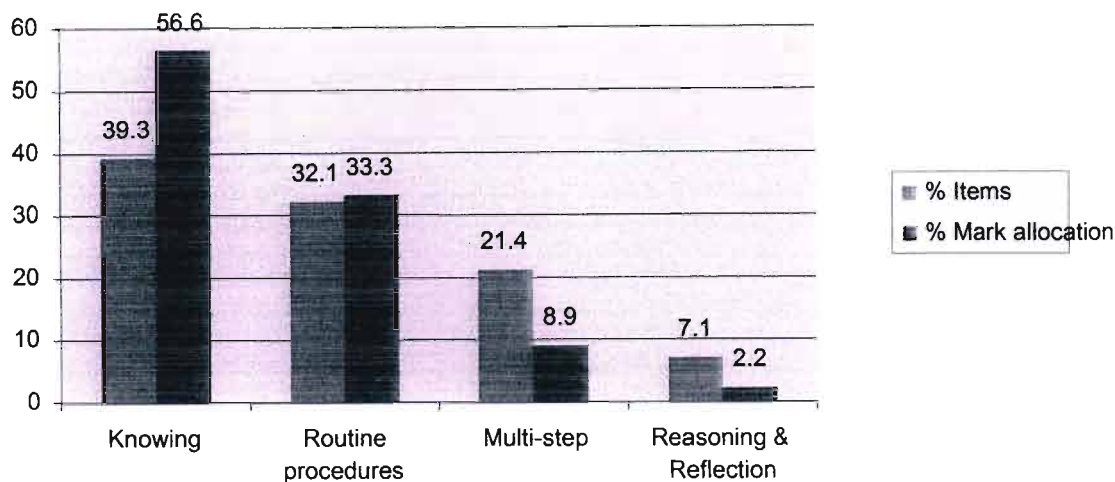


Fig. 8: Frequency of assessment levels for projects and assignments

Twenty-eight question items from six projects/assignments were analyzed. Fig. 8 reveals that more focus was on Knowing or Routine procedures category. About 90% of marks were assigned to these categories. There were few question items on Multistep procedures and Reasoning and Reflection and there was a low marks weighting (11%) assigned to these categories. This accounted for (11%) in these categories.

4.2.2.4 General Comments

Mandla's overall assessment strategy is that Knowing and Routine procedures are more assessed more than Multi-step procedures and Reasoning and Reflection skills. This is evident in oral assessment (observations) and written assessment (controlled test and worksheets).

For example, during observations, out of 25 question items that were analyzed, 21 of these were assigned to Knowing or Routine procedures categories, while only 21,4 % and 7,1 %) were assigned to Multi-step procedures or Reasoning and Reflection respectively.

In written assessment, the highest percentage (90% in controlled tests and 88% in worksheets) was assigned to Knowing and Routine procedures category while a low percentage was assigned to Multi-step and Reasoning and Reflection categories. The teacher's assessment strategy is also reflected in the mark allocations where 77% in controlled test, and 88% in worksheets were assigned to Knowing and Routine procedures.

The project/assignments as written assessment techniques emphasized the Knowing and Routine procedures categories. Less emphasis was put on Multi-step procedures and Reasoning and Reflection categories. Out of 28 question items that were analyzed, 71% were assigned to Knowing and Routine procedures, while 29% were assigned to Multi-step procedures and Reasoning and Reflection. Mandla's emphasis accounts for the mark allocation 90% was assigned to Knowing and Routine procedures, while only 11% was assigned to Multi-step procedures and Reasoning and Reflection learning.

4.2.2.5 The influence of Mandla's' understanding of assessment on his assessment practices.

The interview indicates that Mandla's assessment practices do cater for the variety of learners needs. This was captured from the response to the following question:

R: What kind of mathematics tasks do you use in assessing your learners?

M: I vary my assessment tasks to cater for different learners' abilities. For example in the classroom, I use oral questions to assess them as to where are they in as far as that topic is concerned. I also give them classwork and homework. I

also give them tests that are either formal or informal. I further give them tutorials and investigations.

R: What kind of questions can you rank as knowledge questions?

M: The questions that will require the learner to reproduce what the learner have been taught.

R: What kind of questions do you ask to establish that the learner has reached the high thinking level?

M: Mmmm....I'm not quite sure about that one.

The above responses do indicate the relationship between Mandlas' understanding of assessment and his assessment practices. In his description of assessment in Mathematics he indicated that there should be evidence that the learner understands how to arrive at the answer. In reality though, the kinds of questions that he asks are aiming at learners producing what they have been taught.

4.2.3 Case 3: NELLIE

Nellie teaches at a relatively well resourced school in a rural area. The school has five computers to be used by teachers, one photocopier. It has electricity and the school is offering Computer Applications Technology as a subject in the FET band. The school presented characteristics of functionality. Nellie has a Bachelor of Education (BEd), Secondary Teacher's Diploma (STD) and Further Diploma in Education (FDE) in Mathematics as professional qualifications. Mathematics has always been her favourite subject both at school and at a tertiary institution. She has 11 years of teaching experience both in the urban and rural schools. She has five years experience of teaching Grade 9 Mathematics.

4.2.3.1 Nellie's description of her understanding of assessment in Mathematics.

The interview also revealed that Mathematics has always been the favourite subject for Nellie. She understands Mathematics as a thinking subject. This is supported by Nellie's description of her school education experience, in response to the following questions:

Researcher (R): Tell me about the subject you liked the most while you were at school.

Nellie (N): Mathematics

R: Why did you like this subject the most?

N: It provoked me to think. Mathematics is more directive, it strike my attention when learning it.

Nellie's understanding of assessment in Mathematics is that assessment in Mathematics should promote thinking and interrelated step by step reasoning. This is evident from her responses to the following questions:

R: When assessing, what do you consider more important between the ways in which the answer has been arrived at and the final answer?

N: The ways in which the answer has been arrived at are much important then the answer itself. When the learner has mastered the way involved at arriving at the answer he is assured of arriving at the correct answer. In Mathematics if an answer does not concur with steps involved even though it is a correct answer, I can not award marks.

The interview revealed that assessment practices should be assessing reasoning skills and interrelated knowledge. This was captured from Nellie's response to the question on

assessing the range of mathematics knowledge and skills simultaneously. A response like the following provides evidence:

R: What are your views in assessing a range of mathematics knowledge and skills simultaneously?

N: The interconnectedness of mathematical aspect compels us to assess the range of mathematical knowledge and skills simultaneously. It is therefore important to assess the combination.

R: What evidence would you look for to ensure that the learner is progressing in his/her learning in mathematics?

N: Research given must be submitted in parts so that I can monitor the progress. I'm not quite too sure on this one.

4.2.3.2 Nellie's understanding of the assessment policy in Mathematics.

With reference to the assessment policy in Mathematics, the interview reveals that Nellie is conversant with the assessment policy. The assessment policy and the National Curriculum Statement promote the process of scaffolding of the content to the learners. The response like the following provides the supporting evidence:

R: Do you think learners are critical thinkers or need spoon feeding?

N: It is the combination of the two. For learners to become critical thinkers they need to be feed first. They then gradually master the skill, eventually they become critical thinkers. Critical thinking is the final stage.

The response shows that Nellie's assessment tasks do include those that promote critical thinking from learners as a requirement of the assessment policy. This is further evident from the teacher's response to the following question:

R: What kind of mathematics tasks do you use in your classroom?

N: Mathematics tasks should provoke thinking and reflective process.

The interview also reveals that Nellie uses the assessment policy document when assessing learners. This was captured from the following response:

R: When assessing your learners, do you organize assessment statements in any order of importance?

N: Yes I do. Knowledge must be linked to one another.

Although the interview revealed understanding and use of the assessment policy by Nellie, it also reveals that Nellie does not use a variety of assessment methods to accommodate learner differences in learning. This was captured from her response to the following question:

R: How often do you give learners the assessment tasks that intend identifying and addressing learners' weaknesses?

N: I sometimes.

4.2.3.3 Nellie's assessment practices

This section, as the other sections before, will first present the observation of Nellie's teaching. The information recorded during each lesson is presented in Fig. 9 below.

4.2.2.3.1 Oral Assessment (Observations)

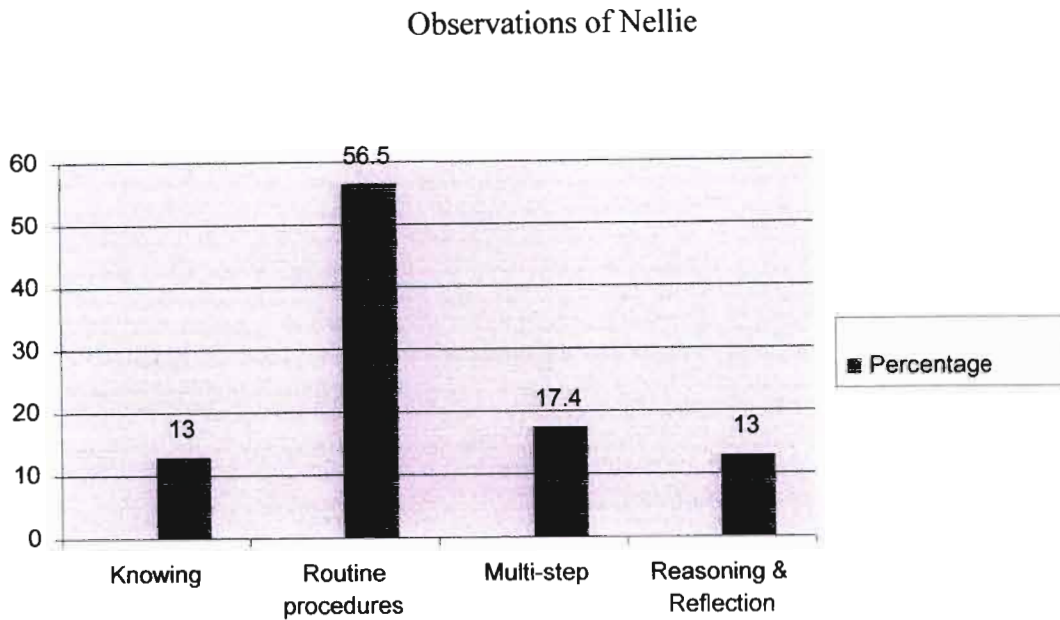


Fig. 9: Frequency of assessment levels

In total, 23 questions items were analyzed from three hours of observations. Fig. 9 above reveals that the most frequently asked question items were ascribed to Routine procedures (57%). The next highest category was Multi-step procedures (17%). Fewer question items fell in the Reasoning and Reflection and Knowing categories 17,4% and 13%, respectively.

4.2.3.3.2 Written assessment

Nellie's assessment documents were analyzed to verify the information obtained from observations of classroom assessment practices. The information recorded from assessment documents analysis is presented in Figures 10, 11 and 12.

(i) Control/Class Tests

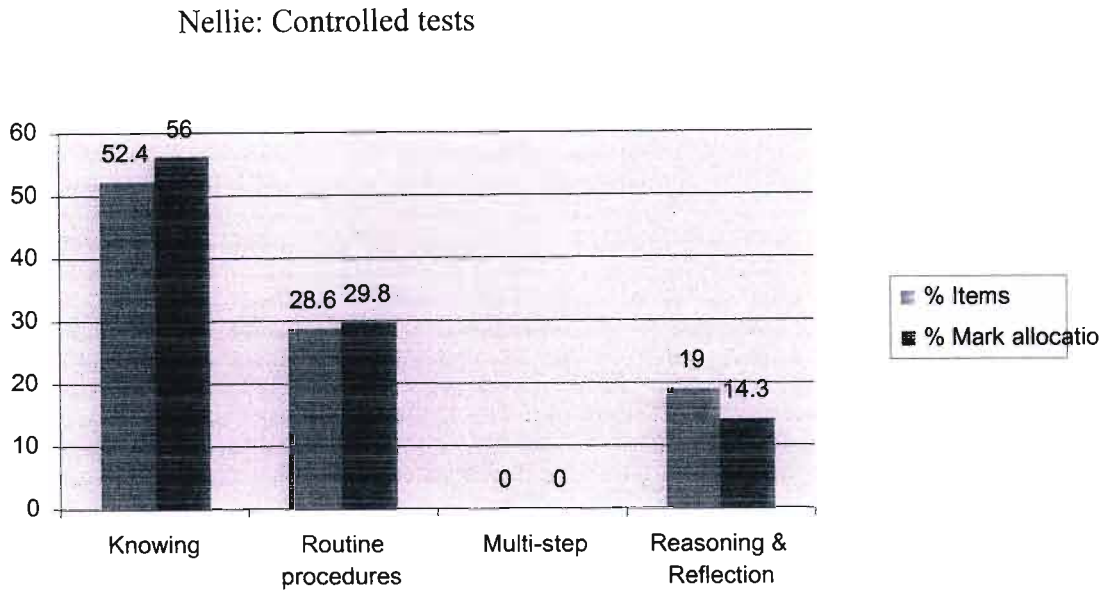


Fig. 10: Frequency assessment levels for controlled tests

Twenty-one question items from three tests were analyzed. Fig. 10 reveals that most question items could be assigned to knowing category, accounting for 56% of the marks. The next category was Routine procedures category, accounting for 30% of the marks. Few items were assigned to the Reasoning and Reflection category which accounted for 14% of the marks. There were no question items that could be assigned for Multi-step procedures.

(ii) Worksheets/Exercises/Activities

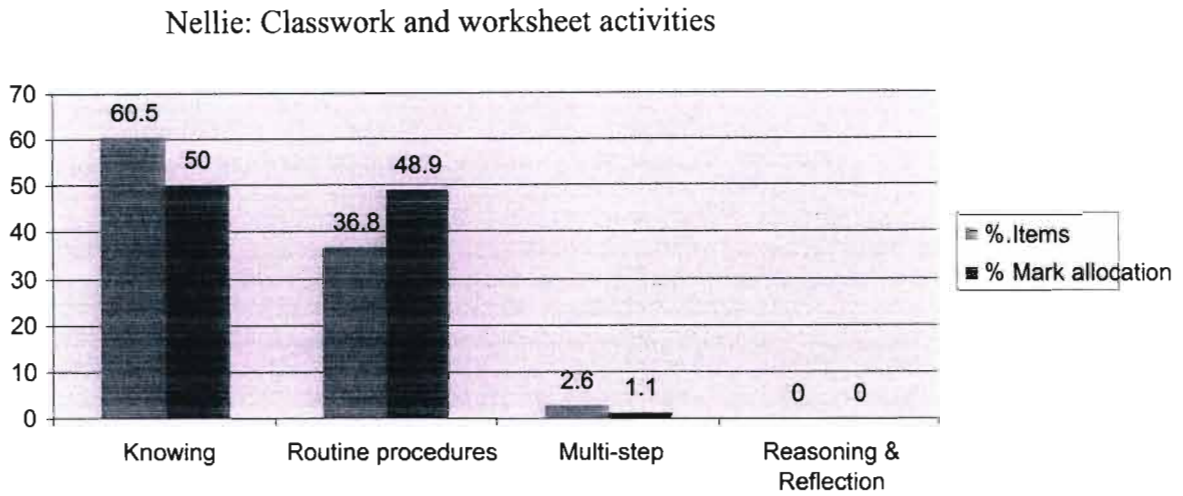


Fig 11: Frequency of assessment levels for classwork and worksheet activities

In total, 38 question items from four tasks were analyzed. Fig. 11 reveals that most question items fell in the Knowing or Routine procedures categories, accounting for 99% of the marks. There were no question items that could be assigned to the Reasoning and Reflection category, and a very small number could be assigned to Multi-step procedures (accounting for 1% mark allocation).

(iii) Projects/Assignments

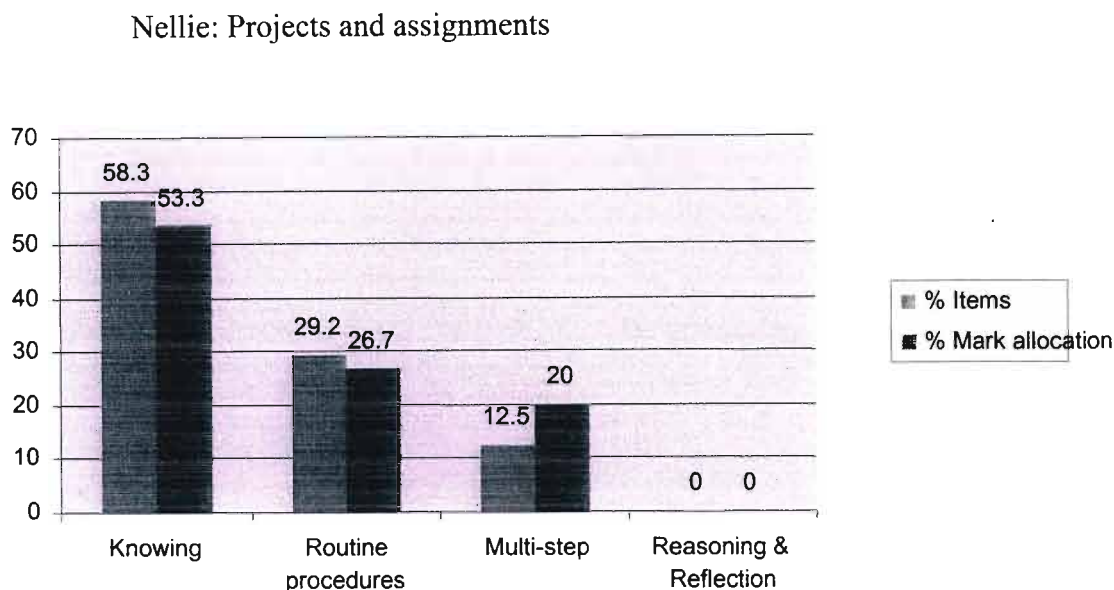


Fig. 12: Frequency of assessment levels for projects and assignments

In total, 20 question items were analyzed from three tasks. Fig. 12 shows that most of the question items could be assigned to Knowing, a higher percentage than any other category, and accounting for about 53% of the mark allocation in projects/assignment. The next highest category, Routine procedures, accounted for about 27% of mark allocation in projects/assignments. Few question items were asked in the Multi-step procedure category accounting for only 20% mark allocation, with no question items in the Reasoning and Reflection category.

4.2.3.4 General comments

Nellie's overall assessment strategy is that Knowing skills are more frequently assessed than other skills. This is evident in all written assessment techniques. For example, in written assessment, the highest percentage of question items could be assigned to the Knowing category. Nellie's emphasis on Knowing learning is supported by the

percentage of marks allocated in written assessment (56% in controlled tests, 53% in projects and 50% in Knowing).

4.2.3.5 The influence of Nellie's understanding of assessment on her assessment practices.

The interview did not reveal any link between Nellie's perceptions of assessment in mathematics and her assessment practices. This was captured from the following responses:

R: What kind of questions can you ask to establish that the learner has reached the high thinking level?

N: Knowledge questions. For example: Name the properties of a square.

The above response is not in line with Nellie's perception that Mathematics promotes thinking and interrelatedness or step by step reasoning process. Such a response does not require learners to demonstrate their understanding of what they are doing. The response indicates that Nellie's assessment tasks do not stimulate learners to think critically which is one of the requirements of the policy. This is further captured from the response to the following question:

R: How often do you give learners the assessment tasks that intend identifying and addressing learners' weaknesses?

N: Maybe once per term.

4.3 The cross-case analysis

A cross case study was done, to summarize analysis across the three case studies in order to facilitate the answering of the research questions. Data from each case study is presented in categories.

4.3.1 Teacher's Understanding of Assessment

Categories of teacher's understanding of Assessment

Teacher	Teaching experience & qualifications		Teacher's understanding of assessment in Mathematics	Teacher's understanding of the assessment policy in Mathematics
Thabane	STD	3 yrs	Test reasoning Interrelatedness of facts	Use of different methods Policy is just a document Assessment standards followed as in the policy document
Mandla	BSc, STD	14 yrs	Finding answers Step by step connections Evidence	Use of memorandum as criteria No use of assessment standards
Nellie	BEd, STD, FDE	11 yrs	Interrelated facts Step by step reasoning	Use of assessment standards to link knowledge Use of scaffolding Less use of various methods

Table 6: Teacher's understanding of assessment

Thabane's understanding of assessment is that of testing reasoning while Mandla understands it to be a way of finding the answer. Nellie and Thabane understand assessment in Mathematics to be assessing the interrelatedness of the facts. Mandla goes a step further in that assessing interrelatedness of facts and he speaks about learners giving evidence of what they are saying and doing. All three teachers agree that

assessment in Mathematics involves a step by step reasoning process of arriving to the solution.

Thabane uses various assessment strategies while Nellie uses a variety of methods in assessing learners. Thabane and Nellie use assessment standards as the assessment criteria in achieving Learning Outcomes while Mandla relies on his memorandum for the criteria. Nellie goes a step further and uses scaffolding. Mandla explains scaffolding as a step by step (building on the previous step) process to lead learners to the solution, while Nellie further uses assessment standards to link knowledge in a step by step manner.

4.3.2 Teachers' assessment of different skills.

Teachers	Knowing	Routine	Multistep	Reason & Reflection
Thabane	41,6%	31,3%	24,7%	2,4%
Mandla	56,2%	31,2%	12,1%	0,7%
Nellie	53,1%	35,1%	7,0%	4,8%

Table 7: Teachers' assessment of different skills

The table above indicates the average percentage of the skills assessed by the teacher in each category of the skills in controlled tests, class exercises and projects and assignments. All the three teachers assessed Knowledge skills from their learners the most. The very least skill that they all assessed was the Reasoning and Reflection skills. As much as all three teachers used oral assessment, tests, worksheet activities and projects and assignments as different assessment strategies, their assessment tasks were more Knowledge based as the table above indicate. This situation suggests that all teachers valued knowledge skills more than any other skill in their assessment. Their assessment tasks mainly require the learners to produce what they have learned. Nellie is the only teacher that assesses as much as 5% of questions related to Reasoning and Reflection skills. It is important to note that although Thabane mainly assesses Knowledge and application of Routine procedures he also does also assess the use of

Multi step procedures from his learners to a significant amount. Mandla assesses the Reasoning and Reflection skills the least. The general trend is that all three teachers assess most the Knowledge and application of Routine procedure skills and they also all assess the Reasoning and Reflection skills the least.

4.3.3 Teachers' assessment practices

The study explored the assessment strategies employed by teachers when assessing learners. The responses from teachers during interviews, document analysis and lesson observations showed that there has been a shift from assessing learners using only test and examinations. Strategies such as assignments, projects, investigations, oral questioning and presentation, homework, test and examinations are used by teachers when assessing their learners.

Homework, as an assessment strategy, was used in an effective and formative way. In using homework, Mandla made it his policy that learners remain after school and do homework under his supervision. Mandla wanted learners to see homework as a meaningful learning activity which is set to benefit them (learners) assessment strategies. All three teachers, Thabane, Mandla and Nellie indicated the use of different assessment practices.

4.4 Summary

The study sought to explore teachers' perceptions about assessment in Mathematics. In this regard, teachers showed an understanding that assessment in Mathematics should test reasoning from learners. Teachers also indicated that assessment in Mathematics should require evidence of understanding of the concepts from learners. As a result of the interrelatedness of facts in Mathematics, assessment should be a step by step process. Although assessment standards are used as the criteria, teachers are still relying on their memoranda as the assessment criteria in achievement of the Learning Outcomes.

During assessment of learners, teachers assess various skills. The data revealed that all three teachers who participated in the study assess mostly the Knowing skills. Very few Reasoning and Reflection skill are assessed by teachers. The skills that are sometimes assessed are the application of Routine procedures in familiar contexts and the application of Multistep procedures.

The study also sought to explore the assessment strategies used by teachers when they assess learners. The data revealed that teachers have shifted from the traditional way of assessing where only test and examinations are used as assessment strategies. The study revealed that teachers are using a variety of assessment strategies. Strategies such as assignments, projects oral presentation, Mathematical investigations and homework are used by teachers in assessing their learners. Although teachers use different strategies, test and examinations are still the dominant assessment strategies.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

One of the imperatives of the new curriculum in South Africa was the implementation of an effective assessment system for providing relevant and timeous information to all role players for use in improving learning in schools (Kanjee, 2009). With the introduction of the new curriculum and the approach of outcomes based education (OBE), a number of assessment related policies and guidelines that placed greater emphasis on classroom assessment were introduced. Specifically, these were the introduction of the Assessment Policy in the General Education and Training Band, Grade R-9 and Adult Basic Education and Training (ABET) (DoE, 1998). The 1998 assessment policy was revised to align it with curriculum changes implemented in the NCS (DoE, 2002). The new policy (DoE, 2007) placed greater emphasis on classroom assessment by outlining the range of assessment information available to teachers.

A number of reasons for the manner in which teachers engage with assessment were noted. Vandeyar & Killian (2007) found that teachers' approaches to assessment were influenced by their background. Van Laren & James (2008) found that teachers had a limited understanding of the new assessment policy. In line with the above findings which address the ways the in which teachers engage with assessment, this study explored teachers' understanding of assessment and the influence of their understanding of assessment on their assessment practices.

In Chapter One, the researcher indicated that this project was primarily interested in Grade 9 Mathematics teachers' assessment practices in KwaZulu-Natal. Data was collected through observation of lessons, through analyzing teachers' assessment documents and through interviewing teachers. To accomplish the purpose of this study, the following questions were developed:

1. What are Grade 9 Mathematics teachers' understandings of the assessment policy in Mathematics?
2. What classroom assessment practices are used by Grade 9 Mathematics teachers?
3. What impact do the teachers' understanding of the assessment policy in Mathematics have on their classroom assessment practices?

The synthesis of the findings of the study is presented in the following section.

5.2 SYNTHESIS OF THE FINDINGS

In presenting the synthesis of the findings of the study, the researcher uses the following categories as they correspond to the three research questions of the study: a) teachers' understanding of assessment, b) assessment practices that are used by teachers, c) the influence of teachers' understandings of assessment on (teachers) assessment practices.

5.2.1 Question 1: Teachers' understanding of assessment

This section reports on teachers' understanding of the assessment in Mathematics. Teachers understand assessment in Mathematics to be summative. Nellie indicated that she assesses learners may be once per term. According to the National Assessment policy (2007) the purpose of assessment is to help teachers identify strengths and weaknesses of the teaching and learning process and it should be used as an on-going integral part of the learning and teaching process. This means that assessment should be used to inform teaching and learning. Black & William (2004) take this point further and by saying that the information obtained through assessment should assist learners to modify their learning. Teachers should use this information to develop plans for further teaching and learning. Stoll & Frink (2001) sees the purpose of assessment as the enhancement of good quality teaching and learning. Also assessment should assist with the early identification of learners who might experience difficulties in learning and development as well as to provide them with learning support (DoE, 2007).

The diagnostic purpose of assessment was not conceptualized by teachers. This point is supported by Nellie's response that she assesses learners once per term. According to the literature reviewed in Chapter 2, teachers need to decide, which assessment tasks are going to be used for diagnostic purpose (Guliting & Stielau, 2002). The diagnostic purpose of assessment should be used to see how capable the learner is for the next task. It is important, as stated in the Assessment Policy document (DoE, 2007), that learners who experience barriers to learning be diagnosed early and be provided with learning support.

Teachers were also asked to indicate how they plan their assessment and when they assess learners. In this area, teachers acknowledged that assessment is conducted on a continuous basis and they referred to 'continuous assessment'. Teachers stated in their planning of assessment that they need to know what and how they are going to assess before they start teaching. As much as teachers indicate that they plan assessment before teaching, planning of assessment is inappropriate. In some cases, assessment takes place after teaching.

For assessment to be continuous, it needs to be integrated into the day to day teaching and learning. The National Assessment Policy (2007) document states that assessment forms an integral part of teaching and learning, not a separate activity. The study found that assessment still takes place as an afterthought activity as teachers admitted not to be integrating it into their day to day teaching and learning. According to the Assessment Policy document (DoE, 2007) "planning for assessment is an integral part of the planning for teaching and learning. The assessment programme is planned by the teacher to meet the needs of learners in the classroom and to facilitate teaching and learning (p. 7).

Despite this, the study found that assessment still takes place as an afterthought activity, and teachers admitted to not integrating it into their day to day teaching and learning. For assessment to be integrated into teaching and learning, it has to be planned beforehand and against the learning outcomes to be achieved.

5.2.2 Question 2: Teachers' assessment practices.

This research project explored the assessment strategies employed by teachers when assessing their learners. It was found that there has been a shift from traditional way of assessing learners (using tests and examinations as the 'only' assessment strategies and testing knowledge only). Here teachers are using a variety of assessment strategies and they were not testing knowledge only.

Homework, for example, was used by all three participating teachers in this study as their assessment strategy. In the use of homework, Mandla made it his policy that learners remain after school and do homework under his supervision. Thabane used various assessment strategies when assessing his learners. Although teachers were assessing different skills they mostly assessed knowledge skills. This was in line with Vandeyar & Killian's (2007) assertion that teachers' approaches to assessment were influenced by their backgrounds. The study found that teachers were using assessment strategies such as assignments, projects, investigations, test and examinations, to mention a few.

Homework, as an assessment strategy, was used in an effective and formative way. Thabane wanted learners to give meaning to homework instead of taking it as one of the activities given to them by teachers. Thabane for example, had made it his policy that learners remain after school and do homework under his supervision. He argued that he wanted his learners to see homework as a meaningful learning activity and to benefit from homework activities. He further argued that he wanted learners to assess themselves as they did homework. He also argued that he used homework activities to assess whether the assessment strategies that he used were effective or not and also to see whether the instruments that he used in assessing were relevant to the work that was assessed. This is in line with the Assessment Policy document (DoE, 2007) that assessment strategies should adequately assess learner achievement and develop skills for lifelong learning. Furthermore, the strategies of assessment should be appropriate for the knowledge, skills and the range of competencies that are assessed.

Although teachers had shifted from using tests and examinations as the only assessment strategies, teachers are still relying heavily on test and examinations as their assessment strategies. For example, Mandla indicated that he uses his marking memorandum as the assessment criteria. The use of the marking memorandum is mostly associated with test and examinations. As mentioned above, teachers have attempted to implement formative and continuous assessment, but their attempts were dwarfed by the traditional summative type of assessment that the teachers themselves have been exposed to in their lives. This is in line with Morgan's (2006) findings that teachers' assessment practices are influenced by ways in which they were assessed as learners themselves and conditions and constraints of the school. This has led to Jansen (1998) to claim that "traditional testing and examinations will continue to play a powerful role in shaping the nature of outcomes based education directed teaching" (p. 329).

Teachers assess learners using a variety of assessment activities. The Assessment Policy document (DoE, 2007) stipulates that "assessment should aim to assess knowledge and skills in contexts that closely resemble actual situations in which that knowledge and those skills are used." It was found that all three teachers assessed Knowing skills from their learners more than the other three skills. The proportion of marks allocated to the assessment of Knowing skills, by the three teachers was on average 50.3%. The Reasoning and Reflection skills were the least assessed skills with the average allocation of 2,63%. As much as all three teachers used various assessment strategies such as oral assessment, tests, worksheet activities, projects and assignments, their assessment tasks were more Knowledge based. This suggested that teachers valued Knowledge skills more than any other skills in their assessment. As Bhika (2004) noted teachers' assessment practices are based on their past experience. Teachers valued Knowing more than any other skill because they themselves were tested Knowledge (Morgan, 2006). It should be noted that even the most experienced teachers, Mandla and Nellie, assessed very little of the other skills. This is in line with Cizek & Fitzgerald's (1996) findings that teachers who have taught for several years still lack in assessment practices and do not tend to acquire skills in this area of work through 'on the job' training.

5.2.3 Question 3: The influence of teachers' understanding of assessment on their assessment practices.

The study also explored the influence of teachers' perceptions on their assessment practices. In the National Assessment Policy (2007) document, "assessment in Mathematics is perceived as a process of collecting evidence of learner achievement and making judgments of the evidence in order to make inference about an individual learner's Mathematical competence"(p. 5). The study found that teachers' understanding of assessment in Mathematics have no influence on their (teachers) assessment practices. Teachers perceived assessment in Mathematics to be emphasizing the assessment of knowledge, skills and values. Assessment in Mathematics had to be an integral part of teaching and learning. However, when teachers assessed their learners they mainly assessed knowledge understanding. The study found that there was a disjuncture between teachers' understanding of assessment and the assessment practices they used in practice. The literature review indicates that assessment should be an integral part of teaching and learning (Clarke, 1996). However, teachers planned their assessment after teaching has taken place. Teachers assessed learners at the end of a section of work. This practice of assessment is contrary to the notion of assessment's being an integral part of teaching and learning.

This study was informed by the theory of educational change. In Chapter Two, the researcher indicated that teachers' assessment practices shifts between the old and new the visions of teaching and assessing learners, and that to take up the new is a task that requires substantial time and development shift. The aim of the study was to explore teachers' understanding of assessment and the influence of that understanding to the teachers' assessment practices. The findings of this study provided the researcher with the insight and understanding to conclude that:

- The teachers who participated in this study viewed assessment as a separate entity from teaching and learning.

- Teachers’ understanding of assessment did not influence their assessment practices. Teachers may have certain perceptions about assessment but that had nothing to with their assessment practices.
- The study revealed that there was a discrepancy between teachers perceptions and their actual assessment practices
- The study revealed that although teachers are using a variety of assessment strategies, the most dominant assessment strategies were traditional tests and examinations
- The study also found that schools do not have their assessment policies. Schools do not formulate their own assessment policies in terms of the procedures that are stipulated in the Assessment Guidelines for Mathematics document.

On the basis of the above findings, the following section will present recommendations.

5.3 RECOMMENDATIONS

These recommendations include assessment policy development and implementation, and teachers’ professional development.

5.3.1 Assessment policy implications

The study found that schools had no assessment policies. In the absence of a school assessment policy, which is in line with the departmental assessment policy, teachers cannot be certain whether their implementation of assessment is on track. Davidoff & Lazarus (1995) states “that teachers are policy implementers and if teachers cannot do what the policy states, that policy needs to be reviewed or the implementation process needs to be re-examined”(p. 5). The authors call for schools to have a school assessment policy. The school policy should be in line with the departmental assessment policy. The school policy should clearly state how assessment is to be planned and implemented in the National Curriculum Statement (NCS).

5.3.2 Teacher professional development

The Department of Education (DoE) must train teachers on what is required to implement the assessment policy. During these training sessions there should be platforms for teachers to share meanings and understanding of teachers' assessment practices. It should be noted that teachers are still in the initial process of engaging with the assessment policy and giving their own understanding of the assessment policy. Ideally, teachers are expected to initiate a teachers' training programme where they would be expected to lead discussions on assessment for colleagues. Because it seems very unlikely that they would have the confidence to do so teachers may need to network with institutions of higher education where they will be invited for further development of required subject assessment strategies. Teachers would have to invite experts to their schools to address teachers on assessment.

5.4 Implications for further research

This study has revealed a disjuncture between the teachers' understanding about assessment policy in Mathematics and their assessment practices. The study revealed that while teachers expressed some understanding of the assessment policy, in practice, they are still using test and examinations as their main assessment strategies.

Further research needs to be done to examine whether assessment policy is understood by teachers. Training must be conducted in a manner that would enable teachers to implement the assessment policy appropriately. Research would also have to be conducted to examine whether such in-service training would help teachers improve the implementation of assessment policy.

5.5 Conclusion

The study revealed that teachers have different understandings of the assessment policy. The teacher's different interpretations of the assessment policy results in assessment

being implemented by teachers differently. To assist teachers, schools need to have their assessment policies that will be discussed and adopted by teachers and should suit the context of the school. To ensure that process, teachers need to be trained in the understanding and implementation of the assessment policy.

Teachers' training on assessment issues should be a regular exercise. Teachers training will provide opportunities for reflection where teachers are able to see areas for developing their assessment practices. Reflection on assessment implementation would provide teachers with opportunities to share meaning of assessment and eventually come to a common understanding which would bring about effective implementation of assessment in the National Curriculum Statement (NCS).

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APPENDICES

APPENDIX 1: LETTER TO THE DISTRICT MANGER AND CIRCUIT MANAGER

BB 571 Umlazi Township
P.O Umlazi
Umlazi
4031

Obonjeni District
Private Bag X 567
Mkuze
3919

**TO: DISTRICT MANAGER
ATTENTION: CIRCUIT MANAGER**

RE: CONSENT FOR RESEARCH

I would like to be granted permission to use Igugulesizwe, Mthwazi and Jevu schools in your Circuit for my research project. I am a student at the University of KwaZulu – Natal. I am doing a Masters Degree in Mathematics Education. I have completed my course work and the research project is the only requirement left. My proposed topic is the Investigation of Teachers' Assessment Practices in Mathematics in KwaZulu – Natal schools. The information and names of all the participants will remain confidential. The period I will be conducting this research is between February - June 2008. The schools involved in this project will benefit from the guidance and support that teachers will receive in mathematics assessment since I work as a Mathematics subject advisor. The participants will be the Grade 9 mathematics teachers. Participants have a full right to withdraw at any time if they want to. Benefits to participants will be obtained from an increased understanding of the use and implementation of the Assessment Policy in Grade 9.


M M THABETHE
(RESEARCHER)

05/05/08
DATE

I the undersigned, hereby grant consent to Mr M M Thabethe to conduct his research at the above schools,


CIRCUIT MANAGER

05/05/08
DATE


DISTRICT MANAGER

05-05/08
DATE

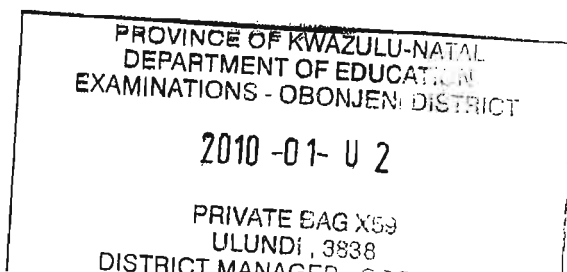
SUPERVISOR'S NAME: Linda Van Laren
Angela James

Work Tel. 031-2603488
Work Tel. 031-2603438

RESEARCHER' CONTACT DETAILS:

MR M M Thabethe
BB 571 Umlazi
Umlazi
4031

Tel. 0827659010

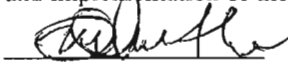


APPENDIX 2: LETTER TO THE PRINCIPAL

BB 571 Umlazi Township
P.O Umlazi
Umlazi
4031

TO: THE SCHOOL PRINCIPAL AND SGB
RE: CONSENT FOR RESEARCH

I would like to be granted permission to use your school for my research project. I am a student at the University of KwaZulu – Natal. I am doing a Masters Degree in Mathematics Education. I have my completed course work and the research project is the only requirement left. My proposed topic is the Investigation of Teachers' Assessment Practices in Mathematics in KwaZulu – Natal schools. The information and names of all the participants and your school will remain confidential. The period I will be conducting this research is between February - June 2008. As a Mathematics subject advisor in the District, I will be in a better position to assist your Grade 9 mathematics teacher on assessment issues and in the implementation of the Assessment Policy in Grade 9. Participants have a full right to withdraw at any time if they want to. Benefits to participants will be obtained from an increased understanding of the use and implementation of the Assessment Policy in Grade 9.

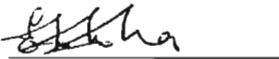


M M THABETHE
(RESEARCHER)

22/05/08

DATE

I the undersigned, hereby grant consent to Mr M M Thabethe to conduct his research in this school.



School Principal

22/05/08

DATE



Chairperson SGB

23/05/2008

DATE

SUPERVISOR'S NAME: Linda Van Laren
Angela James

Work Tel. 031-2603488

Work Tel. 031-2603438

RESEARCHER' CONTACT DETAILS:

MR M M Thabethe

Tel. 0827659010

BB 571 Umlazi

Umlazi

4031

KZN DEPARTMENT OF EDUCATION
THE PRINCIPAL
JEVU SECONDARY SCHOOL
P.O. BOX 579, JOZINI 3969

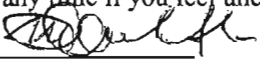
APPENDIX 3: LETTER TO PARTICIPANTS

BB 571 Umlazi Township
P.O Umlazi
Umlazi
4031

TO: THE GRADE 9 MATHEMATICS TEACHER
RE: CONCENT FOR RESEARCH

I would like to be granted permission to involve you as a member of the respondents for my research project. The research will be conducted in your school. I am a student at the University of KwaZulu – Natal. I am doing a Masters Degree in Mathematics Education. I have completed course work and research project is the only requirement left. My proposed topic is the Investigation of Teachers’ Assessment Practices in Mathematics in KwaZulu – Natal schools. The information I will get from you and your school will remain confidential. The period I will be conducting this research is between February - June 2008. The involved teachers will benefit from the guidance and support they will receive in mathematics assessment during this exercise. Participants will obtain an increased understanding of assessment and implementation of the Assessment Policy.

The participant will be the grade 9 mathematics teacher. As a participant you have a full right to withdraw at any time if you feel uncomfortable.

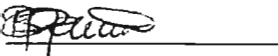


22/05/08

M M THABETHE
(RESEARCHER)

DATE

I the undersigned, hereby grant consent to Mr M M Thabethe to use my assessment documents, observe my classes and to conduct an interview with me for his Masters degree research.



22/05/08

EDUCATOR

DATE

SUPERVISOR’S NAME: Linda Van Laren
Angela James

Work Tel. 031-2603488
Work Tel. 031-2603438

RESEARCHER’ CONTACT DETAILS:

MR M M Thabethe
BB 571 Umlazi
Umlazi
4031

Tel. 0827659010

KZN DEPARTMENT OF EDUCATION
JEVU SECONDARY SCHOOL
P.O. BOX 579, JOZINI 3969

APPENDIX 4: DOCUMENT ANALYSIS INSTRUMENT

NAME OF SCHOOL:.....

DATE:..... LESSON:.....

CLASS:..... TEACHER:.....

ASSESSMENT TECHNIQUE	TYPE OF SKILL	SKILLS BEING ASSESSED	COMMENTS (What the teacher uses, how and when is it used?)
Tests and Examinations.	Reasoning and reflection.		
Homework and Class activities.	Applying multi-step procedures.		
Projects and Assignments	Application of routine procedures.		
Mathematical Investigations.	Knowing.		

APPENDIX 5: OBSERVATION SCHEDULE

NAME OF SCHOOL:.....

DATE:.....

LESSON:.....

CLASS:.....

TEACHER:.....

TYPE OF PROCESS/SKILL	DESCRIPTION OF SKILL	EVIDENCE OF SKILL	SKILL NOT EVIDENT	COMMENTS
Reasoning and Reflection	Teacher’s tasks that require a learner to pose answers about mathematics to be used to solve a problem. Interpret solutions in context. Generalise patterns			
Applying multi-step procedures	Teacher’s tasks elicit transfer performance. Finding the solution of a problem using previously learned skills and knowledge to new situations.			
Applying routine procedures in familiar contexts	Teacher’s tasks explore demonstration of understanding of principles and concepts, translation of information into different representations such as from numbers to words and visa versa.			
Knowing	Teacher’s tasks elicit evidence of recalling, recognizing mathematical facts, definitions, and Procedures.			

APPENDIX 6: INTERVIEW SCHEDULE

A. Educators' Biography

1. Tell me about the subject you liked the most while you were at school?

Why did you like this subject the most?

2. How did you come to teach mathematics?

3. Tell me about your qualifications?

4. Do you enjoy teaching mathematics?

If yes or no, explain why?

B. Perceptions about assessment in mathematics

1. How do you view your learners understanding in your mathematics class?

2. Do you think learners are critical thinkers or need to be spoon – fed?

(a) If yes to “critical thinkers” or spoon – fed” why?

(b) What approaches do you use to teach mathematics in your classroom?

- 3a. When assessing, what do you consider more important between the ways in which the answer has been arrived at (steps) and the final answer?

- 3b. When teaching, where is your emphasis between the two?

Why?

- 4a. What are your views on assessing one aspect (for example, giving learners a task where outcomes for division only are assessed)? Can it give you as a teacher a true picture of learner's progress?

- 4b. Why?

5. What are your views on assessing a range of mathematics knowledge and skills

- simultaneously? Is it important?
- 6a. What is your view in regard to giving learners a group mark? (Assigning group tasks and allocate marks for the whole group. If the group scored 76/100, a group member will earn 76 marks each)
 If this practice is good, please explain.
 If this practice is bad, please explain.
- 6b. Do you give learners such activities?
 During observation/ item analysis I saw.....
 What were your objectives?
7. What in your view can we (mathematics teachers) do to motivate learners such that they are interested in mathematics?
8. How often do you give your learners the assessment tasks that intends identifying and addressing learners' weakness?

C. Assessment practices in mathematics

1. What are the major goals of assessment in mathematics?
2. When assessing your learners, do you organize the assessment standards in any order of importance?
3. What kind of mathematics tasks do you think should be used in assessing learners?
 - a) Which of those you have mentioned do you use in your classroom?
 - b) If none, why is this the case?
4. What kind of questions can you rank as knowledge questions?
 Give two examples of these questions?
5. What kind of questions can you ask to establish that the learner has reached the high thinking level?
 Give one question that will demonstrate this level of thinking?
- 6a. Do you think assessing learners repeating work done in the classroom or in another assessment tasks benefit learners?
- 6b. If it benefits them, how?

- 6c. If it does not, why?
7. During item analysis I discovered.....
What is your comment on that?
8. What type of questions do you normally use (what, how, why) in assessing learner?
- Why do you use them?
 - Do you use questions such as “show all your steps”
 - If yes, why?
 - If not, why?
9. If you discover that some learners are struggling with the task, what do you do?
Do you show them how to do it or give them an additional task?
Why?
10. What evidence would you look for to ensure that the learner is progressing in his/her learning in mathematics?
11. In your thinking, do you think the activities/tasks you use in your assessment enables you to get the picture of the learner’s abilities or knowledge of mathematics?
12. Do you think the amount of work you have in the school influence the type of assessment tasks you administer in your classroom assessment?
- 13(a) In the light of what we have discussed, would you say you have changed your assessment approaches/practices or not since the introduction of the new assessment policy?
- 13(b) If you have changed them, which ones would you prefer? The new ones or the old ones. And why?
- 13(c) If you have not changed. Why?

APPENDIX 7: ETHICAL CLEARANCE CERTIFICATE



RESEARCH OFFICE (GOVAN MBEKI CENTRE)
WESTVILLE CAMPUS
TELEPHONE NO.: 031 – 2603587
EMAIL: ximbap@ukzn.ac.za

10 APRIL 2008

MR. MM THABETHE (971164845)
SCIENCE, MATHEMATICS & TECHNOLOGY EDUCATION

Dear Mr. Thabethe

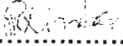
ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0087/08M

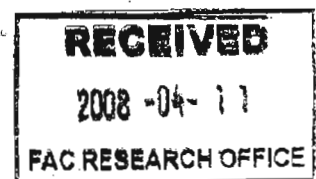
I wish to confirm that ethical clearance has been approved for the following project:

“Teacher assessment practices: A case study of four Grade 9 Mathematics teachers in the Northern Region”

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

Yours faithfully


.....
MS. PHUMELELE XIMBA



- cc. Supervisor (Linda van Laren)
- cc. Angela James
- cc. Mr. D Buchler (Faculty Research Office)