Science and Mathematics Education Centre

MULTIPLE PERSPECTIVES ON THE TEACHING AND LEARNING OF MATHEMATICS IN RURAL SOUTH AFRICAN SCHOOLS IN THE CONTEXT OF NATIONAL CURRICULUM REFORM

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DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

Signed: _____

Tulsidas Morar

DEDICATION

This work is dedicated to my late dad Ratilal Morar.

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ABSTRACT

This study investigates the teaching and learning of mathematics in four rural schools in the Eastern Cape Province of South Africa. The study is set against the backdrop of Curriculum 2005 (C2005) – an outcome based curriculum reform initiative that has been introduced to all South African schools. The objective of the study is to investigate the teaching and learning practices of four rural teachers of mathematics in this complex reform milieu.

The following broad research question guides this study: "How do teachers interpret and implement the new mathematics curriculum in terms of a political perspective (how teachers and learners are connected to the curriculum); a socio cultural perspective (what adjustments the teacher makes to accommodate the learners' circumstances); and a practical perspective (how the teacher implements the goals of C2005)?"

The South African situation provides a unique and particularly challenging context for teaching and learning, and curriculum reform. It is understood that schools differ – and therefore curriculum issues cannot be solved through general pronouncements but rather viewed from a multiplicity of perspectives. In this thesis, I examine the teaching and learning of mathematics in four rural classrooms in the Eastern Cape. By way of honouring the contextual complexity of the situation, I have adopted a multiple perspectives approach to analysing what goes on in these four classrooms. I use a political perspective to help understand how power operates in the curriculum process. I employ a socio cultural perspective to examine how the curriculum process attends to the local circumstances of teachers and learners. A practical perspective is used to examine how the curriculum is implemented in a technical sense.

This constructivist interpretive study employs the techniques of case study and narrative inquiry to study the curriculum practices of four teachers. Multiple methods – including interviews, participant observation and video recording – were used to

gather data. Narrative accounts of the teaching and learning of mathematics were constructed and then analysed using the three perspectives.

The study concludes that the curriculum can be interpreted at different levels – formal, perceived, operational and experiential – and each level can be analysed in terms of the political, socio cultural and practical. Bringing these three perspectives together is a challenging, but necessary task in order to understand and act upon the complexities of educational reform in rural South African classrooms.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION AND OVERVIEW

Introduction

This thesis is about the teaching and learning of mathematics in South Africa. My interest in this topic and my connections to the special problems facing education in this country stems from my own history as a student and educator.

For seventeen years I taught at a primary school before I joined the University of Port Elizabeth (UPE) to work in a teacher professional development project. At UPE I was involved in the training of mathematics teachers from previously disadvantaged communities. I covered many kilometres and spent many hours traveling by car to various districts in the Eastern Cape province where I presented mathematics workshops to groups of between 10-15 mathematics teachers. Two to three weeks after these workshops I visited each of the teachers in their respective classes and supported them in their classroom practices.

From my own experience of attending a disadvantaged primary and secondary school and teacher training college, and finally teaching at a disadvantaged school in South Africa, I can empathise with the disadvantaged teachers. The infrastructure of the institutions I attended was better than many of the rural schools that I have visited. I taught in an urban school where there was water, electricity, doors and windows. My teaching methodology was traditional and teacher-centred. I was instructed to teach in this way by my college tutors. I was the authority figure in my classroom. I was considered an effective teacher and received positive appraisals from the principal. The principal's idea of an effective teacher was a quiet classroom with the learners scribing notes from the chalkboard.

I was extremely fortunate when I was awarded a three-month scholarship to study in the United Kingdom in 1988. At this time, leading researchers were advocating co-operative learning, pupil-pupil interaction and group work (Johnson & Johnson, 1987) and discovery learning within the framework of a (social) constructivist paradigm (Cobb, 1988; Koehler & Grouws, 1992; Yackel, Cobb, Wood, Wheatley & Merkel, 1990). My exposure to alternative teaching methods during my scholarship changed my outlook to teaching and learning and contributed to my personal professional growth.

Since my return from the United Kingdom, I have been involved in four (including the project described in this thesis) major in-service programs as a teacher trainer at UPE. The first program involved training mathematics teachers from 10 schools in 20 school districts in the Eastern Cape Province. Teachers from each district converged at a local school or hall where the training took place. Thirty-six hours of training was presented over six days. The focus of the training was content and alternative strategies for teaching mathematics. My observations of participants' classes revealed that teachers were not very enthusiastic about trying out new methods. They usually blamed large classes and lack of resources for their reluctance to change.

The second program was located at UPE. Teachers attending the course were selected on the basis of an interview, experience and locality. Three years' experience and responsibility for teaching mathematics in grade 4, 5, 6, or 7 classes was the minimum requirement. At least 50% of the participants were rural farm school teachers (in the two regions of the Eastern Cape, namely the Tarkastad-Cradock-Middelburg and the Tsitsikama-Humansdorp regions). The delivery model for the course was a blend of residential, local workshops (including individual contacts) and distance education components spread over a period of nine months. Initial residential contact was in January, repeated in July, with each residential component consisting of two weeks' teaching contact. Teachers were given regular classroom support in the intervening period and were also required to attend 18 hours of workshops. I observed that teachers' practices were resistant to change and this may well have been due to the tension between what was expected in terms of learner centred approaches as espoused by the course and their prior experience and

training (Morar, 1997). While the teachers demonstrated some movement towards the new approach, they experienced difficulties in making adjustments during teaching resulting in 'switching modes' – i.e., 'yo-yo-ing' between teacher centred and learner centred approaches (Morar, 1997).

The third program attempted to develop "lead" or "link" teachers. A cohort of mathematics teachers completed a Further Diploma in Education (FDE) at the UPE. Courses were held over the school vacations. Teachers were to act as change agents in their own schools and organise in-service education and training (INSET) workshops in their respective districts. My research into these lead teachers' practices revealed that they were not "reformed" (Morar, 1999). There appeared to be incongruence between the beliefs of the lead teachers and their colleagues and congruence between the teaching practices of the lead teachers and their colleagues – they used traditional teaching approaches.

My most recent challenge is the project that forms the backdrop for this thesis. This project was initiated in 2001 by the National Department of Education (NDE). Higher education institutions in the Eastern Cape Province were invited to tender for a professional development in-service education and training (INSET) intervention focussing on teachers' conceptual understanding of mathematics and science concepts, child-centred learning strategies and continuous, performance-based assessment. This project was part of a national, large-scale educational reform program designed to upgrade teachers' mathematics and science content and pedagogical content knowledge.

The University of Port Elizabeth (UPE), to which I am attached, was awarded the contract. The district Department officials identified 150 teachers from two districts, situated 500km from Port Elizabeth, who could enrol either for the UPE Diploma in Education program or the UPE Bachelor of Education (BEd) degree in mathematics and science. 127 of these teachers met the entrance requirements of having completed three years of pre-service training and were duly registered for the BEd. The balance of the teachers registered for the Diploma in Education. Teachers enrolled part-time over two years. The BEd course consisted of three central modules – Concepts in Mathematics, Concepts in Science, Concepts in Biology – and eight

education modules. The education modules included four of the essential components of the national curriculum reform – outcomes based education, effective classroom practice, constructivism, and assessment. Teachers were expected to attend a central venue each Friday afternoon and Saturday for formal workshops and lectures and to try out the new ideas in their classrooms. Where possible, teachers were supported by follow-up visits to schools by UPE staff.

It was this INSET program that provided me with the interest and opportunity to conduct this research. Interacting with these rural teachers and visiting their classrooms, it became clear to me that issues of teaching and learning mathematics in rural schools were many and complex.

Background to the study

The apartheid legacy

The period between 1948 and 1994 is often referred to the dark ages of South African education. The apartheid-driven Afrikaner regime successfully managed to enforce a social policy of poverty and degradation that devastated approximately 80 percent of the total 40 million people in the country. This group were deprived of basic social services such as clean water, sanitation, electricity and education (NDE, 2000). The Afrikaner regime manipulated the education system by introducing "Bantu education" enforced in an Act of Parliament and managed by "homeland" leaders. Homelands were created to prevent the black population from receiving the same quality of education as the white minority. Naturally and obviously, funding for education was allocated on an unequal basis.

In the 1950's, Dr H.F Verwoerd the Prime Minister of South Africa made the following statement: "When I have control over native education, I will reform it so that natives (Blacks) will be taught from childhood that equality is not for them" (Verwoerd, 1953). A few years later he reiterated his thoughts by saying "There is no place for the Bantu in the European community above the forms of certain forms of labour" (Verwoerd, 1955). The Soweto Students Representative Council interpreted Verwoerd's utterances to mean that blacks should get training that qualified them to

be "drawers of water and hewers of wood" (Christie, 1976). The outcome of this educational deprivation is highlighted in statistics released by the Parliamentary Working Group on Equity in Education in 2000. In 1995 they revealed that 92% of Black Africans had no formal education at all. Williams (2000) says that the situation in South Africa is unique because this illiteracy was "forced" illiteracy brought about by the Bantu Education Act of 1953.

As a result of the inequalities in provisioning, many of the rural schools in the country have inadequate classrooms and infrastructure; no access to water; pit latrines that are over-utilised, unclean and smelly; no electricity; poor natural lighting; inadequate supplies of teaching and learning materials and lack of storage space (Chisholm *et al.*, 2000). The situation in the 6216 schools of the Eastern Cape is worst than most. Ota and Robinson (1999) reported that the Eastern Cape is one of the poorest provinces in the country, with a legacy of neglected infrastructure. Most of the schools are found in the former black homeland of Transkei (where the study participants are based). The statistics are startling. Thirty four percent of the schools in the province are without running water, 77% need electricity and 81% have no telecommunication networks. The poor socio-economic context exacerbates the educational problems. Many schools have high dropout rates, overcrowded classes and lack physical resources. In 1994, the teacher-pupil ratio was 1:54 (Edusource, 1994).

Poor teacher qualifications are another concern. In rural schools many teachers are either unqualified or under-qualified (Ota & Robinson, 1999). The majority of black teachers, for example, were trained in racially-segregated colleges of education that were "academically isolated, small, poorly equipped and ineffective in the provision of quality teacher education" (National Education Policy Investigation, 1993). Nationally, nearly a quarter of the primary school educators are not appropriately qualified (NDE, 2000). In the Eastern Cape Province, 42% (26 000) of science and mathematics teachers are either underqualified or unqualified (Education Management Information Services, 1996).

Conditions such as those highlighted above underscore the low standard of education of learners in the Eastern Cape. Learners are exposed to health problems having no

clean, running water. As most classrooms are not supplied with electricity, teachers cannot employ modern teaching aids and resources, and learners often have difficulty with poor lighting. Poor teacher qualifications are also reflected in poor learning outcomes for learners.

Curriculum 2005

One of the most significant developments in South African education after the 1994 elections was the release of a new curriculum document, called Curriculum 2005 (C2005). Curriculum 2005 is the South African Government's framework for the first ten years of schooling leading to a General Certificate and Training (NDE, 1997). A number of principles guide C2005. These are learner centeredness, curriculum integration, holistic development, relevance, participation and ownership (a number of stakeholders should share the responsibility of education and training). The document espoused that learners' prior knowledge and values are to be considered; their needs taken into account; different learning styles and the rate of learning acknowledged and accommodated both in the learning situation and in the attainment of qualifications.

The name C2005 was chosen was because the policy makers envisaged that the curriculum would be implemented in all grades by the year 2005 (Graven, 2001). In theory, this timeline seemed achievable. The implementation process commenced in 1998 in Grade 1, Grade 2 in 1999 and Grades 3, 4, 5, 6, each in subsequent years until year 2003. Implementation was to start in Grade 7 in 2001, Grade 8 in 2002 and Grades 9, 10, 11 and 12 each subsequent year to 2005. In practice, this timeline was optimistic and the implementation process encountered many problems as highlighted in the *C2005 Review Committee Report* (Chisholm *et al.*, 2000).

According to this report, many teachers were confused about the design and implementation of C2005 (Chisholm *et al.*, 2000; Taylor & Vinjevold, 1999) and teachers had a shallow understanding of the principles of C2005. Three problematic areas were identified stemming from the structure and design of the policy documents.

These areas of concern were:

> The complex and confusing terminology used in the C2005 document.
> The "overcrowding" of the curriculum. The inclusion of 8 learning areas means that there is insufficient time for the development of reading skills, foundational mathematics and key concepts in the sciences.
> The weakness of the specific design features promoting sequence, pace and progression (Chisholm *et al.*, 2000).

The report also identified a lack of clear guidelines for teachers regarding assessment policy and practice. Two scenarios were presented: on the one hand teachers spent too much of their time managing and administering assessment and less time on classroom work, on the other hand, there was little or no attention paid to assessment in the teaching and learning process (Chisholm *et al.*, 2000).

Three other areas of concern emanated from the report. First, teacher training was inadequate in terms of the training model, duration and quality. The cascade training model proved to be problematic because the district trainers did not understand the underlying principles of C2005, the training was only conducted for two days, the orientation was on terminology, and little attention was given to the substance of C2005 and outcomes-based education principles. Second, there was an absence of learning support materials in many schools for the implementation of C2005. The Review Committee found that the availability, use and quality of resources were problematic. Schools lacked basic resources such as pencils, textbooks and duplicating facilities, and teachers lacked the skills to develop their own materials. Third, there was little or no follow-up support for teachers in classrooms.

C2005 promotes an outcomes-based education approach based on the learner's ability to demonstrate outcomes agreed upon between the teacher and the learner.

Outcomes based education

Outcomes based education (OBE) is the methodology upon which Curriculum 2005 rests (NDE, 1997). According to C2005, OBE marks a shift from a content-centred curriculum of the past to one that has intended outputs as its starting point. OBE demands that the learners demonstrate high quality outputs in an outcomes-based teaching and learning paradigm (Spady, 1994).

Spady (1994) states that OBE has four main principles:

> ➤ Expanding the conditions of success (teachers should take the mystery out of what they want learners to achieve);
> ➤ Higher standards (only when learners can do something, then can it be regarded as being finished);
> ➤ Expanded opportunity (teachers need to be more flexible with time, instructional methods and provide a conducive learning environment); and
> ➤ Designing the system "down" (teachers should start from clearly established outcomes).

Outcomes are the end goals of learning that focus on what the learner can do. Willis and Kissane (1995) described two characteristics of OBE. Firstly, OBE is an educational process that is based on learners trying to achieve certain specified outcomes and second, assessment of learners' progress is based on, and justified in terms of the outcomes students actually achieve. OBE assumes that all learners can achieve learning outcomes of significance given sufficient resources for success and where there is a fundamental shift in the curriculum policy, practice and evaluation that focuses on what learners have learnt rather than what the schools have provided and what teachers have taught (Willis & Kissane, 1995).

The key principles of C2005 and OBE are the following: all learners can learn and succeed if given the opportunity; teaching and learning should acknowledge and be based on children's background and real life experiences; focus on outcomes as a driver of education; expanded opportunities for students, frequently stated as

"success for all"; and adequate provisioning of learning support material (Spady, 1994; NDE, 1997).

Theoretical Framework

This thesis is based on the premise that educational curriculum issues cannot be solved through general pronouncements. What happens in schools is dependant on context and situation; it is not possible to paint schools with the same brush. Different schools have different curriculum problems and to think that it is possible to provide generic answers to curriculum problems is naïve. Because individual circumstances and school situations differ, educational reform changes must be viewed through a multitude of perspectives. Three perspectives have been selected as the basis for the theoretical framework for this study of the teaching and learning practices of four rural of teachers of mathematics — the political, the socio cultural and the practical.

Fundamentally, the political perspective is about power and the exercise of power. Two aspects are reported here. Firstly, I examined how power has been exercised over (or with) the teacher as the teacher comes to understand the ideas inherent in the reform. This normally occurs outside the classroom and is likely to be associated with teacher professional development. Secondly, I examined the exercise of power within the classroom. This aspect involves the teacher's relationship with the students as the curriculum is being implemented.

A socio cultural perspective is concerned with the human relationships between the teacher, the learners and the social milieu. This perspective is based on the teachers' capacity to understand the changes that they are confronting and adapt the curriculum to the local needs and cultural circumstances of the learners.

The practical perspective refers to the technical challenges that teachers face in changing their knowledge, skills and behaviour. Frequently teachers are expected to master new curriculum terminology and teaching strategies. In doing so, they have to be multi-skilled and are expected to be masters of their craft. They need to develop and administer new assessment techniques; teach mixed-ability classes and integrate

ideas and materials from different disciplines (Hargreaves *et al.*, 2002). In short, curriculum reform often requires teachers to adopt a multitude of complex new roles.

Research question

This study investigates the teaching and learning practices of four teachers of mathematics in four rural schools in the Eastern Cape Province. The study is set against the backdrop of C2005 – an outcomes based curriculum reform initiative introduced to all South African schools. The objective of the study is to investigate the teaching and learning practices of these four rural teachers in this complex reform milieu.

The following broad research question guides this study: How do teachers interpret and implement the new mathematics curriculum in terms of:

a) a political perspective (how the teacher, learners are connected to the curriculum);

b) a socio cultural perspective (what adjustments the teacher makes to accommodate the learners' circumstances); and

c) a practical perspective (how the teacher implements the goals of C2005)?

Methodology and methods

In this qualitative research study I have attempted to understand what happens in the classrooms of four rural teachers against the backdrop of national curriculum reform. I have employed a constructivist methodology encompassing methods that are consistent with new ways of thinking or describing a situation. According to Cohen and Manion (1994), emerging techniques like participant observation, and personal constructs are features of the constructivist approach and the resultant descriptive data then allows for either interpretive or evaluative conclusions to be made. Interpretive research, according to Schaller and Tobin (1998), is a term used to describe an investigation, designed to capture the essence of the participants' experience. In this study I employed multiple methods of data collection – including interviews, participant observation and video recording of lessons. These various

forms of data were then used to construct narrative cases applying Polkinghorne's (1995) analysis inquiry approach to examine the complexity of the classroom and curriculum processes.

Each teacher's story can be though of as a case study. Case studies are one of the most common ways to undertake qualitative enquiry, as essentially all case study methods enable interpretation with a context (Denzin & Lincoln, 2000). Case studies focus on a specific situation, they are descriptive and heuristic; that is they offer insights into the event being studied and as such fit within the qualitative or naturalistic framework in a real life context and used multiple sources of evidence (Merriam 1998, 1990; Shipman 1985; Yin 1984). Yin (1984) asserts that case studies have four possible interrelated applications:

> to explain the causal links in real-life situations
> to explore situations in which the intervention has no clear or single set of outcomes
> to describe real-life contexts and
> evaluating using a descriptive mode (p.24)

This investigation is based on the first two of Yin's applications and can be used to describe how rural mathematics teachers are managing to implement C2005.

Interpretive case study can be described as narrative inquiry or analysis. The use of narratives describes events that have occurred. A strength of narrative as a technique is that it can improve communication between people because story telling is fundamentally a human activity. Carter (1993) argued that a story is a "is a mode of knowing" and that it captures the nuances of meaning in human affairs. It is an engaging type of discourse that focuses on the teacher, takes a pragmatic or critical position, and provides meaningful findings (Constas, 1998). Vignettes related to the same topic are often included in narrative inquiry (Polkinghorne, 1995). When a number of vignettes are presented alongside each other, greater insight and understanding is provided than any single vignette. In this way narratives can be used to make generalisations that can assist policy and decision makers to draw conclusions. In this study, I will present narrative vignettes of the teaching of the

four rural teachers (Polkinghorne, 1995). The vignettes will be examined for themes and patterns and also for differences and commonalities.

Significance of the study

This research has a number of levels of significance – for myself as researcher, for the teachers involved and for the curriculum policy development more generally. From a personal perspective, as a lecturer involved in teacher professional development, this study provides me the opportunity to appreciate the pedagogical challenges faced by teachers who have been involved in the professional development program. By observing and talking to the study teachers I have come to a better understanding of how teachers are connected to the curriculum reform.

For the teachers, it is hoped that their participation will provide them with an opportunity to reflect on practices and improve their understanding of the reform. If the teachers can understand the reason for their decisions, and the constraints under which they are working, then they may be able to better manage their futures.

Third, the study has significance for those responsible for curriculum policy development because I offer an analysis of some of the challenges under which rural teachers are operating and multiple perspectives on the teaching and learning of mathematics. If curriculum planners and teacher development agencies can better understand the situation of rural teachers, then they may be able to better manage future changes. Hopefully this study will promote dialogue between policy developers and teachers.

Challenges of the study

Port Elizabeth is a city situated in the Eastern Cape province of South Africa. A number of districts in the former homeland "Transkei", were identified by the National Department of Education (NDE) as nodal zones where mathematics and science interventions should occur. Umtata, the town where the courses were presented, is situated 500 kilometres from UPE. This meant that I had to travel 500

kilometres from Port Elizabeth every week for the lectures and then travel back on either the Saturday or the Sunday.

Visiting schools presented similar difficulties. On one occasion I travelled 555 kilometres to a school, leaving home in the early hours of the morning in order to observe the teacher. You can imagine my disappointment when the principal informed me that the teacher was not at school as she had taken the learners to a choir concert at a neighbouring school. "No problem", I said, " I will see the teacher in a couple of days time". A week later I returned only to find the caretaker available – all the learners and the teachers were at a sports day in the nearby village.

A second challenge was that one of the teachers was transferred to a new school during the term. Another teacher took a cross transfer 280 km north of Umtata. This meant a total travelling distance of 780 kilometres to carry out the research.

A third challenge was that, in general, teachers in the rural areas have a cultural disposition to respect those in authority. Sometimes I felt that teachers answered my questions in a particular way because that is what they thought I wanted to hear. Also, because the interviews were conducted in English, rather than mother tongue, the teachers were not able to express themselves eloquently. Responses were often quite short – requiring me to probe the teachers for more detail. Also because my visits to the school were infrequent it is likely that teachers and students changed their behaviour to accommodate my presence. However, this is always a feature of research of this kind. Researchers always affect their research settings. I have done my best in the thesis to make this explicit so that readers can interpret my observations accordingly.

Thesis overview

In this chapter, I described my personal background and my motivation to conduct this study of the teaching and learning of mathematics in South Africa. I have provided a situational analysis of the schools in the Eastern Cape focusing particularly on the conditions in the rural schools. I have also provided some background on the C2005 national curriculum reform and its OBE philosophy. An

outline of the theoretical framework, research question, methodology and methods, significance and some of the challenges is also provided in this chapter.

Chapter 2 serves two purposes, to review the literature on curriculum reform in South Africa and to establish a theoretical framework for the rest of the thesis. This framework is built on a multiple perspectives approach – I look at curriculum processes from a political, socio cultural and practical perspective. In chapter 3, I elaborate on the methodology and methods that I used in the study. I provide the rationale for my choice of a qualitative, interpretative case study approach employing narrative inquiry. Chapters 4 to 7, present narratives of the four teacher participants including an analysis based on the three perspectives – political, socio cultural and practical. In chapter 8 I re-examine the data from the previous chapters in terms of 'levels' of curriculum and draw some conclusions and implications for the teaching and learning of mathematics in similar contexts.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Introduction

This chapter serves two purposes, to review the literature on curriculum reform in South Africa and to establish a theoretical framework for the rest of the thesis. Consequently, I have divided this chapter into two sections. In the first section of the chapter, the literature review, I discuss five contextual issues influencing educational reform in South Africa. Under the first issue I examine the background of South African educational reform. Under the second issue I focus more specifically on curriculum reform and outcomes-based education (OBE). In the third issue I examine various elements of the change process. Under the fourth issue I review the teacher education development that has taken place since the implementation of Curriculum 2005 (NDE, 1997). Finally, I look at the prevailing conditions in South African rural schools.

In the second section of the chapter, the theoretical framework, I argue the case for using multiple perspectives to examine curriculum reform. I consider three perspectives — political, socio cultural and practical. These three perspectives form the theoretical foundation for the analysis of my data. Under the political perspective I examine the power relationships surrounding curriculum reform. In the socio cultural perspective I review the human relationship issues that affect the teaching and learning process. Under the practical perspective I look at technical aspects of implementing the curriculum.

Contextual issues

Introduction

In this section of the review I look at five educational issues that form the backdrop for the teaching and learning of mathematics in South African schools, particularly rural schools. I begin with a portrayal of the broader educational reform movement in South Africa. I thereafter discuss in more specific terms the C2005 reform movement based on an outcomes-based (OBE) approach. In the third issue I discuss issues relating to teacher education in general and more specifically in South Africa. Fourthly, I examine the educational change processes at work during educational reform with specific reference to the South African context. Finally I discuss the conditions that exist in many of the rural schools in South Africa. The five contextual issues provide the background for the multiple perspectives approach discussed in the second section of this review.

South African educational reform

Educational reform can be motivated by many different imperatives. In the 1950's and 1960's and after the launch of the Sputnik, curriculum reform took place in almost every country of the world during an economic boom. One or other political, educational, economical, psychological or sociological ideology motivated the reforms. For example, in Britain in the 1960's and 1970's, the perceived needs, interests and characteristics of the learners initiated reform and informed the British thrust towards child-centred education (O' Neill, 1995). In the late 1950's and early 1960's the American reform movement was strongly influenced by the Cold War and the desire to catch up with the Russians (Goodell, 1998). In Australia, in the 1980's, politicians moved for curriculum reform based on that country's economic malaise (Carter, 1995).

South Africa provides a different scenario for educational reform. Until 1994, black people in South Africa were oppressed politically, economically and educationally. The poor socio-economic environment, stagnant output, high levels of unemployment, distorted wage differentials, low levels of literacy and inadequate

primary schooling contributed to poor education outcomes for the majority of South Africans. In her book *The right to learn* Christie (1976) asserted that the educational conditions of black people in South Africa qualified them to be "drawers of water and hewers of wood". The Parliamentary Working Group on Values in Education (NDE, 2000) revealed that 92% of Black Africans in 1995 had no formal education at all. Williams (2000) says that the situation in South Africa is unique because this illiteracy was "forced", brought about by the Bantu Education Act of 1953.

For these reasons, in 1994, the newly democratically elected government, the African National Congress (ANC), urgently pressed for educational reforms that would attempt to eradicate the educational deprivation of black people. The Minister of Education, Professor Kader Asmal (2000) said that the new curriculum would "transform a broken-down and corrupt system of separate and unequal education provision" (p. 2). The system was clearly inequitable. The educational budget provisioning that the whites received as compared to the blacks was in the ratio of 6:1 (Khosa, 2000). Inequalities in teacher training, resourcing and teacher salaries contributed to achievement scores skewed in favour of white learners. Overall the South African education system was characterised by the unequal distribution of resources.

After the 1994 election a new educational reform initiative was developed in a highly politicised environment and legislated in 1995. Curriculum 2005 (C2005) provided a framework for the first ten years of schooling leading up to a General Certificate and Training. The name C2005 was chosen because the curriculum reformers envisaged that the curriculum would be implemented in all grades by the year 2005 (Graven, 2001). The African National Congress (ANC) saw C2005 as a means of overcoming the legacy of apartheid. The process of implementation was delayed because of insufficient financial resources and physical and human capacity to implement the programme. However, the South African National Education Department embarked on a number of in-service Education and Training (INSET) programmes aimed at reaching all 300 000 teachers in the system (Chisholm *et al.*, 2000). The stated aim of the INSET was to inform teachers of the principles, teaching and learning strategies and assessment techniques of the new curriculum.

The fact that so many blacks had no formal education was a serious concern. The *National Education Policy Act* (NDE, 1996) stipulated that schooling is compulsory for children between ages 6-14 and that they have the right to access both basic and quality education. This was an ambitious goal in the South African setting. Many learners in primary schools are from the disadvantaged rural areas and perform poorly in schools because many of the teachers are poorly educated, the conditions of teaching and learning are poor (Ota & Robinson, 1999), the teachers teach from the textbook (Verspoor & Wu, 1990) and there is a lack of access to educational materials (NDE, 2000). These factors do not provide ideal conditions for learners who have long been deprived of quality education.

Focusing on the school context in the United Kingdom, Hopkins and MacGilchrist (1998) identified three types of strategies for approaching reform in schools. The first type, type 1, concerns low performing schools requiring high levels of external support because they lack the ability and capacity required to manage their own reform. They focus on a limited number of clearly defined achievable learning objectives to build their confidence in order to continue with further reform. The second type, type 2, is a strategy is for moderately effective schools requiring assistance on specific teaching and learning issues and on management. The third type, type 3, is a strategy for highly effective schools that do not require external assistance (Taylor, Diphofa, Waghmarae, Vinjevold & Sedibe, 1999). In South Africa many rural schools fit the description of a type 1 category requiring as much external assistance as possible to provide learners with opportunities to contribute to the moral, social, cultural, and political development of the country (NDE, 1997). The conditions in rural schools, as I will reflect on later, are so poor that implementing such high ideals provides an enormous and overwhelming challenge.

The parlous state of South African education was further highlighted by the results of the Third International Mathematics and Science Study (TIMSS) (Howie & Grayson, 2002). South Africa was placed last out of the 45 countries that participated in the Grade 7 and 8 studies that took place in 1994/5. In a repeat study of 38 countries in 1998/9, the result was the same. These data highlighted the poor mathematical ability of South African learners and the poor conditions of teaching and learning in South African schools.

Another yardstick used to measure education in South Africa is the results of the annual matriculation examination. Annually, after the matriculation results are released there are concerns expressed as to why the learners are performing so poorly. The reasons cited are the same every year; teachers are poorly qualified (Naidoo & Lewin, 1998), lack resources and operate under difficult socio-economic conditions (Mkhatshwa, 1999). Responding to these concerns the government introduced the Matriculation Intervention Programmes. In 2001, the intervention in the Eastern Cape started in the middle of September. However, the "experts" who were to provide the intervention services barely managed to present their workshops before the learners sat for their examinations two weeks later. The matriculation results in 2000 were again very poor. Only 20 243 black students sat for the higher-grade mathematics examination out of a total population of over 400 000. Only 3 128 candidates passed the higher-grade mathematics examination paper.

In summary, South African reform has been motivated by a post-apartheid goal of equitable educational development for all South Africans as well as the need for South Africa to feature in the global arena in subjects like mathematics and science. However, South African students' continuing poor performance in mathematics and science against a backdrop of large disparities in educational resources has meant that these goals are a long way from being met. In the following issue I examine in more specific terms the rationale and expected outcomes of the C2005 curriculum reforms.

Curriculum reform and outcomes based education

There is much debate in South Africa about how C2005 came into being. Two viewpoints are offered. Many believe that the C2005 philosophies are linked to an egalitarian transformative education movement known as People's Education. People's Education policies are anti-rote learning, learner centred and community orientated (Kraak, 1999). A more popular view is that C2005 philosophies can be traced to the ideas of Bill Spady, an American educationalist, often considered to be the father of OBE (Chisholm *et al.*, 2000).

While Spady is credited with popularising OBE, elements of the approach can be found in the *Mastery Learning* ideas that were developed by Bloom (Bloom, 1973). Bloom's taxonomy can be used as a means by which teachers and students are able to evaluate their knowledge. So OBE is not totally a new approach to teaching. Related movements include educational objectives (Mager, 1962), competency-based education (Franc, 1978) and criterion-referenced assessment (Masters & Evans, 1986). However, Slavin (1994) argued that these ideas do not adequately explain OBE which is said to be an educational process based on the learners trying to achieve certain specified outcomes (Willis & Kissane, 1995). The teacher decides on what the student should be able to understand and be able to do before both structures and curricula are designed to achieve those capabilities. The principal feature of OBE is that there is an input with a resultant output. The inputs are discretionary and depend on what the teacher brings to the classroom for the learners. These inputs include the teaching approach, worksheets, textbooks and resources. The quality of the teacher's inputs or interactions is measured in terms of learner outcomes.

Spady (1994) proposed three types of OBE: transformational OBE, transitional OBE and traditional OBE. The South African national education policy framework is arguably based on transformational OBE. Transformational OBE implies that there will be integration across several learning areas (there are eight in C2005), that learning is shaped by outcomes and there is formative assessment. Integration across learning areas has been prevalent in the United States of America (Rutherford & Ahlgren, 1990), United Kingdom (National Research Council, 1989) and Western Australia (Curriculum Council of Western Australia, 1998). The purpose of integrating across the learning areas is that teachers can give learners opportunities to make connections between different areas of knowledge. It is believed that through integration learners will become better problem solvers.

In mathematics education, the OBE approach has developed into an international reform movement promoting a move away from traditional practices in favour of students' ability to reason mathematically and to master the techniques of problem solving, communication and connected mathematical ideas and applications (National Council of Teachers of Mathematics, 2000). Taylor and Vinjevold (1999)

argue that there is broad consensus that teaching and learning in South Africa is generally described in terms of teacher centredness, pupil passivity and rote learning. In OBE, the shift is towards a learner-centred approach that has elements of social constructivism (Graven 2002).

The basic premise of social constructivist theory is that knowledge is obtained and expanded through active construction and reconstruction of theory and practice. Teachers are expected to find out what the learners already know and, with this information, plan the lesson (Ausubel, 1968). The learners are actively engaged and interacting with their peers in groups rather than memorizing theorems and formulas often without understanding, (Duit & Confrey, 1996; Niekerk, 1995).

Under a constructivist philosophy, learning is developmental, a positive climate strengthens learning, learners construct new knowledge by building on their current knowledge and people learn more when they accept challenging and achievable goals (Brandt, 1998). Kamii and Ewing (1996) describes constructivism as learning that occurs within the child and therefore it is important that the learner is at the centre of the teaching process. Learners are expected to manipulate the resources provided and be responsible for their own learning. The teacher is the facilitator of learning and the provider of resources rather than a giver of information.

These OBE and constructivist philosophies are translated into specific teaching and assessment strategies set out in some detail in the South African national education policy document (NDE, 1997). Under C2005, the teacher is encouraged to begin the lesson by communicating outcomes to the learners. Learners are expected to know what outcomes the teacher plans to achieve in the lesson and what outcomes they need to demonstrate to the teacher. Learners who do not meet the outcomes are to be given opportunities to resubmit their work. The teacher is to support the learners until they can demonstrate that they have mastered the outcome. Formative continuous assessment is expected to help the teacher monitor the strengths and weaknesses of each learner's performance. The teacher is expected to record evidence of each learner's progressive achievement and their work is kept in a portfolio. There are a number of assessment tools the teacher may use; diagnostic assessment, achievement-based assessment, self-assessment, peer assessment,

portfolio assessment, performance assessment, observation sheets and journals (NDE, 1997).

In C2005 classes, teachers are expected to employ a variety of learning support materials to facilitate the learning process. Notes, textbooks, workbooks, supplementary readers and reference books are all considered to be learning support material. In the policy documents it is suggested that the learning support materials (LSM) for both teachers and learners are to be developed and distributed by the provincial departments of education (NDE, 1997). Teachers are also expected to develop their own learning materials to support teaching and learning. These teaching and learning strategies, explicated in the national curriculum document (NDE, 1997), will provide a framework for my classroom observations in the thesis.

In conclusion, the major reform vehicle for South African education at the turn of the century is C2005, an initiative relying heavily on the principles of OBE. OBE is intended to transform education in a way that will allow all learners an opportunity to develop knowledge, skills and values that will prepare them for the challenges of the global market. However, commentators such as Jansen and Christie (1999) have criticised OBE and predicted its failure. These authors suggest that South African education should go back to the basics, claiming that learner centred approaches are impractical for South African teachers and classes. Other commentators, such as Malcolm (2000), argue that while the OBE is a complex reform philosophy with many practical implementation difficulties, it is worthy of support over the long term.

While C2005 (and its OBE rationale) has a strong political and ideological foundation based on equitable opportunities, its implementation is problematic. A number of factors have hampered the implementation of C2005. These factors include poor distribution of policy documents, inadequate information for teachers, short implementation and overstretched cascade models of implementation (Chisholm *et al.,* 2000). Under the next issue I will examine some of the change processes involving the introduction of the reform.

Change processes

Chisholm *et al.* (2000) cite a number of problems that many South African schools and teachers experienced as a result of the C2005 education reform. These problems included complex language and curriculum design, inadequate teacher training, poor school infrastructure and teacher unwillingness to engage with the new ideas. Others have cited lack of sufficient teaching and learning material to support the implementation (Govender, 1998). Here, I highlight four areas of concern related to the implementation of the reform in South Africa, namely the language usage, learner-centred teaching and learning approaches, the implementation strategy, and textbooks and learning support materials.

The first area of concern is the language used in the education policy documents. The implementation of C2005 was hampered because the language used in the policy documentation was complex and confusing (Chisholm *et al.*, 2000). In 2000, the Minister of Education appointed the C2005 Review Committee who concluded that much of the C2005 policy documents contained meaningless jargon, vague and ambiguous language, and unnecessarily unfamiliar terms resulting in a lack of common understanding of the C2005 terminology (Chisholm *et al.*, 2000). Rogan (2000) painted a scenario of a teacher who was introduced to the C2005 terminology at a workshop. The thought of applying these concepts in her class "secretly scares her silly". When C2005 was first introduced it had five design features – namely, critical outcomes, specific outcomes, learning programmes, phase organisers and programme organisers. Chisholm *et al.* (2000) who headed the Review Committee recommended that the 12 critical outcomes be retained but the 66 specific outcomes be reduced. Subsequently, C2005 has now been renamed Curriculum 2021 (C2021) by the Minister of National Education and policy developers are in the process of developing new implementation strategies. The C2005 Review Committee recommended that the specific outcomes be changed to learning area statements. Other confusing terminology such as assessment criteria, range statements performance indicators, phase organiser and programme organiser are to be removed from the policy documents.

The second area of concern is the learner-centred teaching and learning approaches promoted by C2005. Generally in underdeveloped countries learners spend most of

their time transcribing long texts of notes from the chalkboard (Pryor & Ampiah, 2002). The situation in black South African schools is no different. According to Taylor and Vinjevold (1999), five years after the implementation of C2005 teacher talk, pupil-passivity, rote learning, low-level questioning dominates the classroom environment and teachers generally dominate lessons. There is broad consensus that teaching and learning in the majority of South African schools leaves much to be desired. Little group work or other interaction occurs between pupils and lessons are generally characterised by a lack of structure and the absence of activities that promote higher order skills such as investigation, understanding relationships and curiosity. Clark (in press) paints a similar picture in his case study of one South African teacher who has worked under conditions of "conflict and constraint". He argues that teachers who have been victims in the apartheid legacy are potential inhibitors of change-classroom practices. He does, however, add that teachers are willing to embrace the education reform.

A third area of concern is the curriculum implementation strategy. South African teachers according to Jansen and Christie (1999) had no voice in the debates around C2005 curriculum reform and teachers' input into the nature of the change process was extremely limited. In terms of preparing teachers for the reform, the likelihood of success for the implementation of C2005 was limited because the intervention was held over two days using a cascading model of training. This quick fix, one-shot approach to in-service (Fullan, 1991; Hopkins, Ainscow & West, 1993) is insufficient to produce significant changes in classroom behaviour (Lesh, 1996 in Gibbons, Kimmel & O'Shea, 1997). Loucks-Horsley and Hergert (1985) maintain that pre-intervention training cannot solve the problems of curriculum innovation and that help and support given to teachers after the initial training is critical for success.

As reported in the *Sunday Times* the new curriculum policies "are aimed at improving teachers' classroom practices" (Pretorius, 2000, p. 6). The Report from the Curriculum 2005 Review Committee stated: "many problems and difficulties were experienced in the process of training teachers for the new curriculum" (Chisholm *et al.*, 2000, p. 11). These problems related to the models, duration and quality of training. Gibbons, Kimmel and O' Shea (1997) argue that staff development programs held after school or infrequently should be not seen as ends in

themselves. Guskey (1985) states that very few teachers can move from a staff development programme and begin implementing the innovation in the classroom with success. Clearly, teacher change is a gradual process and there are no "quick-fixes" (Clark, in press; Venville, Wallace & Louden, 1998).

The fourth area of concern is textbooks and learning support materials. Verspoor and Wu (1990) argue that teachers who are poorly educated and inadequately trained are dependent on textbooks for the presentation of lessons. There is conflicting evidence about the availability and use of textbooks in South African schools. Studies by Taylor and Vinjevold (1999) found that textbooks were not readily available and, where present, they were not being used. However, Adler, Dickson, Mofolo and Sethole (2001) argue that there are textbooks available in schools and that they are being extensively used. In some schools there is an absence of basic learning support material such as books and pencils (Chisholm *et al.*, 2000). It is clear, however, that the promised C2005 resources and support have not been delivered (Govender, 1998). Clark (in press) maintains that given appropriate support teachers can be empowered to produce learning materials and in the process alter their current practices.

In summary, I have presented four areas of concern related to the implementation of the C2005 curriculum reform. These are language usage, learner-centred teaching and learning approaches, the implementation strategy, and textbooks and learning support materials. Overall the literature paints a picture of the difficulties experienced by the South African teacher in the implementation of C2005. Firstly, it is clear that the complex language used in the policy documents confused teachers and therefore presented problems in its implementation. Secondly, South African classes are still traditional and lessons still dominated by teacher talk and pupil passivity. Thirdly, the nature of the implementation strategy did not empower teachers to implement the curriculum reform. The short two-day C2005 training that teachers received through a cascade model without further support and training was inadequate for its successful implementation. Fourthly, there is a lack of learning support material at schools. Poorly educated and inadequately trained teachers are dependent on textbooks for the presentation of lessons and need additional support for the implementation of C2005.

Teacher development

There is an urgent need in South Africa for teacher education. In the Eastern Cape Province, for example, 42% (26 000) of science and mathematics teachers are either underqualified or unqualified (Education Management Information Services, 1996). The Monitoring Learning Achievement (MLA) survey shows that 24% of primary school teachers are not appropriately qualified to teach. The utilisation of under qualified and unqualified teachers is a common phenomenon in rural schools (NDE, 2000). Thus, C2005 presents its own challenges for teacher professional development for an underqualified teaching force.

Scanning the international literature, it is clear that one of the keys to curriculum reform is through teacher education and professional development (Schubert, 1986). Teachers everywhere in the world have been bombarded with demands and plans to "fix" education (Basica & Hargreaves, 2000; Fullan & Hargreaves, 1992; 1996). Teacher education reform is a complex system that involves a number of interrelated components. The interrelationships exist between curriculum and instruction, school and classroom organisation, teacher in-service training, reporting and evaluation (Fullan & Miles, 1992). Loucks-Horsley and colleagues (1998) proposed that a good teacher professional development programme should have the following characteristics: teachers in active roles rather than passive recipients of knowledge; a balance between content and pedagogical knowledge; learning through inquiry and investigations; opportunity for risk-taking and experimentation; time to reflect on and practice what is learned; include leadership and sustained support; and model strategies that teachers will use with their learners in an on-going assessment of the learners in professional development experiences. Kahle (1999) cites evidence that quality teacher professional development focused on content and pedagogy affects teaching practice and the changes are retained over time.

Traditionally in South Africa, the state is responsible for providing subject specific INSET through a subject advisory service. Non-Governmental Organisations (NGOs), largely overseas funded, also provided subject specific INSET. However, the NGO's were far from uniform in their approach, some had narrow technicist, market orientations, and others were in direct opposition to the government (Adler, 1994).

One such intervention was the Primary Science Project, an NGO providing INSET to disadvantage teachers in South Africa. Webb and Wessels (1997) report that the aim of the project was to train teachers in the implementation of student practical activities. In 1997 the program expanded to 800 schools with broadened objectives. The project focused on promoting teaching methodologies with a focus on process skills. It is through INSET and teacher development programs that teachers develop professional expertise required for effective classroom instruction. Joyce and Weil (1986) and Leithwood (1992) developed models that can be used to determine a teacher's repertoire of classroom instructional skills based on an image of effective classroom instruction. These models reflect increases in expertise as teachers acquire greater skills in the application of their teaching.

The South African National Department of Education recognises that curriculum reform and in-service education and training for teachers is a concurrent process (NDE, 1997) and in 1996 the Heads of Education Departments Committee (HEDCOM) approved a broad strategy to introduce teachers to an outcomes-based education approach. Professional development was planned for the district personnel, the school governing bodies, the management officials at the schools and the teachers. For example, at provincial level, in the Eastern Cape province, a systemic reform initiative was implemented in 2000.

This project – called the Imbewu (meaning seed) project – was funded as part of a partnership agreement between the Eastern Cape Education Department and the British Government. The project was specifically designed to foster the goals of C2005 through professional development of teachers and whole school transformation (Maurice, 1999). In the first instance, the Imbewu project was piloted in 100 intermediate primary schools in year 1 and 423 intermediate schools in year 2 in the Province. The project was advertised in the local newspapers and schools applied to become involved. Either ten or fifteen schools were chosen for each of the twenty-eight districts. Participation in the project was voluntary. The project aimed to move teachers from a "chalk and talk" approach to a learner-centred approach and to improve their skills as managers and facilitators of learning. Teachers and their principals were also expected to operate as part of an active learning community within the school (Maurice, 1999).

In summary, I have highlighted here the urgent need for high quality teacher professional development in the Eastern Cape Province. A worthy teacher professional development programme provides a balance between content and pedagogical knowledge with on-going sustained support in the classroom. Such teacher development should focus on improving teacher knowledge and skills in the context of systemic whole school transformation.

Conditions in rural schools

Under this issue, I will focus on three areas of concern regarding conditions in rural schools in South Africa namely, infrastructure, teacher absenteeism and time-on-tasks days, and the learners. Throughout this issue, I make specific reference to the Eastern Cape.

The first area of concern is the infrastructure in the rural schools in South Africa. Bishop (1997) alluded to the lack of classrooms when he pointed out that outdoor teaching is the norm. Of the 5958 schools in the Eastern Cape, 80% do not have electricity, 2578 need repair and 823 are "falling to pieces". According to Bishop (1997) more than a third of the schools in the province have no water. Rural schools in the Eastern Cape, had a teacher pupil ratio of 1:54 (Edusource, 1994). The consequences are that teachers often share classrooms and large classes are the rule. Ota and Robinson (1999) reported that the Eastern Cape is one of the poorest provinces in the country. In the 6216 schools of former Transkei (where the study participants are based) there is a legacy of poor infrastructure. Thirty four percent of the schools have no running water, 77% of the schools are without electricity and 81% of the schools have no telecommunication networks. The poor socio-economic context exacerbates the educational problems. Many schools have high dropout rates, overcrowded classes, lack of physical resources and teachers are either unqualified or under-qualified (Ota & Robinson, 1999).

The NGO SchoolWise painted a similar picture. In a 2002 report, SchoolWise highlighted a lack of electricity, poor water and latrine facilities, also a lack of resources such as textbooks as a backdrop to teaching and learning during the

apartheid years. Generally, many teachers in rural schools work in over-crowded and under-resourced schools (SchoolWise, 2002).

The second area of concern is the high absenteeism rate and low time-on-task days. Research into teachers' practices shows an endemically bad work ethic with teachers regularly out of school (Macfarlane, 2001). Teachers regularly do not attend school on paydays or during union meetings (Macfarlane, 2001). Taylor and Vinjevold (1999) found that out of a possible 191 tuition days, only 21 days of the year are spent on actual tuition. The bulk of the days are on non–tuition tasks such as registration at the beginning of the year, a slow start to the subsequent terms, examination preparation, writing and marking of examinations, paydays, memorial services, athletics, music competitions and other sundry causes (Taylor & Vinjevold, 1999).

The third area of concern is the learner. In South Africa more than five million children in the country (or 30% of the population) regularly go hungry (Idasa, 2002). Of these five million, 25% live in the Eastern Cape and the other 25% from KwaZulu Natal (Streek, 2002). Approximately 10 million children in South Africa under the age of 17 have no income. While access to public schooling is supposedly universal, in some provinces more than 10% of the children have no school to attend (Idasa, 2002). Learners in rural schools are typically served by untrained and demotivated teachers (Garson, 1999), few textbooks (Taylor & Vinjevold, 1999), absent teachers, poor sanitation (Ota & Robinson, 1999) and lack of shelter (Mail and Guardian, 2002). For a complex combination of reasons, rural students in South Africa could be said to know very little and do very little (Taylor & Vinjevold, 1999).

In summary, I have described three areas of concern related to rural education in South Africa namely infrastructure, teacher absenteeism and time-on-tasks days, and the learners. Overall I have painted a picture of educational deprivation highlighted in statistics released by the Parliamentary Working Group on Values in Education in (NDE, 2000). They revealed that 92% of black South Africans in 1995 had no formal education at all. The conditions in rural schools such as those highlighted have served to maintain a particularly low standard of education and poor prospects for change.

Summary

In this first section of the review I have looked at five contextual issues. I began with some of the broader issues of South African educational reform, looked at some of the specifics of the C2005 initiative and finished with a review of the conditions of rural education. In constructing the review I have progressively narrowed my focus to examine the particular conditions of rural South African schools where this study is located.

The literature paints a complex picture of education reform in South Africa. The scars of the apartheid regime devastated and crippled the country politically, economically, socially and culturally. The South African environment can be characterised by lack of employment, stagnant output, low levels of literacy, poor primary schooling achievement, distorted wage differential, and unequal distribution of resources, providing a compelling case for curriculum innovation and reform. However, curriculum is never a neutral process, because it represents the values and interests of those involved. The new South African national curriculum is a political tool that was introduced to remove the apartheid ideologies. The reform is also set against certain cultural and practical realities. For this reason I argue that South African reforms are best viewed from multiple perspectives. In the next section of the review I elaborate on the reasons for my choice of this approach and explicate three different perspectives namely the political, socio cultural and practical.

Theoretical framework

Why use multiple perspectives?

Educational curriculum issues cannot be solved through general pronouncements. Rogan (2000) says that what happens in all schools is dependant on the context and situation that schools find themselves in. It is not possible to paint schools with the same brush. Different schools have different curriculum problems and to think that it is possible to provide generic answers to curriculum problems is naïve. Schubert (1986) argues that to make general pronouncements would assume that the needs of all human beings and their circumstances are alike. Because each individual's

circumstances and school situations differ, cognisance must be given to a multitude of perspectives.

Schubert (1986) sees issues related to the curriculum through perspectives, paradigms and possibilities. Perspectives form the context that nourishes the set of beliefs or assumptions. Perspectives provide fuller and richer images of curriculum conditions or states of affairs. Paradigms are the conceptual lenses through which problems in the curriculum are perceived. They guide the work of educators and also the type of questions we ask and the ways in which we view the consequences of our efforts. The conceptual framework that we use to debate issues about curriculum problems shape their character and impels us to accept or reject the evidence that exist. Possibilities provide a range of solutions that meets needs and addresses problems (Schubert, 1986).

Adopting multiple perspectives enables people to see the same episode or situation differently (Anderson, 1992). Curriculum possibilities are dependent on the understandings that the individual has. House and Mcquillan (1998) argue that school reforms have failed because not all the perspectives are considered. For example, technological reforms often fail because reformers have an incomplete understanding of the political and cultural perspectives (House & Mcquillan, 1998). Therefore in order for education reform to be understood, careful consideration needs to be given to the full range of the political, the socio cultural and the practical. A multiple perspectives approach serves as a guide to social action (Schön, 1979). Anderson (1992) supports this notion and postulated six reasons why multiple perspectives should be used in education reform:

- ➢ the systemic nature of curriculum reform endeavours;
- ➢ the cross-disciplinary nature of much of the important new research;
- ➢ the complexity of educational situations;
- ➢ the myopia introduced into many discussions of research questions and research results by researchers who fail to consider all the facets of what may influence their research.
- ➢ the range of philosophical or psychological bases for educational change; and
- ➢ the need to avoid serious mistakes in action, (pp. 861-866).

The education researcher or leader who does not take into account all of these many dimensions is likely to initiate actions that are destined for failure because they are inconsistent with the real world of learners, teachers and schools and the multiple stakeholders in educational reform. For these reasons I argue for use of this approach to understanding teaching and learning. Three perspectives seem particularly appropriate to this study — the political, the socio cultural and the practical.

The political perspective

Fundamentally, the political perspective is about power and the exercise of power. Two aspects of the exercise of power are reported here. Firstly, I am interested in how power has been exercised over (or with) the teacher as the teacher comes to understand the ideas inherent in the reform. This normally occurs outside the classroom and is likely to be associated with teacher professional development. Secondly, I am interested in the exercise of power within the classroom. This aspect involves the teacher's relationship with the students as the curriculum is being implemented. Often there is a mismatch between the way teachers are treated by reformers and what they are expected to do in the classroom. This mismatch is referred to as the constructivist paradox (Wallace & Louden, 1994).

In the first aspect, the exercise of power outside the classroom, the focus is on the extent to which teachers are connected to the changes. The literature is replete with studies of teacher involvement and connectedness with the change process (Fullan, 1991; 1993). Here terms such as ownership, personal meaning, involvement and negotiation are pertinent (Wallace, Parker & Wildy, 1995).

Ownership for example, concerns the degree to which teachers take on the change ideas. Many studies show that change mandated from above often leaves teachers without a strong connection to the procedures and context of the change (Ball, 1987; Nyberg, 1981, Sarason 1990, Sikes, 1992). Too often, the in-service opportunities are one shot, infrequent without the necessary follow through to support teachers in the classroom (Fullan, 1991; Hopkins, Ainscow & West, 1993; Loucks-Horsley & Hergert, 1985).

The level of the implementation of the curriculum change in the classroom is dependent on the personal meaning that teachers have of the mandated changes. Only when teachers come to understand the reality of the educational change in context of their classroom will they implement changes (Sikes, 1992). This understanding of reality is influenced by the teachers' ideologies, in other words by the values and beliefs and the body of ideas that they have of education and teaching. Thus, the level of change will be dependant on what the change means to the teachers and what they subsequently do and how they do it. Curriculum reformers who mandate a curriculum change fail to recognize that teachers are people that will choose a course of action or strategy which suit their purpose (Hargreaves, 1988).

The next area is involvement. Although teachers are primarily both the subject of change and the agent of change, they are unlikely to be involved in the formulation of the change. Allen and Glickman (1998) point out that in cases where the curriculum has been mandated, teachers are reluctant to implement curriculum reform because they lack an understanding of the process that was involved. However, where teachers perceive that there is a need for the change, and if they can contribute to the change, they will implement the change.

Negotiation is a fourth aspect of power over the teacher. Often, teachers have little voice in the content of what goes into a mandated curriculum. To this end teachers are afraid of drastic innovations because they prefer the familiar and they have vested interest in existing arrangements (Gustavson, 1955). Gustavson argues that where teachers are left out of the policy discussions, they will resist the educational changes.

In the second aspect, related to the first, my focus is on the exercise of power within the classroom. Traditionally, the teacher has all the power and is responsible for what happens in the classroom. I examine this issue of the teacher's power over the learners in the classroom using the same terms that I have discussed above, namely, ownership, personal meaning, involvement and negotiation. Interestingly these terms are similar to the goals of C2005 that exhort learners to "manage themselves", "work in teams" and "identify and solve problems".

Here ownership, refers to the extent of involvement of the student in deciding on the teaching and learning strategies. Classrooms are typically characterised by a low level of ownership. The teacher decides the curriculum content to teach, what resources to use, what, when and how to assess the learner and what discipline techniques to use. The learner has to act in accordance with the beliefs, values and principles of the teacher. Sarason (1990) argues that if educational reforms at the classroom level are to succeed, then the power relationships between the teacher and learners must be transformed.

Personal meaning is largely dependent on the learners' understanding of the educational reform and whether they believe in the changes. Only if the educational reforms are consistent with the learners' values and beliefs about the reform, will curriculum changes will be acceptable to the learners. If learners do not believe in the change, they will be resistant to the changes.

Involvement is also dependant on whether learners perceive the need for educational reform. Where a need is perceived, the learners would participate in the educational reform by deciding with their teachers on issues related to their teaching and learning.

Negotiation in the classroom rarely takes place. In traditional classes the curriculum is non-negotiable. However, Hargreaves, Earl, Moore and Manning (2001) argue that learners should negotiate the assessment of their work in a learner-centred teaching approach. They believe that the learners should accept responsibility for their learning and the teacher should negotiate the criteria on which they assess the learners.

In summary, the political perspective on curriculum reform looks at how power is exercised over the teacher and how power operates in the classroom. Teachers, however, often find themselves in a constructivist paradox (Wallace & Louden, 1994). On the one hand, teachers are pressurised from those who have power over them into adopting the mandated curriculum. On the other hand, teachers are expected to negotiate the curriculum with the learners based on the learners' prior knowledge. This paradox means that teachers are left feeling confused. On the one

hand they are exhorted to negotiate the curriculum with their students and to value students ideas. On the other hand they are presented with the curriculum in a non-negotiable manner and their own ideas are not valued (Wallace & Louden, 1994).

The political perspective looks at the relationship between the teacher and the implementation process, specifically at how power has been exercised over (or with) the teacher outside the classroom and the exercise of power within the classroom. Four elements namely, ownership, personal meaning, involvement and negotiation are discussed. Finally, I provide a brief explanation of the constructivist paradox.

The socio cultural perspective

The classroom is a social setting involving teachers and learners. Other role players from beyond the classroom, for example, principals, school governing bodies and the parent are also important influences on the teaching and learning process. A socio cultural perspective is concerned with the human relationships between the teacher and the learners and the social milieu. The teachers are at the centre of all educational innovations and consequently the cultural perspective is based on the teachers' capacity to understand the changes that they are confronting. An educational reform initiative requires the teacher to understand a number of new philosophies that underscore the curriculum innovation. From a socio cultural perspective the teacher has to take into account the family background and circumstances of the learners when implementing a new curriculum.

The teacher is constantly learning about the learners' background and how the learners interact with each other, and with the community. Taking a socio cultural view, teacher learning is conceptualised as a process of transformation of participation in the practices of the community. Learning is viewed as a social and cultural activity that involves transforming the ways in which the teacher participates in the practices of the community (Roussouw & Smith, 2001). According to Hargreaves, Earl and Schmidt (2002) the cultural perspective allows an investigation of how the teacher interprets the curriculum innovation and attempts to integrate it into the social and cultural context of schools. The changes will affect the teachers'

beliefs as well as their practices and how these changes affect their ideas, beliefs, emotions, experiences and lives (Hargreaves, Earl, Moore & Manning, 2001).

For example, a socio cultural perspective on the phenomenon of student engagement is dependent on the understanding that teachers have of their learners' background and home circumstances. Teachers will choose curriculum that the learners are familiar with and plan the lessons accordingly. Teachers from rural schools will find it difficult to engage the learners in topics such as skyscrapers or concorde-jet planes.

In summary, the background of learners determines the teaching and learning ethos of the classroom. The way teachers interpret and are influenced by the curriculum innovation would influence their practice in the social and cultural context of their schools. The teacher has to consider the home circumstances of the learners and the conditions under which the learners live. The socio economic status of the learners will influence the teaching and learning curriculum content.

The practical perspective

The practical perspective refers to the challenges that teachers face with changing their own knowledge, skills and behaviour. Frequently teachers are expected to master new curriculum terminology and a demanding new set of teaching strategies. In doing so, they have to be multi-skilled and are expected to be masters of their craft. They need to develop and administer creative assessment instruments; they are to teach in mixed-ability classes; they have to integrate ideas and materials from different disciplines (Hargreaves *et al.,* 2001). In short, curriculum reform often requires teachers to adopt a multitude of complex new roles.

The practical perspective looks at how teachers alter their existing practices in favour of alternative teaching strategies as mandated in the educational reforms. Teachers require opportunities to experience observation, training, practice and feedback so that they can develop new skills and make them an integral part of their classroom routine (Hargreaves *et al.,* 2001).

In the case of the C2005 reforms there are three main underpinnings; a philosophy of learner-centeredness; an outcomes-based approach and an integrated approach to learning. The changes from "old" to "new" practices are summarized in Table 1.

OLD	NEW
▪ 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 to real-life situations
▪ Textbook/worksheet bound and teacher-centred	▪ Learner-centred; teacher is facilitator; teacher constantly uses group work and teamwork
▪ Teachers responsible for learning; motivation dependent on the personality of the teacher	▪ Learners take responsibility for their learning; pupils 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

(NDE, 1997, p.6-7)

Table 1: "Old" and "new" classroom practices, according to C2005

According to Brodie (2002) the "old" and "new" characterisation of C2005 presents a dichotomous view of the classrooms, suggesting that they are either of one type or the other and devaluing the teachers who are not using the "new". However, such a dichotomy does present a kind of framework for examining teaching and learning using a practical perspective.

The "new" approaches fall within the paradigm of the socio-constructivist, learner centred and integrated approach to teaching and learning mathematics. This represents a shift away from the content-based and performance-based approach toward a more competence-based approach. The principles of learner centred teaching are what Bernstein (1996) refers to as the competence model. The focus of the competence model is what learners know and can do at the end of the learning. I want to focus on a competence model that Bernstein (1996) refers to as liberal/progressive form of competence. This model highlights cognitive empowerment that focuses on cultural empowerment. The learning goals of the

progressive movement fit into the thinking behind the learners' goals for an OBE learning approach. Under this philosophy learners are encouraged to exhibit independence and take initiative. Learners are taught skills to ask questions, evaluate evidence, apply knowledge, moving beyond simple recall, recognition and reproduction of information (Taylor, 1999).

In keeping with this philosophy the national curriculum policy document expects teachers to:

> ➤ use group work and teamwork;
> ➤ allow learners to apply critical reasoning skills, reflect on their learning, and be actively engaged in the learning;
> ➤ integrate knowledge so learning is relevant and connected to real-life situations;
> ➤ use learner-centred approaches where the teacher encourages group work and the teacher is a facilitator;
> ➤ encourage learners to take responsibility for their learning;
> ➤ provide the learner with constant feedback and affirmation of their worth; and allow learners to work at their own pace. (NDE, 1997)

An example of student engagement in the practical perspective is the demonstration by learners to construct their own learning through the learner centred approach with the support and guidance from the teacher who acts as a facilitator.

In summary the practical perspective considers whether teachers engage in learner centred teaching and learning in their classrooms. It specifically focuses on the technical ability of teachers to alter their practices from traditional "old" methods to learner centred "new" practices. As explained earlier, these practices set out in the national curriculum document (NDE, 1997) describe how the OBE ideas have been *translated* by the curriculum planners. Hence, they provide a framework within which teachers are expected to operate, and for my own data collection.

Summary

In this section, I have outlined the rationale for a multiple perspective approach to examining mathematics curriculum reform in South Africa. Three perspectives have been discussed namely the political, the socio cultural and the practical. These three perspectives form my theoretical framework and guide the thesis process.

The political perspective examines the relationship between the teacher and the implementation process. I have used four elements namely, ownership, personal meaning, involvement and negotiation to discuss how power has been exercised over (or with) the teacher outside the classroom and the exercise of power within the classroom. A mismatch between actual and espoused power relationships often results in a constructivist paradox.

The socio cultural perspective looks at the importance of context in determining the nature of teaching and learning. The teacher has to consider the backgrounds and the conditions under which the learners live. Learners who come to school hungry, or have additional chores to do at home before coming to school or walk a long way to get to school, may experience concentration problems in the class. These are the realities of education in rural South Africa. How the teacher adapts the curriculum to meet these cultural realities is the socio cultural perspective.

The practical perspective examines the teaching approach. This perspective examines, in a technical sense, how the teacher implements the goals of C2005, based on OBE and learner centred approaches, and is based on the guidelines set out in the national curriculum document (NDE, 1997).

In the following table, I have summarized the essence of the multiple perspectives framework and identified some related focal questions under each perspective to help explicate the perspectives and guide the thesis process.

Chapter summary

In this chapter I have set out to examine the context of curriculum reform in South Africa and in so doing establish a theoretical framework for my research.

What emerges from my review of the literature on the South African educational scene is a picture of inequality, poor achievement, poor school infrastructure, minimum time on teaching tasks, poor socio-economic conditions of the learners and a nation struggling with the legacy of the apartheid era. In response to this situation the authorities initiated a bold reform effort under the banner of C2005. Under the weight of enormous logistical and resource difficulties the implementation of the program has been, at best, patchy. The problems are particularly evident in rural schools, the location of my research.

Given the complexity of this picture I have adopted a multiple perspective approach to the research allowing an examination of the power relations in curriculum implementation, the socio cultural circumstances of the classroom and the practical or technical aspects of classroom practice. This approach, I argue, will enable a fuller analysis of the implementation of curriculum action.

In subsequent chapters (4-7) I use these three perspectives as a theoretical framework to analyse the curriculum practices of four South African rural mathematics teachers.

Perspective	Element	Related focal questions
Political		
The extent to which the teacher is connected to the curriculum	**Outside classroom** Ownership	▪ How have teachers taken on the reform ideas? How connected are the teachers to the reform?
	Personal meaning	▪ How do teachers perceive the reality of the educational change in the context of their classroom? In what ways is the educational reform consistent with the values and beliefs of the teacher?
	Involvement	▪ Do teachers perceive the need for the education changes? How do teachers perceive their roles in the curriculum reform? What influence have the teachers had on the process of implementation?
	Negotiation	▪ How have teachers been able to negotiate the curriculum?
The extent to which the learner is connected to the curriculum	**Inside classroom** Ownership	▪ How have the learners taken on the change ideas? How connected are the learners to the educational reform?
	Personal meaning	▪ How do learners perceive the reality of the educational change in the context of their classroom? In what ways is the educational reform consistent with the values and beliefs of the learner?
	Involvement	▪ Do learners perceive the need for the education changes? How do learners perceive their roles in the curriculum reform?
	Negotiation	▪ How have learners been able to negotiate the curriculum?

Perspective	Element	Related focal questions
Socio cultural The adjustments the teacher makes to accommodate the learner	Background of learners	▪ What are the socio economic conditions of the learners?
	School, classroom context	▪ How do the conditions at the school affect learning?
	Problems experienced by learners	▪ What problems do learners experience resulting from the socio cultural conditions?
	Problems experienced by teachers	▪ How are teachers challenged in performing their task because of the socio cultural conditions? What curriculum adaptations does the teacher make to accommodate learners' circumstances?
Practical The extent to which the teacher implements the goals of C2005	Learner-centred approaches	▪ How does the teacher use group work and are learners actively engaged in the learning?
		▪ How does the teacher act as a facilitator?
	High order thinking	▪ How does the teacher stimulate higher order thinking?
	Integration of knowledge	▪ How does the teacher integrate the knowledge across the learning areas?
	Relevant content	▪ How is the content relevant and connected to real-life situations?
	Learner responsibility	▪ How does the teacher help learners to take responsibility for their own learning?
	Assessment	▪ How is the teacher using alternative assessment and providing the learners with feedback and affirmation?
	Pace of learning	▪ How does the teacher use flexible time-frames to allow learners to work at their own pace?
	Resources	▪ How does the teacher provide the learners with the learning resource materials to support the learners in the learning?

CHAPTER 3

METHODOLOGY AND METHODS

Introduction

This chapter is divided into six broad sections. In the first section I outline the aim and research question. In the second section, I discuss the rationale for the qualitative approach and my use of case study and narrative inquiry. In section three, I discuss my data gathering techniques focussing particularly on participant observation and semi-structured interviews. In section four I outline the phases of the study. In section five I look at the ethical considerations and in section six I discuss the quality criteria by which the research should be judged.

Aim and research question

C2005, the new educational reform, was introduced in South Africa in 1997. Since then efforts have been made by the National Department of Education to educate teachers on the content of the reform to help them to implement the reforms in their classrooms. This implementation process provides an enormous challenge, particularly for isolated rural schools lacking in resources. In this study, I examine the teaching and learning practices of rural mathematics teachers and their learners. The following broad research question guides this study: How do teachers interpret and implement the new mathematics curriculum in terms of:

a) a political perspective (how the teacher, learners are connected to the curriculum);

b) a socio cultural perspective (what adjustments the teacher makes to accommodate the learners' circumstances); and

c) a practical perspective (how the teacher implements the goals of C2005)?

Rationale for a qualitative approach

In order to make sense of the complexities surrounding teachers and their teaching, qualitative research methods best describe what teachers do in their classrooms. Having read the work of Cohen and Manion (1980, 1994), Denzin and Lincoln (1994, 2000), Eisner (1997), Guba and Lincoln (1989) and Merriam (1998) I saw that the qualitative approach favours a more subjective stance than a quantitative approach and views the world as being softer and more personal. The study of education particularly favours qualitative research because the research takes place in a social setting. The data collected is primarily through qualitative instruments such as interviews, field observation and videotapes (Strauss & Corbin, 1994).

To make sense of the realities of what happens in classrooms, the qualitative approach provided me with the opportunity to draw on my own experiences, knowledge and theoretical dispositions and collect data to present my understanding to the world (Glesne & Peshkin, 1992). I have also tried to assume a relativist ontology (there are multiple realities) and a subjectivist epistemology in a constructivist-interpretative paradigm (Guba & Lincoln, 1989).

I chose to use a qualitative and interpretative case study research approach because my aim in conducting this research was not to apply theory to practice. Rather it was to work with the teachers to better understand how they interpreted, and implemented the educational reform in their classroom practice in order to enhance its ongoing practicality (Connelly & Clandinin, 1988). Eisner (1997) suggested that the researcher begins by telling a story of each one of the participants. The story should represent the bricoleur's (Denzin & Lincoln, 1994) images and understandings of the study undertaken and connect all the parts to represent the whole. This process involves reflecting on the meaningful interactions and relationships in the environment researched. Stories represent the richness and the nuances of meaning in human affairs and are presented through case studies in the form of narrative inquiry. Geertz (1973) says that case studies strive to provide a close up of the reality of the situation through thick descriptions of the context, experiences and feelings about a situation.

Qualitative research is endlessly creative and interpretative Denzin & Lincoln (2000). The researcher first has to create a field text consisting of field notes and documents from the field. The researcher as interpreter moves from this text to a research text, which consists of notes and interpretations based on the field texts. This text is then re-created as a working interpretative document that contains the researcher's initial attempt to make sense of what is learnt. In this study, I will employ two broad techniques that originate from the qualitative paradigm. These are case study and narrative inquiry.

Case study

Case studies are one of the most common ways to undertake qualitative enquiry as essentially all case study methods enable interpretation within a context (Stake, 2000; Yin, 1984). According to Stake, case studies have become one of the most common ways to do qualitative inquiry. A case study is not a methodological choice but a choice of object to be studied. Yin (1984) describes a case study as an empirical inquiry that investigates a contemporary event within a real-life context. In case studies multiple sources of evidence are used. Case study, according to Yin (1984) is appropriate when a "how" or "why" question is asked about a contemporary set of events over which the researcher has little control. Case studies focus on a specific situation or phenomenon, they are descriptive because they provide a rich illustration of the phenomena under study; and they are heuristic. That is, they offer insights into the phenomenon being studied and as such fit within the qualitative framework (Merriam, 1998).

A distinguishing feature of case studies is that the context of the study is unique and dynamic (Sturman, 1999). It is for this reason that case studies investigate and report the complex dynamic and unfolding interactions of events, human relationships and other factors in a unique instance. Hitchcock and Hughes (1995) suggest that the case study approach is particularly valuable when the researcher has little control over the events. These authors do, however, point out that the case study provides a rich and vivid description of chronological events, description of events with an analysis, a focus on individual actors, highlights specific events, the researcher is integrally involved, and the richness of the case is portrayed in writing up of the report.

Stake (2000) identified three types of case studies. These are the intrinsic case study, the instrumental case study and collective case study. For the purpose of this study, I focus on the intrinsic case study. An intrinsic case study is undertaken when the researcher wants to have a better understanding of the particular case. In this way the researcher temporarily subordinates other curiosities so that the stories of those living the case will be clarified and teased out.

Some of the strengths of case study are that the results are easily understood by a wide audience including non–academics; they speak for themselves; they are strong in reality; they provide insights into other, similar situations and cases, thereby assisting in the interpretations of other similar cases and they embrace and build in unanticipated events and uncontrolled variables (Nisbet & Watt, 1994). The disadvantages of case studies are that the results may not be generalizable (Yin, 1984). They are not easily open to crosschecking and therefore, may be selective, biased, personal and subjective. Finally they are prone to observer bias, despite attempts made to address reflexivity (Nisbet & Watt, 1994).

Narrative inquiry

This thesis is also grounded in Clandinin and Connelly's (1994) work in narrative research. They describe narrative as phenomenon and method. The phenomenon is the story and the method is the narrative. Narrative, as interpretive research, brings the researcher closer to the lives and stories as told by teachers. The stories portray a landscape of firstly, how teachers see events that occur in their respective classes and secondly, the researcher within the paradigm of his or her personal practical knowledge of teaching has qualities unique and similar to those of the teachers. The amalgamation and analysis of the information, shapes the stories told.

Wallen and Fraenkel (2001) encourage the idea that the results of qualitative research are most effectively presented by means of a narrative that is rich in detail. Narrative research in teaching begins with teachers' stories of their lives. Developing narrative inquiry foregrounds the developing knowledge of teaching as existential, established and narratively–constructed, personal practical knowledge of teaching. The narrative comes from the construction and reconstruction of personal and professional

experiences, both inside and outside the field of curriculum reform and teacher professional development.

The transformative quality of narrative study in educational practice has the potential for changing traditional classroom stories and teacher narratives to alternative practices. One of the strengths of narrative is that it can improve communication between people, as story telling is essentially a human activity that can result in a more engaging type of discourse that can reduce the gap between abstract research and teachers and find more meaningful findings (Constas, 1998).

Positivist researchers may ask why should I want to represent my research in the form of a narrative? The narrative is embedded in themes or plots (Polkinghorne, 1995) and based on the presumption that storied events are unilinear and can be divided into two broad categories depending on the origin of the data. Polkinghorne (1995) argued in his paradigmatic analysis (a classifying or categorising approach to bring order to experiences) of narrative, that narratives can be divided into two broad categories.

The first of his narrative categories is called narrative analysis and involves the construction of narratives from the stories or raw data. According to Polkinghorne (1995), data elements could be configured into a story in the process of narrative analysis. The configuration of the story often begins with the final outcome and events and actions that produced the story are reconstructed to provide a reason why the event has occurred. Analysis of narrative is the second narrative category described by Polkinghorne (1995) that uses a paradigmatic analysis of stories to create categories or themes. In this study I used a pragmatic and critical approach (Constas, 1998). In this way I was able to analyse the actions of the participants and ask why and how the episode has occurred (Polkinghorne, 1995) and draw conclusions based on my own perceptions of the situations.

Narratives may assist politicians, curriculum planners and teacher trainers (at universities) to come to a greater understanding, at the political, social and practical level, of the perceptions of teachers and curriculum development. Teacher narratives help build multiple perspectives on curriculum reform and teacher education. In this study, stories will be used to develop a multiple perspective approach to

understanding the complex world of teaching and learning mathematics in South African rural schools.

Data gathering techniques

In this study, two major data gathering techniques were participant observation (making use of several observational tools such as video and field notes) and semi-structured interview.

Participant observation

Adler and Adler (1994) state that observation is the fundamental base for all research methods. Werner and Schoepfle (1987) see observation as the foundation of ethnographic research. According to Travers (2001), it may be necessary to observe a setting over a few weeks to obtain enough data for the kind of analysis that is needed. He argues that the researcher can learn a great deal simply by spending a morning in a social setting. He says that even without taking notes the researcher may be able to come away with a reasonable understanding of the role that participants play. Merriam (1998) describes a participant observation as a "schizophrenic activity" in that the researcher usually participates in the activity but not to the extent of becoming totally immersed in the activity. The researcher attempts to stay sufficiently detached from the activity to observe and analyse (Merriam, 1998). The observer also needs to be fairly unobtrusive; otherwise the pupils (and the teacher) will be on their 'best' behaviour and will give a record that does not reflect the real life of that particular classroom (Blythman, MacLeod & Ciesla, 1987).

Having the opportunity to observe the teachers in their classrooms, I was able to gather live data from a live situation (Cohen, Manion & Morrison, 2000). Morrison (1993) argues that through observation the researcher is able to gather data on the physical setting (the physical milieu wherein the participant works); human setting (the organisation of the learners, the characteristic make up of groups and the learners); interactional setting (the formal, informal, planned and unplanned setting); and programme setting (the resources that the teacher and learners use and the

pedagogic style of the teacher). A participant observer may use several tools such as field notes and video.

In this study, when I observed the teacher, I attempted to be as unobtrusive as possible. I entered the class and made my way to the back of the classroom, where I set up a video recorder. The video recorder had the capacity to pick up the voices in the classroom within a reasonable range. At most times I focused the video on the teacher. When learners were engaged in group-work activities I zoomed in on the interaction in the groups.

Soon after the video was set up I made brief notes of the physical and human setting within the class. I noted the number of students present in the classroom, whether there was a table and chair for every learner, what teacher resources are visible, whether there was room for the teacher to rotate from group to group, number of learners in each group, general appearance of the classroom and whether there were any physical constraints. During the lesson, I used the video to particularly focus on the interactional setting and record the interactions that took place within the groups. I circulated amongst the groups and observed them manipulating the resources, working on their tasks, and talking to each other. Throughout the lesson, I jotted down some questions regarding the teacher's choice and availability of resources and her choice of teaching style. I used these questions as prompts when interviewing the teacher after each of the lessons I observed.

During my observations and video taping, I did my best not to interrupt the flow of the lesson. However, I acknowledge that, at times, my presence and my use of the video equipment, caused the students and the teacher to become distracted. But I was also surprised at how quickly the students settled down to attend to the teacher and to the content of the lesson.

Semi structured interviews

The interview is one of the methods of data collection in qualitative interpretive research (Guba & Lincoln, 1989). Hitchcock and Hughes (1995) claim that the semi-structured interview:

> allows depth to be achieved by providing the opportunity on the part of the interviewer to probe and expand the interviewee's responses. ... Some kind of balance between the interviewer and the interviewee can develop which can provide room for negotiation, discussion, and expansion of the interviewee's responses. (p.83)

The advantage of the semi-structured interview is that the interviewer is in control of the process of obtaining information from the interviewee, but is free to follow new leads as they arise. The interviewer must be alert to possibilities and ask questions which leads the interview point in some direction but do not limit the nature of the answer. It should not become a case of the interviewer trying to prove his or her point by selecting limited evidence from the interviewee's reality. The interviewer has to ensure that he or she is not inattentive or has already made a pre judgment of the respondent. This could lead the respondent to believe that the interviewer is either not interested in what is being said or does not care for the respondent's point of view.

In this study, I tried to ensure that I listened carefully to what the teacher said and thereafter asked the appropriate question. At most times I restated the responses of the teacher to ensure that I correctly understood the response. Cohen, Manion and Morrison (2000) refer to this process as active listening and suggest that follow up questions should be developmental rather than indicate radical shifts in direction.

All the interviews with each of the participants were recorded and transcribed. The purpose of recording the interviews was that subtle cues such as enthusiasm, attitude and confidence could be picked up from the tone of the participant's voice when they answered the questions. Through the semi-structured interviews, I was able to gather information relevant to the teachers' interpretation of C2005, their involvement in the development of the policy documents and other relevant issues related to C2005.

I tried to place myself in the shoes of each teacher and I attempted to interpret the situation from the viewpoint of the teacher. I had an idea of the type of questions that were to be asked, but more questions emerged from the responses from the participants. A common set of questions based on curriculum reform, socio cultural factors in rural schools and my observations of classroom practices provided the framework for the interview schedule. Because the nature of the events are diverse, I needed the freedom to move beyond the basic set of questions in order to probe for an explanation of a better understanding of a particular situation.

Phases of the study

In this study, I employed the methodologies and methods described above in several phases of data collection and analysis. By spreading the collection of data process into two definite periods, I had the opportunity to reflect on the initial set of data collected and identify additional issues for clarification.

Phase 1: Selection of participants

I based my selection of participants on a survey of all the 127 teachers involved in the professional development project that I was managing. In August 2001, I gathered biographical details such as age, gender, years of teaching experience, qualifications of teachers, classification of their schools (rural, urban, township), and their willingness to participate in the research. A purposeful sample (Punch, 1998) of four participants was chosen for the study. Since the ratio of female teachers to male teachers in the project was approximately 4:1, I chose three females and one male teacher. Most of the teachers involved in the study teach in the rural schools. In order to get a balanced perspective, I thought it best to include a township school in the study. However, during the course of the study, the teacher that taught in the township took a cross-transfer to a rural school.

I made contact with the potential participants and they agreed to be involved in the study. I confirmed with them the main purpose of the research and that the data collection would involve interviews and classroom observations. I also assured them of the confidentiality of the material collected and that pseudonyms would be used

for teacher and students' names. Participants were informed that complete confidence is sometimes difficult to achieve in field study research (Brickhouse, 1992). Permission was also was also obtained from the four principals.

Phase 2: First school visit

I used maps provided by the participants and planned my itinerary for the school visits. The nearest school from my home is 480 kilometres and the furthest school is 555 kilometres. As the schools are situated around Umtata, I determined that I should use this city as my base. The journey from my home to Umtata takes approximately 5 hours, so I needed one day for travelling. For my first visit, I planned to visit each teacher for one day. The number of days needed to visit all the participant teachers and return was 6 days. I planned my itinerary and ensured that I had my video recorder with videocassettes, audio recorder and audiocassettes, paper to write field notes and an interview schedule.

The issues that I planned to raise during the interview included biographical detail about the teacher, conditions of the school, social problems experienced, curriculum implementation issues and the level of support from the District. Further questions were asked to probe for clarification. Examples of these questions are:

➢ Briefly outline your career as a teacher up to this point in time. Where did you study, how long did you study at college, and how many years of teaching experience do you have?

➢ How did the Department of Education introduce you to C2005? Were you consulted in the development of the national curriculum statements?

➢ Has your school received the policy documents; how often do you consult these documents?

➢ Describe the conditions at your school. Do you have running water, electricity and teaching and learning resources?

Some of the probing questions included:

> How do you use the policy documents?

> Do you think that other teachers at your school understand the principles of C2005?

> You have highlighted some of the problems that your learners experience. What have you or the school been able to do to solve the problem?

I planned to arrive at each school at 9am, and spend three hours at the school. I ensured that I saw the principal and confirmed his or her support for the study.

In the classroom, I videotaped the teacher presenting a lesson. Thereafter, I interviewed the teacher. These interviews were taped with the permission of the participants. I made field notes of the teacher's environment. In my field notes I jotted down interesting and notable events about the teaching and learning situation. At the end of the day, I looked at the video and compared my field notes to the video lessons. This allowed the development of my own understanding to be documented. The semi-structured interviews were transcribed. Prior to my second visit to the participant teacher, I jotted down questions that I needed to ask the study teacher for further clarification.

Phase 3: Second school visit

The next set of data collection took place between March 2002 and June 2002.

Given the large distances involved in traveling to the schools and because teachers were often engaged in duties other than face-to-face teaching, it was not always easy to observe them in the classroom. For my second visit, I prearranged to observe the four teachers in a particular week. I did not always announce the exact time of my visit because I wanted to see them teaching in a natural setting and not in a contrived, artificial setting where they would "window dress" for my visit. Only two of the teachers were teaching when I arrived at their schools. The other two teachers were

not at school and I needed to make alternative arrangements. In one instance, I returned home and had to travel the long distance the following week after telephoning the teacher to arrange the exact time of the visit. As I had done in my previous visit, I videotaped each teachers' lesson, interviewed them and took some field notes. My observation and interviews were guided by the previous visits and my on-going analysis of data.

Phase 4: Narrative analysis

This phase is what Polkinghorne (1995) calls narrative analysis. Narrative analysis according to Polkinghorne (1995) involves the construction of narratives or stories from the raw data. The configuration of the story often begins with the final outcome and events and actions that produced the story are reconstructed to show "how and why this outcome has occurred" (p. 18). According to Guba and Lincoln (1989) the analysis is "characterised by a thick description that not only clarifies the all important context but that makes it possible for the reader vicariously to experience it" (p. 181).

I used the video as my primary source of data. I played and replayed the video to interpret the actions of the teacher and write the first drafts of stories. I used my field-notes and my recollections to confirm the events depicted in the stories. Two of my colleagues also read my vignettes and shared their ideas with me. Most of their ideas were focused on the practical and technical aspects of teaching and I incorporated some of their ideas in the stories. The stories are focussed on the teaching and learning of mathematics in each of the four classrooms observed. The final version of the narratives or stories is presented in chapters 4-7. There are two stories for each teacher; depicting events coinciding with my two school visits.

Phase 5: Analysis of narrative

I used Polkinghorne's (1995) analysis of narrative to interpret and analyse the stories in terms of the theoretical framework I developed in chapter 2. The narratives were subjected to the process of constant comparative analysis whereby the stories were visited and revisited to find the data pattern for each of the three perspectives in the

framework. From this process, a theory or proposition was established to provide reasons why teachers perceived and reacted to changes made while implementing the C2005 document. The narratives were also revised slightly to reflect the emphasis in the framework. The narrative analysis and the analysis of narrative are to be found in each of the chapters 4 to 7. In the final chapter, I revisit the theoretical framework adding a further layer to the narrative inquiry in terms of curriculum "levels".

Ethical considerations

I attended to the ethical considerations in the following manner. To cover the instrumental ethics of the study, I explained in an open meeting to all the teachers that I was undertaking this study. The goal of this initial meeting was to obtain "informed consent" (Brickhouse, 1992). I informed the potential participants of the nature of the study, the proposed features of the research design, the issues that are to be probed, the time frames and time commitments of each participant. Participants were informed that I would be coming to observe and video their lessons and audio tape the interviews. Participants were also informed that the procedures would remain flexible allowing them to have a better understanding and feel for the research as it developed (Brickhouse, 1992). I restated my intentions in more detail to the four participant teachers. I requested that the teachers provide me with a map of the location of their respective schools so that I would be able to find their schools relatively easily.

Throughout the study I also tried to attend to what Noddings (1988) called relational ethics. Relational ethics involves more than rational propositions pertaining to justification and fairness; and consequences such as caring must be considered. These caring relationships in research include such qualities as similarity, symmetry and trust (Wallace & Louden, 2000).

There were similarities between my thinking and that of the participants in terms of how this research might possibly lead to improvements into mathematics education in South Africa. The relationship was also based on mutual respect. I made my intentions clear to the participants. I tried not to have any hidden agendas and treat the teachers as colleagues and friends.

Quality criteria

Critics of the anti-positivist stance feel that in abandoning the scientific procedures, the means of verification and making useful generalisations about behaviour are in danger of being ignored (Cohen & Manion, 1980). The feeling is that verbal accounts to give meaning of events, rules and intentions are not accurate and that subjective reports are incomplete and misleading. Interpretive research involves the negotiation of meaning with the participants within the social paradigm where the interaction occurs. Thus, science and mathematics education researchers are concerned with the relevant stakeholders, their relations with themselves and the milieu in which they find themselves. Therefore education research is based on the study of experiences (Schaller & Tobin, 1998).

Denzin and Lincoln (1998); Guba and Lincoln (1989) argue that post-positivist research paradigms requiring validity and reliability are not relevant for an interpretative study and replaced the terms internal validity and external validity with trustworthiness and authenticity. The trustworthiness criteria I consider are credibility, transferability, dependability and confirmability of the methodology (Denzin & Lincoln, 1994; Guba & Lincoln, 1989), and the authenticity criteria I consider are fairness and educative authenticity.

Trustworthiness criteria

Credibility

Guba and Lincoln (1989) define credibility as a "match between constructed realities represented by the evaluator and attributed to the various stakeholders" (p. 237). They developed five methodological procedures to establish credibility. The methodological procedures are: prolonged engagement, persistent observation, peer debriefing, negative case analysis and member checks (Guba & Lincoln, 1989; Merriam, 1990).

When the researcher is on site for a period of time and immersed in the environment long enough to make sense of the context, this is referred to as prolonged engagement. In this study prolonged engagement was achieved by spending time with the four teachers during the professional development project and within schools and classrooms, but also my lengthy engagement with the data. Because I was directly involved in the teacher development program, I was able to build a trust with the teachers and explore other issues relating to their perceptions of teaching and learning. Persistent observation was conducted through on-site observations using multiple and complementary methods.

Peer debriefing takes place when the researcher describes the research to a peer who asks the "why" and "so what" questions and also suggests alternative frameworks. In this study two of my colleagues from UPE assisted in viewing the videos and asked the "why" and "so what" questions. Through discussion with my supervisor, I achieved insight into the case studies and he provided guidance and helped me clarify my thoughts and directions.

Negative case analysis takes place when all inappropriate data is reviewed and understood so that reasons can be given for its inappropriateness. I reflected on the data, used my hindsight and refined the data to clarify that the propositions I arrived at were appropriate.

Member checks take place when the researcher refers the texts back to the participants, so that they can reflect on the text and authenticate them. At the conclusion of each lesson I observed, I discussed incidents that occurred during the lesson with the teachers. The teachers were also interviewed at this time and issues relating to C2005 were raised. The semi structured interviews were audio taped and presented to the teachers for acknowledgement and approval of content. Items that the teachers did not wish to become part of the data were omitted.

Transferability

Transferability is seen as the ability to generalize about the study. The main thrust of transferability is that it is the reader's task to refute the discussion and analysis of the

study if they are not satisfied with the descriptions provided by the researcher. Guba and Lincoln (1989) argue that case study research has to be presented having "thick descriptions" of the phenomena. In this way the reader will have a complete set of data to facilitate transferability judgements if the study is to be applied in their own situation. In this study, narrative vignettes have been used to provide the "thick descriptions". The vignettes have been constructed from the original transcripts and the two lessons observed.

Dependability

What is needed in qualitative research is dependability or consistency of the results obtained (Guba & Lincoln, 1989). What is expected is that a reader of the study will concur that within the context of the study and data collected the results makes sense (i.e. they are dependable and consistent). In this study dependability was achieved by providing an audit trail documenting the logic of process and method decisions. The process has been carefully considered and documented to enable others to replicate the structure of the study.

Confirmability

Guba and Lincoln (1989) proposed the concept of confirmability in a constructivist-oriented study. The reader has to conduct the confirmability audit that would confirm that the findings of the research were not simply part of my imagination. Confirmability then, is conducted to ensure that the data, interpretations, and outcomes of the inquiry are rooted in some context apart from that of the researcher (Guba & Lincoln, 1989). The evidence for this is to be found in the rich descriptions provided in the data chapters.

Authenticity Criteria

Guba & Lincoln (1989) suggest that the authenticity criteria are the hallmarks of a trustworthy and rigorous qualitative enquiry. These include fairness and educative authenticity.

Fairness

Fairness refers to the extent of a participant's understanding of the situation. Exclusion of the participant's comments is a form of bias (Lincoln & Guba, 2000). Fairness is a deliberate attempt to prevent the participants from being marginalized and to ensure that all voices of the inquiry had a chance to be represented in the text. In this way, the participant's stories are treated fairly and with balance. In this study, the participant teachers understood that the purpose of the research was not to criticise them, and the events were to be presented as they were perceived.

Educative authenticity

Educative authenticity is difficult to ascertain in advance and is determined by the extent to which the work is useful to others. Guba and Lincoln (1989) suggest a major technique of educative authenticity is to "achieve the testimony of selected participants who will attest to the fact that they have comprehended and understood the construction of others from themselves" (p. 249). I have tried to enhance the usefulness of this study by making the writing as accessible as possible and providing implications for policy makers and teacher educators.

Summary

In this chapter I have first outlined the aim and broad research question. Second, I discussed the rationale for the qualitative approach, case study research and narrative inquiry. In section three, I discussed my data gathering techniques employed focussing particularly on participant observation and semi-structured interviews. In section four I outlined the phases of the study. In section five I looked at the ethical considerations and in section six I discussed the quality criteria by which the research should be judged.

CHAPTER 4

MRS NKOSI

Introduction

In the next five chapters, chapters 4 through chapter 7, I present each of the four teacher participants in case study format. Each case study is based on classroom observations and teacher interviews. I present narrative accounts of two lessons observed six months apart. Between each lesson the teachers attended weekly professional development meetings on the new C2005 mathematics curriculum. In each of the next four chapters, I present a teacher profile, a description of the setting of the school, a narrative of the two lessons, and an analysis of the lessons in terms of the political, socio cultural and practical perspectives. I used pseudonyms for all case study participants.

Teacher profile

Mrs Nkosi is married with three children. She has a teacher's diploma and 19 years teaching experience. She described her motivation to teach as her love for children. She taught mathematics and science at her school. She commenced her career teaching mathematics and science to grades 7, 8 and 9 classes. Currently she is teaching these subjects to grades 4, 5 and 6 in a co-educational rural school situated about 15 kilometres from the nearest village. The school has electricity and chalkboards but no computers, typewriters or telephones. There are approximately 600 learners in the school. She has 58 learners in her grade 4 class, 61 learners in her grade 5 class, and 47 learners in her grade 6 class.

First visit

I took a long time negotiating about 1 kilometre of gravel road (that could barely be called a road) to reach Mrs Nkosi's school. I passed a number of cattle grazing on the side of the road. There were several rondavel (hut) homes along the way, but I wondered where the people were on this bright sunny day. For most homes the door was open and there was washing hanging on a makeshift fence around the squarish looking piece of land. I travelled very slowly because of the unevenness of the road and fear of damaging my vehicle. The last fifty metres were the worst as the road sank and I wondered whether I would have been able to drive the car to the entrance of the school had it rained. I was relieved when I saw the school to my right. There is a fence around the school and the gate was closed. I stopped in front of the gate and observed that there were two parallel buildings each with five classrooms, and a small block, measuring approximately 6 metres by 3 metres, which had to be the principal's office. Little greenery adorned the school and the dry sand stuck to my shoes and clothing. There was only one small van parked in front of the office. Teachers would either be staying in the nearby village or travelling by taxi to school. A learner of about 9 years of age, wearing a school uniform, came to open the gate, and escorted me into the school.

As I drove my car into the yard, the principal came out to greet me. He was a very pleasant man who said that Mrs Nkosi had informed him that I was coming to visit her classroom during this week. He assured me that the school was happy to be involved in the study and said that I was most welcome to visit Mrs Nkosi's classroom at any time. My learner escort was instructed by the principal in English to tell Mrs Nkosi to come to the office. The principal and I chatted briefly about the purpose of my thesis. He told me that the teacher had been working with her colleagues to explain "these OBE things" to them. I assumed from his tone that he distanced himself from the curriculum reform. However, he seemed positive and expressed the need for teachers to upgrade themselves, especially in subjects like mathematics and science, which had been identified as priority areas in South Africa. Mrs Nkosi arrived and said that she was very pleased to see me. I gathered that she had prepared a lesson and was very keen to show me her teaching capabilities. She

left me with the principal and said that she would be in the classroom at the end of the building and that I should give her a couple of minutes.

I entered Mrs Nkosi's classroom and observed that the classroom was big enough to comfortably accommodate all the learners in the class. Some of the windows were broken. There were no ceiling boards and there was a hole in the roof at the front of the class. The teacher's table was placed in front of the fixed chalkboard and there were sufficient tables for the learners. On the table there were some oranges in a bag, a large box and some books. Some old desks were at the back of the classroom. No pictures or evidence of learners' work was visible on the walls in the classroom. There was a wooden partition dividing Mrs Nkosi's class from the neighbouring class. This was quite annoying as I could clearly hear the teacher and the learners in the class next door. In Mrs Nkosi's class there were 39 learners seated around small tables in groups of four, five or six.

Lesson 1: Fractions

Mrs Nkosi's teaching reminded me of my teaching days after I had returned from my short experience in the UK. She displayed a mixture of both traditional and learner centred approaches. As I entered the classroom, the children stood up and in chorus said, "Good morning, teacher". I responded to their greeting and asked them how they were. They chorused, "We are very well thank you". The teacher instructed the learners to sit down and I took up a seat at the back of the classroom.

I recollect that I was socialized in my schooling days in the same way. I also expected my own learners to formally greet any visitor to the classroom. Furthermore, I insisted that my learners sat very quietly until the visitor had left. The ethos at the school I taught at was such that learners should be quiet and only speak when told to do so by the teacher. I was in charge of my class and the pupils followed my instructions.

Before I arrived at the classroom, the teacher had prepared for the lesson and I noticed that the date, and the words "Grade 4" and "Fractions" were written on the board. I noticed that the teacher had not written the outcomes of the lesson on the

board, as suggested by the OBE approach. Mrs Nkosi did not explain to the learners what she intended doing nor did she inform the learners what they were expected to demonstrate at the end of the lesson.

I watched Mrs Nkosi freehandedly draw a circle on the board, carefully dividing the circle into two parts. I assumed that Mrs Nkosi did not have a teacher's compass as such resources would be rare in rural schools. Pointing to one part of the circle, she asked the learners what part this was. The learners chorused the answer, "half". Her facial expression told me that she was unhappy because she wanted only one learner to answer.

She asked, "Can somebody spell half?" and directed her attention to one learner. As the learner spelt the word half, she wrote the letters on the board with the other learners chorusing each letter. She congratulated the learner by saying, "very good". Mrs Nkosi's friendly and warm smile seemed to put the learners at ease.

She freehandedly drew a second circle on the board. Although the drawing represented a circle, it was not very circular. This time she divided the circle into four parts. She asked the learners, "How many parts are there?"

She pointed to one part of the circle and the learners chorused as they counted, "one, two, three, four".

She shaded one part of the circle and asked the learners what fraction was shaded. The learners who knew the answer were eager to answer. This was evident as they raised and shook their hands. I wondered whether she was going to present the whole lesson in this way, using a question and answer technique. She asked one of the learners to answer. She wrote ¼ on the board and asked the learners "what is one over four?"

Without waiting too long she prompted the learners and together they chorused, "one quarter".

She asked the learners if they could spell a quarter for her. The learners started chorusing, but she stopped them. She then asked one learner to spell the word as she wrote it on the board.

She proceeded to divide the learners into groups of six and one group of three. She asked for a group leader to come and help her. It was evident that the learners were confused, as none of them knew who the group leader was. She then spoke in mother tongue to clarify her instruction and circulated from group to group nominating a group leader. Each group leader peeled an orange while the other learners watched.

I assumed that the freehanded drawings were her introduction to the lesson. If it was that, then it was brief and to the point and supported with the use of the freehanded drawings that she had drawn on the board.

I watched in horror as the group leaders peeled the oranges. Mrs Nkosi had not provided any papers or plates to work on and the desks became wet and slimy with some of the mess spilling onto the learners' writing books. Mrs Nkosi saw the learners spilling the juices from the oranges, but did not say anything. It seemed that she did not have had a cloth available in the classroom. There was silence in the class while the oranges were being peeled. I could hear the teacher in the adjacent class, teaching. Once the group leaders had peeled the oranges she requested the learners to divide them into six parts. Mrs Nkosi circulated from group to group checking on what the learners were doing. She asked one group to count the number of pieces. They counted, "one, two, three, four, five, six".

I know that many teachers, when they introduced fractions, used either an orange, a slice of bread or some string. The advantage of string is that the learners can place the pieces next to each other and compare the lengths. However, an orange is a good choice if it is cut with a knife and can make the lesson interesting for learners. Mrs Nkosi's choice of an orange indicated to me that she had given the presentation of the lesson some thought.

When she observed that the groups had completed the task of sharing the oranges she asked them, "Are you finished, are they equal?"

The class responded by saying, "yes".

I noticed that although the pieces looked similar, none of the pieces were actually equal. The teacher, however, felt satisfied that the learners knew how to divide the orange into six pieces. The fact that the pieces were unequal did not seem to be important to her. I was tempted to intervene at this point to indicate to Mrs Nkosi that the pieces must be equal. I noted that she had made the same mistake when she freehandedly divided the circle into unequal parts.

Mrs Nkosi went to the board, freehandedly drew another circle and cut the circle into six parts. She asked the learners to take their piece of the orange and she asked them, "What fraction is your piece of orange?"

One of the learners answered, "one eighth".

She asked the whole class whether it was one over eight.

They responded, "no".

Another pupil responded by saying the answer is one sixth. She wrote one sixth on the board and the whole class chorused, "one over six".

Satisfied that the orange had served its purpose in helping the learners to understand the concept, she asked the learners to "swallow the orange".

By this point the orange looked rather messy and dirty but they were swallowed in a flash. Mrs Nkosi then gave specific instruction to the class that someone other than the group leader should come to the table. She handed each person a number of bottle tops, following a similar lesson approach to her use of the oranges. This time she used groups of five pupils and three pupils. The learners were asked to identify a fifth and a third and she wrote down "one fifth" and "one third" on the board.

By using concrete examples of the oranges and bottle tops Mrs Nkosi attempted to move the learners through the process of learning by starting from the concrete, moving them through the semi-concrete to the abstract. Her concrete resources, the oranges and the bottle-tops, were intended to stimulate the thinking of the learners.

There were flashes of her applying OBE classroom practices in having the learners work in groups, acting as a facilitator and affirming their answers. However, the teacher still made extensive use of question and answering as a teaching approach.

Towards the end of the lesson, I watched Mrs Nkosi distribute a worksheet to each group. The worksheet resembled a fraction wall and each rectangular whole was divided up in fraction parts. She asked the groups to shade in one fifth using their pencils. One learner in the group proceeded with the shading while the others watched. Thereafter, she asked another learner to shade in two thirds. I observed that some of the learners were not concerned with what the scribe was doing and they were happily looking around or talking to each other. The worksheet that Mrs Nkosi distributed to the learners was not photocopied. The teacher made eight of these fractions walls from some paper. I thought that these must have taken a long time to prepare.

To finish the lesson, Mrs Nkosi wrote on the board a number of fraction sums for the learners to complete in their books. She copied these sums from her preparation book. She gave the learners three shaded drawings. Her instruction was that they should "write the following shaded parts in numbers and in words". I watched the learners quietly and diligently doing their sums. Many covered their work and were determined that no one could copy their answers.

The lesson was intended as an introduction to fractions. The learners were asked to identify fractional parts. The teacher brought into her class a number of teaching aids to assist the learners to identify the number of parts that comprised the whole. She presented the lesson initially through question and answer method with the learners responding in chorus. She also arranged the learners in groups encouraging them to interact with each other. Mrs Nkosi acknowledged that the learners had difficulty in understanding English and using it in class. Mrs Nkosi often switched to mother tongue and repeated the questions many times to help the learners to understand. After the lesson Mrs Nkosi told me that she was aware that the fractions she drew

were not equal blaming the lack of teaching resources for her need to use freehand drawings.

Second visit

Six months later, I again observed Mrs Nkosi's teaching. This was my third attempt to see the teacher. I had tried to see Mrs Nkosi two weeks prior. On that occasion, on my arrival at the school, I was informed that Mrs Nkosi was not present because she had accompanied the choir group to the nearby village for choir competitions. My second attempt to see the teacher also met with little success. I arrived at the school only to find the gates locked. The teachers and learners were attending a sporting event at another school in the area. Finally, I telephoned her on her mobile phone to confirm that I would be coming to observe her lesson and interview her.

On this occasion, Mrs Nkosi was teaching in a different room. The back wall of the classroom was stacked with old desks and tables. The classroom resembled a ministoreroom. The only wall adornments were two A4 sized pieces of paper with bar graphs. The classroom had sufficient tables and chairs for the learners. There was a dirty and worn out blackboard fixed to the front wall. The windows that could open were opened to the fullest. The classroom, in my view, was dark and not the most conducive for a teaching and learning environment. There were 48 learners in this grade 4 class arranged in groups of six, seven or eight. On the front learner's table there was a cardboard tray filled with bottle tops.

Lesson 2: Multiplication

I noticed that Mrs Nkosi arranged the learners in groups. Mrs Nkosi started with the lesson immediately. "I want the group leader to come and take twelve bottle tops", she instructed in her firm, yet friendly voice. The group leaders approached the front learner's table, where the teacher had positioned herself with the tray in her hands, and took twelve bottle tops. She asked the learners in their groups to check whether they had twelve bottle tops.

I noticed that Mrs Nkosi did not waste any time with a lengthy introduction. She immediately handed out the resources and gave the learners instructions on what to do. I wondered whether she had any other resources. I recalled that she used bottle tops in the previous lesson that I observed. Nevertheless, the fact that she was using a resource that was easily available pleased me.

Her next instruction was to the whole class: "I want you to show me two groups of six".

I could see that learners understood what she meant and they went about their task. However, she seemed unhappy with her instruction and she repeated the instruction in Xhosa, the learners' mother tongue. I heard her repeat "two groups of six" four times to make absolutely sure that the learners understood the instruction. She circulated from group to group and checked on their progress. If she saw that a group needed help, she stopped and assisted the learners. One of the groups was using the bottle tops to make six groups of two. She repeated "two groups of six" to the groups. When they provided the correct solution she praised them by saying "good". She stopped at another group that also made six groups of two and guided the learners to the correct solution. She asked the learners to count the number of bottle tops in the two groups.

When she was satisfied that each group had completed the task she asked the class to make one group of twelve. Two groups had difficulty in understanding what was to be done. One group placed twelve single bottle tops, whilst the other group laid out one group of eleven and one group of one. I could see that the teacher was very patient and diligent. She went to the groups that were experiencing problems in order to help them achieve success. Seeing that all the groups had completed the task, she asked the whole class, "one group of twelve equals?" There was a lot of shaking of arms, hands and fingers as many of the learners showed their eagerness to answer. She chose a pupil who answered correctly. Mrs Nkosi was not in any rush. I was happy that Mrs Nkosi did not rush with the lesson and thought that she worked at a pace suitable for the learners in her class.

Her next instruction was, "what is three groups of four equal to?" She gave the instruction and rotated from group to group. She did not wait for an answer this time, but once she was satisfied that the groups were making adequate progress, she moved on to the next question, "what is two groups of six?" Once the groups reached a solution they raised their hands. Mrs Nkosi approached each group in turn and checked the solutions.

I liked the way Mrs Nkosi consolidated the learners' understanding of the concept under discussion throughout the lesson. She made sure that the learners understood before she moved on to the next concept. Her instructions were clear, concise, and simple taking into consideration that these were second language learners.

Her next step was to hand out some blank, approximate A3 size papers, to each group. She also asked the group leader to collect more bottle tops. She repeated her instruction in mother tongue. She went to the board and wrote on the board:

a)   3 X 6
b)   4 X 5
c)   5 X 3
d)   6 X 6

Her instruction to the learners was:

> right you first do this one on the paper I've given, you do it with the bottle tops and then you choose somebody to write what you found on the paper.

The classroom was abuzz. The learners were talking to each other and some were coming to the tray to collect more bottle tops. Some of the learners were standing up in their groups and seemed to be engrossed in the activity. I thought that Mrs Nkosi appeared to be very comfortable teaching in this grade.

Mrs Nkosi repeated the instructions, "three groups of six", a number of times as she walked around the class peeping over the shoulders of the learners in the groups to see what they were doing. She stopped at a group that had laid out the bottle tops as

six groups of three. She asked the learners to count the number of groups of bottle tops on the table.

They counted, "1, 2, 3, 4, 5, 6".

She repeated the instruction, "three groups of six" and guided the learners to the correct solution. Only when she was satisfied that they had understood this concept did she ask them to count all the bottle tops in the three groups.

The learners counted, "1, 2, 3, 4, ...18".

She was very pleased that they arrived at the answer and said, "very good, very good, very good", as she walked away from the group.

I watched her facilitate the lesson. She moved around from group to group. In some groups she conversed in mother tongue and observed what the learners were doing before saying, "good", and walking on to the next group. She continually praised the learners when they completed the assigned tasks.

She stopped to help one group of learners that had only made five groups instead of six. She repeated the instruction and helped them to success. Once she had been to each group she asked the whole class, "What is three groups of six?"

Her next instruction to the whole class was, "draw on your paper three groups of six". She repeated her instruction in mother tongue.

Throughout the lesson I noticed that Mrs Nkosi spoke very few words. She repeated her instructions a number of times. She asked a limited number of questions and her instructions to the learners were precise. In order for the learners to understand the instruction she repeated the instructions in Xhosa.

She pointed to the next sum on the board and asked the learners to draw five groups of four on their papers. All the learners seemed busily engaged in the activity. Learners were consulting with each other and moving the bottle tops around. She

went around from group to group, encouraging the learners. She instructed them to, "lift up your hands if you are finished".

One group progressed quickly to the next sum. They did not seem to need any prompting from the teacher to continue with all the sums that she had written on the board. Another group experienced some problems. The teacher advised this group to, "first do it with the bottle tops before doing the drawings".

A third group had completed its work and called for the teacher. She called out, "I'm coming, I'm coming", as she made her way to the group. I was impressed by her enthusiasm and eagerness to respond to the learners when they called for her. The learners seemed to know that if they called on her, she would offer them the support that they required.

Once Mrs Nkosi saw that all the groups were nearly finished she went to the board and wrote the date, instruction and three sums. The instructions and sums were:

Fill in the boxes

1       $2 \times 9 = \square$

2       $3 \times 7 = \square$

3       $6 \times 4 = \square$

The pupils took out their books and worked independently without communicating with one another. Some of the learners used the bottle tops to help them with the task. The solutions this time were not as simple as they were working with relatively bigger numbers. The teacher moved around from group to group with little or no interaction with the learners.

A few minutes passed. The teacher stopped by a learner who had made nine groups of two instead of two groups of nine. She assisted the learner by repeating, "two groups of nine". The learner managed to come up with the solution and the teacher moved on.

Once the first learner completed the task, she stood in front of the class marking the learner's books. From the speed that she was marking, it appeared as if most of the learners succeeded in obtaining the correct solution. She came to the end of her lesson.

★ ★ ★ ★

Although, I did not see any outcomes written on the board, I thought that Mrs Nkosi had prepared her lesson. She seemed to be clear in her mind about what she wanted the learners to do. The immediate outcomes were clear. The broad outcomes were not clearly defined, however the process revealed that she achieved what she wanted to achieve.

Mrs Nkosi had provided the learners with the resources that they required to perform the task that she wanted them to do. She gave the learners the questions and asked them to work in groups to manipulate the bottle tops and come up with the solution. Mrs Nkosi acknowledged that she no longer asked the learners to memorize the multiplication tables, as she had previously taught. Her current practice was to encourage learners to use the resources she provided to come up with the answers. The learners in the class seemed to be engaged in the tasks that she set for them.

★ ★ ★ ★

The two lessons illustrate Mrs Nkosi's classroom practices in teaching a fractions and a multiplication lesson respectively. There are indications that Mrs Nkosi has taken on some aspects of the "new" teaching approach as advocated in C2005. The analysis of the two narrative cases I present is based on the three different perspectives that I had introduced in chapter 2, namely the political, socio cultural and practical. In addition to the cases, I draw on my classroom observations and interviews with the teacher.

Political perspective

The political perspective allows me to examine the power relationships involved in the implementation process and the classroom practices. I will look at two aspects – focusing on the teacher's relationships outside the classroom and relationships inside the classroom particularly focusing on issues of ownership, personal meaning, involvement and negotiation. Firstly, I am interested in how power was exercised over (or with) the teacher as the teacher came to understand the ideas inherent in the reform. This normally occurs outside the classroom and is likely to be associated with professional development. Secondly, I am interested in the exercise of power within the classroom. This aspect involves the teacher's relationship with the students as the curriculum is being implemented. In each case I focus on the four areas of ownership, personal meaning, involvement and negotiation.

Outside the classroom

In terms of ownership, Mrs Nkosi said in the interview that she was not interested in the C2005 reform when it was first introduced. She elaborated that she wanted to have nothing to do with the C2005 and had contemplated resigning from the profession. She said, "I wanted to leave the profession in the beginning when this OBE was introduced". The reasons she provided was that she was confused and felt useless, as she did not know what to do in her classroom. When I interviewed Mrs Nkosi during my first visit, she blamed the National Department of Education for the lack-lustre way that they had introduced the curriculum reform to the teachers and she felt that the amount of training that she received was inadequate and the content confusing. She said that when she was first introduced to C2005:

> the workshops were conducted and there was a lot of things that we were told about OBE within a very short time so that we did not understand.

Also, she said that she did not understand all these "things" to assess the learners' work. However, on my second visit, Mrs Nkosi said that she felt more confident about the curriculum changes since she had been studying at the University of Port Elizabeth (UPE). She said, "since studying with UPE, I am motivated about OBE"

and that she "will never leave teaching now". Mrs Nkosi referred to the educational reform as OBE. From the two lessons I observed, my impression of Mrs Nkosi is that she was confident in the way she facilitated her lessons. She had her learners arranged in groups and provided them with resources. When I spoke with her during the second visit she said that she "never used resources before and the learners just had to memorize the tables". The enthusiastic manner in which Mrs Nkosi answered my questions indicated to me that she was more positive about OBE reform.

In terms of personal meaning, my impression of Mrs Nkosi is that she believed that the educational reform would expose the learners to educational opportunities that she had not received. She said in the interview that:

> OBE is good comparing the type of education we were exposed to. What I know is that the learners are going to be job creators and we are interested in the outcomes of what they are going to be in the end.

She said in the interview that the educational reform would prepare the learners to get better jobs in the future and give them skills to be job creators.

In terms of involvement, Mrs Nkosi said that she wanted to make a valuable contribution to the lives of the learners in her class. In the interview she said that she did not want to deprive her learners of getting "better education" and "this OBE is very good for the learners". Mrs Nkosi repeated a number of times during my second visit that her initial reaction to "OBE" was negative and that "OBE had so many big terms" and that now she "studied at UPE, she now understands". She said that she planned and presented her lessons in a different way. Mrs Nkosi said that she did not stand in front of the learners and teach using long lectures as much as she did before.

In terms of negotiation, Mrs Nkosi felt that the dissemination of the information of the new curriculum was poorly handled and she was not involved or consulted in the formulation of the National Curriculum statements. She said, "I really don't know" why she was not consulted. She thought that it was important that she should have

been consulted in the formulation of the statements. However, she said that with more exposure through INSET programmes and workshops presented by the Department of Education, she came to understand the benefits of the new curriculum.

It is clear that over the course of the study, Mrs Nkosi became more positive about the educational reform than when C2005 was first introduced. A number of factors contributed to the fact that she felt more confident about the educational reforms, including her involvement in the teacher development program and her own perceptions of the values of the intended educational reform.

Inside the classroom

In terms of learner ownership, the learners in Mrs Nkosi's classroom have been exposed to the curriculum changes solely as a result of the teaching style adopted by Mrs Nkosi. For example, in the fraction lesson, I observed that Mrs Nkosi displayed a teaching approach that had threads of both "old" and "new" practices. In terms of the "old", in the introduction of the fraction lesson she drew circles on the board and based her questions on the drawings. Pointing to the circles she asked a number of questions: "Can anybody spell half?" and "How many parts are there?" The learners chorused the answers, counting "one, two three, four". The chorusing of the answers and the low level of questions indicated to me that the teacher was still very much an "old" teacher. Mrs Nkosi took responsibility for all aspects of the learning. She drew the circles on the board and asked the questions; she distributed the oranges and asked the questions; she distributed the bottle-tops and asked questions. Aspects of the "new" classroom practices were also evident. In the fractions lesson she divided the learners into groups of six and asked them to discuss the number of pieces of the orange and determine the fraction of each segment of the orange. She attempted to engage the learners in some activity, for example, peeling the oranges, counting the number of segments and shading parts of the fraction wall on the worksheets.

In the multiplication lesson, Mrs Nkosi used some aspects of the "new" approach. This is evident from the way she managed her lesson. From the start of her lesson, the learners were arranged in groups. She gave instructions for the group leader to collect the bottle tops. For every task she gave her instructions to the groups; for

example, "I want you to show me two groups of six". This was her approach throughout the multiplication lesson and she facilitated the learners by visiting the groups. She allowed learners to work at their own pace and only when the learners completed the task did they call for her to confirm that their answers were correct. When she was satisfied that the group had the correct solution she praised them.

Comparing the two lessons, in terms of learner ownership, the multiplication lesson was more learner centred and the learners seemed more connected with the curriculum than during the first lesson. My impression here is that learner ownership is dependant on the extent of ownership that Mrs Nkosi has of the curriculum reform. In the fraction lesson, the teacher appeared to be more in control of the teaching and learning that took place in her classroom. She determined the tasks learners had to complete. In the multiplication lesson, Mrs Nkosi appeared much more relaxed and confident. She facilitated the lesson and the learners were able to call upon her to confirm their solutions. It seemed that the greater Mrs Nkosi's growth, development and confidence in terms of her personal ownership of the curriculum, the greater the learners' ownership of the curriculum.

In terms of the learners' personal meaning, both Mrs Nkosi's lessons were content based and not directly related to the learners' experiences. Nkosi choice of content in the first lesson was identifying fractional parts and in the second it was algorithmic where learners had to calculate the product of two numbers.

In terms of learner involvement, the learners in the multiplication lesson involved themselves in the curriculum and therefore appeared to have more power. Mrs Nkosi provided the opportunity for the learners to work in their groups and interact with their peers. The learners were able to call upon the teacher and she responded by saying, "I'm coming, I'm coming", to the request of the learners who wanted her to check their work. I observed that at no stage did any of the learners ask a question or seek further clarification. In the interview, the teacher said that learners generally do not ask questions and were not involved in the class discussions because "she wanted them to speak in English". Mrs Nkosi often used mother tongue to ensure that learners understood her questions. Mrs Nkosi seemed to be aware that the learners should be involved in the curriculum and it is for this reason that she coaxed them to

work in their groups. This practice was evident in both her lessons. In the fractions lesson she divided her 39 learners into six groups of six and one group of three. In the multiplication lesson, the learners were already in their groups when the lesson commenced.

The learners in Mrs Nkosi's class had little negotiation power. The teacher decided what had to be done in her classroom and the students did as she instructed. In both lessons, the teacher's instructions were firm and the pupils responded immediately. In neither of the lessons were the learners consulted on assessment issues. The teacher decided on the assessment she wanted to apply. In the fraction lesson she drew three shaded fraction parts on the board and the learners had to "write the shaded parts in numbers and in words". In the multiplication lesson, she assessed the learners based on their responses to the three sums she wrote on the board. Mrs Nkosi believed that she should test the learners at the end of the lesson by giving them a number of sums to complete. The reason she provided for not allowing learners to be involved in the assessment task is "the young ones, they do not do it properly". Mrs Nkosi faced a dilemma of wanting to have control of the teaching and learning that take place in her classroom and allowing the learners to determine the components of the teaching and learning. At this stage, Mrs Nkosi was not prepared to give power over to the learners.

In summary, over the course of the study Mrs Nkosi began to feel more confident with the changes and was beginning to understand the reason for the educational reform. Her classroom practices began to show that she was willing to accept the educational reform and make changes to her teaching and learning approaches. Initially, however, her introduction to the curriculum reform left her confused and reluctant to implement the curriculum changes. Some of her change in attitude came from her participation in the two-year teacher professional development program. It was my impression that the learners were becoming accustomed to the changes in her teaching approach and appeared to be comfortable working in their groups. However, Mrs Nkosi was still in charge of most aspects of teaching and learning in her classroom and possesses power over the learners.

Socio cultural perspective

In this analysis I specifically focus on the background of the learners, the school and the classroom. I will look at the problems experienced by the learners and the teacher and the ways in which the teacher accommodated the learners' socio cultural circumstances.

Mrs Nkosi said in the interview that many of the learners are from low socio-economic backgrounds and single parent homes. In some cases the learners are orphans and are being cared for by their grandparents. She said that many of the learners came to school hungry and that there was a feeding scheme to provide the learners with peanut butter sandwiches. Mrs Nkosi said that she would like to help the learners and is of the opinion that the school:

> can get some money so that we can plant vegetables at school and then we find some women to cook for the children at school.

She felt that this would alleviate some of the hunger problems. She also said "the school has very little money and cannot help the learners". Mrs Nkosi said that the school fee per learner is R20 per annum and that there were many parents that cannot afford to pay this amount.

Mrs Nkosi said that they were "running short" of classrooms and that there were too many learners in one classroom. She felt that the classrooms were "congested" and that she found it difficult to move "freely from group to group".

All the learners in Mrs Nkosi's class had their own writing books. She said that the learners were able to write in their books everyday and she gave them "exercises" to do. From my observation these exercises involved the application of the content that the learners were taught in the lesson. The teaching materials that Mrs Nkosi provided the learners in the fraction lesson were oranges and bottle tops and the bottle tops in the multiplication lesson. She said that she has no other learning materials at the schools and that "learners do not have mathematical instrument boxes". She said that she did not have many teaching resources and it was for that

reason that she drew her circle free handed, and having no photocopying facilities made the preparation of worksheets difficult.

One of the difficulties that Mrs Nkosi was experiencing is that learners did not attend school regularly. She said that on many days the learners did not attend school because they had to do a number of chores at home. For example, on cattle dipping days it is common for learners to stay away from school in order to accompany the animals to the dipping tank. Other reasons for learners not coming to school might be that the learner may not have a shirt, or the shirt was dirty and there was no soap to clean it. She also said that sometimes when it rains, learners do not attend school or they arrive late.

In summary, Mrs Nkosi is faced with a number of teaching and learning challenges. Poor home conditions, the lack of resources and learners' absenteeism are some of the challenges. In response to these challenges, she suggested that the school organises a feeding scheme run by the parents to encourage learners to come to school and have something to eat. Mrs Nkosi also collected second hand clothing to distribute to learners in need. Mrs Nkosi has to work around the lack of resources in her school. She sometimes requests the learners assist her in collecting the bottle-tops for her resources. She often purchases teaching aids from her own coffer as she did in her first lesson with the oranges. In both her lessons she made use of cheap, local resources. On frequent occasions, Mrs Nkosi has to repeat the lessons to accommodate the absent learners. She said that she could only repeat lessons for those learners who are absent for a day or two and is not able to help those who are regularly absent.

Practical perspective

Under the practical perspective I look at the technical aspects of the classroom implementation of the new curriculum. Specifically, I focus on the goals of C2005 – for example, whether the learners are provided opportunities to construct their own understandings; use higher-order thinking; integrate with other subjects; and develop responsibility for their own learning. I will also look at the assessment techniques used by the teacher and how the teacher paces the lesson and uses resources.

Mrs Nkosi acknowledged that she was not sure whether group work was an effective approach. However, she had been trying to implement or incorporate group work in her lessons. In the fractions lesson, for example, after the introduction to the lesson, the learners were arranged in groups. While the learners were seated in their groups the teacher asked them to count the number of segments in the orange. The learners counted in their groups "one, two, three, four, five, six". Mrs Nkosi then reverted to whole class questioning and the learners did not consult with their peers before giving the answers. In the multiplication lesson, six months later, the learners appeared to be more comfortable working in their groups. They stood around their tables to work closely with each other. Where learners experienced problems, Mrs Nkosi assisted them and referred them to other resources that she provided. For example, she gave the instruction "draw on your paper three groups of six", and then she repeated the instruction in mother tongue. Speaking about her conception of learner centred teaching she said:

> You will find that the children know a lot. When you talk of learner centred the learners are in their groups and they are supposed to talk, not the teacher. So more talking must come from the learners.

In the multiplication lesson Mrs Nkosi simply presented the lesson with a question and asked them to proceed on their own. My impression is that she had sequentially planned each step and guided the learning activities in her classroom. This was evident in the way she introduced the resources in the fraction lesson and in her choice of questions for the multiplication lesson. Because of the large numbers of students Mrs Nkosi said that she prepared each lesson and made sure that she had the resources to teach using groups in her class.

Under the "new" teaching approach it is advocated the teacher encouraged higher order thinking and not use routine questions. However, Mrs Nkosi routinely used the question and answer method in the fraction lesson and the students chorused the answers. In this lesson she asked simple, lower order thinking questions, for example, "How many parts are there?" and "Can somebody spell half?" The learners were not challenged by any problem-solving task in this lesson. In the multiplication lesson, Mrs Nkosi facilitated the lesson by issuing instructions about what the

learners should do. She repeated the instructions a number of times in both English and mother tongue, but did not rephrase or assist the learners by asking questions. Many of the questions she repeated in mother tongue and this is understandable as, according to Mrs Nkosi, the only English that the learners speak and hear is at school.

Another of the goals of C2005 is the integration of knowledge across learning areas. Mrs Nkosi said that it was difficult for her to integrate the eight learning areas as proposed in the C2005 document. She said that she did not know how to integrate the mathematics content into the other learning areas, although she sometimes used science concepts in her mathematics classes. The lessons I observed showed that there was no integration of the lessons across learning areas. Both the lessons were mathematics content-focused. In the interview she said that teachers in the district should "come together" to help each other plan the integration of lessons.

C2005 does not prescribe the content to be taught in the respective grades. My initial impression of the content that Mrs Nkosi chose for both the lessons was that it was too simple for grade four learners. In the fraction lesson, the teacher asked learners to identify "one quarter", and in the multiplication lesson they had to demonstrate "two groups of six". However, I was surprised when learners experienced difficulty in understanding the concepts and had to be assisted by the teacher. In the interview I asked Mrs Nkosi about her choice of content. She said that unlike the old syllabus, the new curriculum did not specify the content in detail. She said that in choosing the content she considered what the learners already knew and planned accordingly:

> When I have not achieved an outcome, I get frustrated and go back home and think of other ways to teach the learners. Other times I have to teach the same lesson to make sure that the learners understand.

Another goal of C2005 is that learners should develop responsibility for their own learning. In terms of learner responsibility, the teacher provided all the learning resources required for teaching and learning. In the fraction lesson she provided the oranges, the bottle-tops and the fraction walls, and in the multiplication lesson she provided the bottle-tops. The learners followed the teacher's instruction and

performed tasks as directed. In the fraction lesson, Mrs Nkosi guided the whole lesson, directing learners to identify to identify the parts of the circle and the fractional parts on the fraction wall as well as peel their oranges. Similarly, in the multiplication lesson the learners were expected to follow instructions throughout. In both lessons, the learners appeared to have little responsibility for their learning, falling well short of the intended curriculum goals of having learners construct their own knowledge and plan their own learning outcomes.

Mrs Nkosi said in her interview that she had frequently tried over the past few months to implement alternative assessment practices as recommended by C2005. She said that it was not easy for learners to assess themselves and one another. She attributed this to the age of the learners and her own cultural background. She said she was a traditionalist teacher and had difficulty with assessment. She said,

> teacher assessment is the best that she can use in her class and she assessed the learners on the work that they completed in their books.

Typically she would present the learners with a number of "sums" to do and mark them at the end of the lesson. Although C2005 advocates that all learner assessment should be based on formative and summative evaluation, Mrs Nkosi did not record any marks during the two lessons.

Another goal of C2005 is to allow learners to work at their own pace. I saw some evidence that Mrs Nkosi was making progress on this goal. In the fraction lesson she patiently watched the groups count the number of pieces of the oranges or the bottle tops. When she gave the learners a task to do, she always asked, "Are you finished?" In the multiplication lesson she ensured that the learners completed their one task before moving on to the next. Mrs Nkosi facilitated and guided the teaching and learning process. In the interview she said that because the learners were in their groups, they were able to help each other and work at a pace that they could manage. She said that she tried to allow them sufficient time to complete the task and waited for all the groups to finish.

C2005 promotes the use of learning resource materials. Mrs Nkosi said that she did not have many teaching resources and that the learners had collected and brought the bottle-tops to the class. In the first lesson she provided the oranges, the bottle-tops and the hand-made fraction walls for each group. In the second lesson, she made extensive use of bottle-tops.

In summary, over the course of this study, Mrs Nkosi appeared to have greater awareness of the demands of the C2005 educational reform. Mrs Nkosi made considerable strides towards incorporating the espoused goals of "new" teaching approach. She displayed good facilitation skills and she provided learners with those resources available to her. There was also evidence that the learners were beginning to work at their own pace.

Conclusions

Looking at the events in the classroom, what seemed to be a single event can be interpreted from the three perspectives. Mrs Nkosi's understanding of the reform is strongly connected to her curricula actions in the classroom. Looking at the events from a political perspective, we see that both Mrs Nkosi, and the learners are trying to find their voice in the curriculum and take on more responsibility. There is some evidence, but limited evidence, of them doing this. For example, she allowed the learners to manipulate their own learning resources and they could call upon her at any time for clarification. This was not something that usually happened in traditional classes. In terms of the socio cultural perspective, Mrs Nkosi accommodated the learners by re-teaching lessons to learners who could not attend school regularly and wanted to assist learners who came hungry to school. In the practical perspective, Mrs Nkosi seemed aware of the intended practical expectations, but she was only able to make progress on some of the intended goals, for example, learner centred approaches and learners working at their own pace.

CHAPTER 5

MISS TULANI

Introduction

In this chapter I describe the second of the study teachers, Miss Tulani. I firstly, present a brief profile of the teacher. Secondly I present narrative accounts of the two lessons that I observed six months apart. Thirdly, I provide an analysis of narratives in terms of the three perspectives – political, socio cultural and practical. Finally I draw some conclusions based on my analysis.

Teacher profile

Miss Tulani is a single parent with two children. After obtaining her matriculation certificate she worked for two years as a teacher aide before enrolling for a 3-year teacher diploma. She has 12 years teaching experience. She is currently teaching grade 7, 8, and 9 mathematics at a co-educational junior secondary rural school. The school has electricity and chalkboards but no computers, typewriters nor telephone.

First visit

Miss Tulani's school is situated in a village 20 km away from the nearest town and 1.5 kilometres off the national road. Most of the teachers commute from town on a daily basis. Most of the learners attending this school come from the local village. The school is to be found at the end of the rural village. There are 10 classrooms and 520 pupils. Although the buildings were in fair condition, the school needed to be painted. There were no broken windowpanes visible. I noticed that there was no fence around the school and there were cows grazing in the schoolyard. On my arrival at the school, I was directed to the principal's office. The room the principal occupied was small and the only furniture in the room was a table and two chairs. There was a timetable on the wall. We spoke about the teacher development

programme that Miss Tulani was attending. The principal desired that more teacher development programmes be offered, not only in science and mathematics, but also in the other learning areas. She complained about the lack of resources at her school. Miss Tulani entered the office and told me in which class she would be teaching.

I entered Miss Tulani's classroom and observed that the walls in the room were bare with no visible signs of the learners' work. The room was large with sufficient room for all the learners. There was a red box in the front corner of the room. The 30 learners were seated in groups of five when I entered the classroom.

Lesson 1: Triangles

Miss Tulani started the lesson by asking her learners a question, "What name do we give a triangle with three equal sides?" She rephrased and asked, "What name do we give such triangles?" Some learners put up their hands and some learners talked to each other. She pointed to a learner for an answer.

He answered, "Isosceles triangle".

The teacher did not respond to the learner's answer and responded "a triangle with all the sides equal?"

One pupils answered "quadrilateral" and the whole class immediately thereafter chorused, "quadrilateral".

She told the learners that it was equilateral. She walked to the board and wrote the word "equilateral".

The learners chorused "equilateral" as she wrote.

Miss Tulani then asked the pupils to repeat the word. They chorused, "equilateral".

She wrote on the board: 2 equal sides, and asked the learners, "let us give a name to a triangle with two equal sides".

A learner answered, "isosceles triangle".

While she wrote the word 'isosceles' on the board she spoke to the learners and said, "Sometimes we have triangles with no equal sides, what is the name for it?" She then wrote on the board: no equal sides. A learner provided the answer, "scalene triangle".

While she wrote the word scalene triangle she said, "triangle with no equal sides, we call it scalene triangle".

The learners responded in chorus, "yes".

Miss Tulani continued the lesson by saying:

> OK, so I think we can classify the triangles. I do not think there is a need for me to draw the triangles on the chalkboard.

The learners chorused, "yes".

She instructed the learners to draw two types of triangles:

> Each group must draw me at least two types of triangles, I would love you to draw the triangles yourselves.

The learners took out their books. The class was noisy at this time. I noticed that there was at least one mathematical instrument box at each group. Miss Tulani repeated her question saying, "At least two types of triangles per group, draw a triangle of your choice".

One child in the group drew, while the others watched. The teacher rotated among the groups, spending a minute at each group to watch the learners drawing their triangles. She interrupted the whole class saying, "there should be sharp corners," and walked to the board. "I can see that some of you have drawn something like this", she said as she drew curved lines meeting at an angle. "You must have

something that is sharp", she said, and drew an angle on the board demonstrating the angle of a triangle. She then asked them, "you understand?"

The learners chorused, "yes".

Miss Tulani rotated from group to group enquiring what type of triangle they were drawing. She stopped at a group and told the learners that their drawings were small. She asked them to draw "bigger and bigger triangles" and explained, "if you are going to draw the small things you can't measure it, you will have a problem when you are measuring". After a couple of minutes she asked whether they finished their drawings.

Some of the learners said, "no".

She focused her attention to a group and asked what type of triangles they drew.

One learner in the group answered, "isosceles and scalene".

Miss Tulani asked each group to name its triangle. The last group was not sure of the classification of its triangle and did not answer. She said, "you don't know", and she walked towards them to assist them. Satisfied that the group understood, she returned to the front of the class saying, "each triangle has three sides".

The learners chorused, 'yes".

She then said, "each triangle has three angles".

The learners again answered affirmatively.

She said, "we have classified triangles according to the sides, we don't know what happens to the angles of those triangles".

The learners appeared almost mechanical in their response when they said, "yes".

Miss Tulani continued, "we know that we have unequal sides and equal sides".

Once again the learners said, "yes".

She asked them, "now what about the angles of the triangles", and she instructed them, "now I want you to measure each and every angle in your triangles." She asked them what instrument they were going to use.

Some of the learners said, " protractor".

One group did not have a protractor. She borrowed a protractor from one of the other groups. She rotated from group to group and watched the learners. One learner measured each of the angles while the others help decide the angle. When the teacher saw a group struggling and she informed the whole class, "you start with the zero line".

The learners measured for a few minutes before she asked, "are you finished?" No pupil responded to her question.

I watched as she helped a group. She initially asked them which angle they planned to measure. She instructed them to position the protractor and measure the angle.

She asked, "what is the size of the angle?"

The learners responded by saying 40 degrees. She asked them to recheck their answer, saying they should be precise. She said, "do not just say 40 when the angle is 42 or 41, do not assume it is 40". She then asked the groups if they were finished. Satisfied that the groups had completed their measuring, Miss Tulani said, "now let's go back to the sides", and asked the learners "Are the sides equal?" She took a mathematical instrument box from the learners' table and took out a pair of dividers and told them to check if the sides were really equal. She asked the all the learners, "what instrument are you going to use to measure the sides of the triangles?"
Some of the learners answered, "divider", and some answered, "rulers".

Miss Tulani repeated the instruction. The learners were to measure the sides of the triangle with a ruler. Loudly she said to the whole class, "I think the best way for you to do this is to have some recording". She went to the board and wrote:

Type of triangle

Size of angle	Lengths of the size

She said, "ok let us have something of this nature, you write size of angle and lengths of the sides". She gave them an example:

Type of triangle

Size of angle	Lengths of the size
$20°$	
$60°$	

She said, "and then you write down the lengths of the sides". She asked the learners whether they understood and they said, "yes".

The learners resumed their measuring of angles and sides.

Miss Tulani did not say anything for a long time. She rotated from group to group and watched their progress. After about three minutes she asked the learners whether they had drawn the table and whether they were recording. The learners answered in the affirmative. After a couple of minutes she asked them, "are you finished?"

One group said, "no" and she immediately asked them what the problem was.

The group said, "we need a ruler". She borrowed a ruler from one of the other groups.

The teacher asked the learners from one group, "what is the sum of the interior angles of the triangle? What are you suppose to get?" The learners could not provide an answer. She asked the whole class, "sorry people, we want to know what we are supposed to get if we add the angles of a triangle?"

The learners chorused, "180°".

Miss Tulani repeated "180°", and pointed out that the sum of the interior angles of the triangle is equal to 180°. She diverted her attention to the group that did not know the answer. She informed the group that if they did not get 180° then they had made a mistake. After a number of minutes she said:

> Ok, I think you should have a pause. You have numbered the angles and you have measured the sides of the triangles. Now let's look at the table, I will ask from each group one triangle you have recorded.

Miss Tulani went to the board and asked the learners in the group to identify the triangle and give her its measurements. The first group said that their triangle was an isosceles triangle and gave the teacher the measurements. She recorded the angle sizes as well as the lengths of the sides.

The first set of measurements were:

Type of triangle: Isosceles

Size of angle	Lengths of the sides
90°	13.5 cm
45°	9.5 cm
45°	9.5 cm

She recorded triangle measurements for another group:

Type of triangle: Scalene

Size of angle	Lengths of the sides
50°	7.6 cm
54°	8.2 cm
72°	10.6 cm

Miss Tulani said that all the learners should look at these measurements and said:

There is something that we know. The sum of the interior angles should be 180°. When we add this, what do we get?

The learners from the group immediately responded, and said, "Miss, we made a mistake and said that the 72 should be a 76".

The teacher responded to the learners by saying that she did not trust them because they were "making changes without measuring". She asked whether any group drew an equilateral triangle. A group responded and provided their measurements, which she recorded as follows:

Type of triangle: Equilateral

Size of angle	Lengths of the sides
62°	7.5 cm
62°	8.0 cm
56°	7.5 cm

Miss Tulani asked the learners to look at these measurements and asked them what type of triangle they thought it was. A learner answered that was an isosceles triangle because two sides were equal.

The teacher proceeded with the lesson and asked the learners to look at the first set of measurements of the isosceles triangle. She drew a right angle triangle on the board and filled in the measurements. At this time the learners did not appear to be listening to her and did not respond to her questions. She drew the scalene triangle on the board and filled in the dimensions. She asked the class, "is there any relationship between the size of the angle and the lengths of the sides?" There was no discussion in the groups, and silence in the class. She went through a lengthy period of trying to connect with the learners to make them understand that the longer side is opposite the big angle and the smaller side is opposite the small angle. She wrote this on the board. She appeared to be irritated that the learners could not see the relationship.

The teacher concluded the lesson by asking the class "if we have an equilateral triangle, what would the sizes of each angle be?" She repeated the question thrice.

There was no response from the learners and she specifically asked a pupil who said that the answer was $45°$. The learners put up their hands and she chose a learner who gave her the correct answer. She asked the learner "why do you say $60°$?"

The learners chorused, "if you add 60 and 60 and 60 you get 180".

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In this lesson on triangles, the teacher revised the different kinds of triangles in her introduction. The learners worked in their groups to measure the angles and the sides of triangles that they drew. The learners made use of their protractors, dividers and rulers during the lesson. The lesson was 50 minutes long and although they were engaged for much of the time, the learners did not respond to Miss Tulani's questions towards the end of the lesson. Miss Tulani said that she tried to involve every learner in the lesson. She wanted the learners to be free to talk to each in their groups and only intervened when she saw that they required assistance.

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Second visit

The second visit to Miss Tulani's class took place six months after the first. It was a cold, rainy day. The teacher and the learners were warmly dressed and the lights in the classroom were switched on. The teacher had not been informed that I was coming to observe her teaching and I was pleased that she was present at the school. The principal was teaching when I arrived, and therefore I did not see her. Another teacher requested that I wait for Miss Tulani in the principal's office. Miss Tulani arrived and I followed her to her grade 8 class. There were 20 learners in the class. The classroom had sufficient tables for the learners and the classroom was large enough to accommodate at least 35 learners. The learners were sitting very quietly in groups of four when I entered the classroom.

Lesson 2: Area

Miss Tulani informed the learners that they were to calculate the area of triangles. She referred them to the calculation of rectangles that they had previously completed by counting 1cm x 1cm squares. She asked the learners "how do you calculate the area of rectangles?"

The learners chorused, "length times breadth".

The teacher said " we need to know the areas of other shapes, so we are going to look at triangles". She supplied each learner with a template of a triangle and told all the learners that they should "just put the triangle on your page and trace it". She demonstrated on the board how the learners should use the template. The learners were busy with their own drawing and the classroom was quiet. After a couple of minutes she asked them whether they were finished and instructed them to count the number of squares inside the triangle. She went to assist a learner.

The learners were very busy on this task and Miss Tulani repeated her instruction, "count the number of squares". After a while she went to a learner and asked the learner which squares she had counted. The learner showed the teacher who responded, "but you say you are calculating the area, you have to count all the

pieces, so why don't you count these pieces?", pointing to the blocks on the page that were not squares within the triangle. She told the learner:

> If you want to tile this floor you said that you had to know each and every piece, let's try to recall when we talked about area. We said that if you tile this floor, you need to know each and every piece, so you have to know the complete area of the floor. If you do not count these pieces, that means you are not going to tile this floor. The room is going to have pieces that will have no tiles.

The learner did not respond. She started to count the number of squares in her triangle. The teacher watched her count. The learner told Miss Tulani that there were 47 squares. Another learner said that there were 46 squares.

She asked the whole class whether they had finished and whether anyone had a problem.

The learners chorused "no".

After a couple of minutes she went to the board and told the learners that she had a problem. She drew a rectangular grid and counted the number of blocks in the rectangle. It was a 3cm x 4cm block so she counted 12 square cm. She then proceeded to draw a triangle on the board. Whilst she drew, she said to the learners, "so you did not have any problem calculating the things inside?" She went on and asked, "anyone with a problem?"

The learners answered, "no".

She asked the whole class, "Just show me how you counted?" She called a learner to the board. The learner counted the full squares. The teacher asked the whole class whether they could see what she was doing. The learners said, "yes". She raised her voice and asked, "What is the problem with what she is doing?" There was silence in the class.

She called on one of the learners. The learner said, "she is not counting the pieces in the corners". The teacher repeated what the learner had said and asked the learners whether they saw that she did not count the corners. The learners chorused, "yes".

She turned her attention to the learner who was still standing at the board and asked her, "can you see that?" The learner told the teacher that the corners of the triangle were not squares. She asked the learner what she thought should be done to include the corners. The learner did not respond so she asked the whole class, "my question is what can we do to include all the pieces, just anyone?"

Again there was silence in the class. The teacher said, "anyone?" No learner responded and there was silence in the class. She asked one learner who said, "make a rectangle". The teacher said, "I don't understand, come and show me on the board".

The learner went to the board and drew the rectangle. She sent him back to his seat and asked, "now what are we going to do with the rectangle?" The learner did not answer and the class sat quietly. She spoke in mother tongue and waited for a response. One learner said, "add the pieces".

Miss Tulani asked, "which pieces?" There was no response from the learner. The teacher spoke again in mother tongue. This time the learners moved closer to each other in their groups and started talking to each other.

Miss Tulani went to a group and spoke in mother tongue. I heard her telling the learners that they should add the pieces to other pieces and give some explanation. At the next group she asked the learners whether they counted the small pieces. A learner responded and said that you add the pieces together to make a square. She probed the learner until they said that two pieces could be added to make a square.

The teacher asked the learners whether they knew of any other way that the area of triangles could be calculated. The learners answered, "no".

Miss Tulani questioned the learners as to how these pieces were to be added and which pieces to add. She pointed to her drawing on the board. Again the learners did not respond. The teacher raised her voice in an angry tone and asked, "which pieces do we add, do we add the pieces at the corners?" The learners responded, "yes'.

Miss Tulani then told the class that there is another way of calculating the area of a triangle. She used the triangle that she drew and said that a rectangle could be drawn around the triangle. She counted the number of blocks within the rectangle. She confirmed that there were 30 blocks in her rectangle. She then went on to ask the learners how many triangles there were in the rectangle. She said that there were two triangles in a rectangle. She pointed to her drawing and told the learners that the area of the triangle she had drawn is half the area of the rectangle. She then said, " When you calculate the area of the triangle you must complete the rectangle and divide by two".

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Miss Tulani presented her lesson on the calculation of the area of triangles. She provided the learners with a template to trace the triangle on a grid that they had prepared in their books. The teacher used the learners' prior knowledge of the area of rectangles to introduce the lesson. Miss Tulani used question and answer techniques when presenting the lesson. For the greater part of the lesson the learners worked individually.

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I observed two lessons on triangles presented by Miss Tulani. The first lesson focused on the classification of triangles and the relationship between the size of the angle and the length of the side. The second lesson focused on the calculation of the area of triangles. In the first lesson Miss Tulani tried to involve all the learners who sat in groups and worked on the assigned task while one group member manipulated the mathematical instruments, the other learners from the group showed interest and support and gave input. In the second lesson, the learners were given a template and were asked to find their own solutions. The approach was very different from the

first lesson. When learners did not respond to the teacher's questions, she became irritated, raised her voice and spoke in an angry tone. I now analyse the two narratives, based on the three perspectives that I introduced in chapter 2, namely the political, socio cultural and the practical.

Political perspective

Under the political I examined the power relationships involved in the implementation process and the classroom practices. I focus on two aspects. Firstly, I examine the teacher's relationships outside the classroom and secondly, the teacher relationships inside the classroom. In both aspects I focus on four issues, namely, ownership, personal meaning, involvement and negotiation.

Outside the classroom

In terms of ownership Miss Tulani had been a teacher for the past 12 years and thought that the old system was successful and when C2005 was introduced she was initially quite negative. She said that implementing C2005 was very strenuous because she had to put more effort into preparing her lessons. Miss Tulani said that the Department of Education only trained them "for a short period, and that it was not possible to learn a lot within a short period of time". Miss Tulani is more positive now and she said "I am motivated, especially after the training from the University of Port Elizabeth". When I asked about her involvement in the formulation of the policy documents she said

> I think the people from... I would say, above decided for us, I think they could have asked us how do we think we can change, what difficulties do we have and what do we think the learners would benefit from.

Miss Tulani disclosed in her interview that she prepared her lessons daily and that she "don't always consult the policy documents". She said that some of the outcomes in the policy document were unrealistic and difficult for the learners to achieve. However, she is "beginning to enjoy teaching the OBE way, because of the training that she is getting. I am starting to gear myself towards the C2005".

In terms of personal meaning I look at whether the educational reform is consistent with the values and beliefs of the teacher. Initially Miss Tulani was not interested in the educational reform because she was not aware of the advantages of the reform for the learners. She was beginning to understand that C2005 is about building the skills, values and attitudes of the learners and that C2005 combines the "skills with the work knowledge". In the lesson on triangles that Miss Tulani presented, the learners developed skills of measuring using protractors, dividers and rulers. Miss Tulani believes that she has to develop the learners' skills through her mathematics class.

In terms of involvement I examine how Miss Tulani perceived her role in the curriculum reform. Miss Tulani said the curriculum reform was forced upon her. She was not asked whether she was prepared to implement the curriculum. She wanted more clarification from the Department of Education before she accepted the educational reform and changed her practices. She said that "they could have done it better and discussed the reasons for the changes and then we know the need for the change". She said that she needed the training and that the "Department must provide the training". She was very grateful that she was chosen to be on the teacher professional programme. She said that the programme has helped her change the way she taught and this "new way" is helping the "learners have a positive attitude in her mathematics class". Miss Tulani said that she was beginning to change her practice and wanted learners to "discover things for themselves" and she said that she has "changed a lot" in terms of her classroom practices as suggested in the C2005 policy documents.

In terms of negotiation, Miss Tulani said that her input in the curriculum reform is important. When asked whether she was involved in the formulation of the policy documents she replied "no". She said that the "people above" did not consider the difficulties encountered by teachers in rural areas. She said the district Department of Education only "gives us textbooks, nothing else". Miss Tulani said that she got no support from the district office and the initial reading of the policy document was "too complicated" and therefore she did not consult the documents. Under the previous syllabus, "I knew exactly what I was supposed to teach, what could be

asked. Now I just teach, teach, teach, and I am unsure whether I am on the right track or not".

In many respects, Miss Tulani is still holding on to the old syllabus in terms of the content that she teaches her learners. While she is attempting new teaching approaches, she frequently reverts to the more traditional approaches as encountered by the lesson on the calculation of area of a triangle. Through the teacher development programme, she is slowly becoming more connected to the educational reform and she acknowledged that she is learning more about teaching the OBE way.

Inside the classroom

In terms of learner ownership, the learners in Miss Tulani's class are dependent on Miss Tulani to provide them with the stimulation required for their learning. Miss Tulani directed their thinking towards the outcomes that they had to achieve at the end of each lesson. Miss Tulani's approach to teaching encouraged learners to interact with each other and this was very evident in the triangles lesson. In this lesson she allowed the learners to discover for themselves the sizes of the angles and how to use the protractor. This discovery of learning approach is advocated in the C2005 document. The learners were exposed to both traditional and learner centred approaches. The learners appeared to enjoy the interaction in the triangles lessons and they were able to work together and measure the angles themselves. In the calculation of area lesson, when the teacher used traditional teaching to explain towards the end of the lesson, the learners were not as connected to the content. The teacher became angry when she did not get any response from the learners.

In terms of personal meaning, Miss Tulani chose the content for both the lessons. The learners in Miss Tulani's class are from the rural village and both lessons were based on mathematical concepts that the learners in the rural village rarely encounter. These two content-based lessons did not appear to take into consideration the values and beliefs of learners.

In terms of learner involvement, the learners appeared to be more involved in the first lesson than the second. They appeared to enjoy working in groups with their peers. At no time did any of the learners ask the teacher a question or ask the teacher for clarification. There was less learner involvement in the second lesson. At one point, Miss Tulani had raised her voice in anger as the learners sat passively without responding.

The learners in Miss Tulani's class appear to have little negotiation power. Miss Tulani's teaching was largely content driven, a legacy from the old syllabus. In both her lessons, she orchestrated the learners' actions. At no stage did the learners divert from the task they were required to perform.

In summary, there is evidence that Miss Tulani is moving towards an acceptance of the educational reform. She was unhappy that she was not consulted about the content and processes of C2005. She acknowledged that she rarely used the policy documents and that she preferred a syllabus that prescribed what was to be taught. However, she was trying to become more learner centred. This was evident in her lesson on triangles although less apparent in her lesson on the calculation of the area of triangles. There is little evidence that the learners in Miss Tulani's class are connected to the curriculum reform. Miss Tulani determines most aspects of the learning environment. She decided when, what and how learners perform their tasks. Although the learners are able to work in groups, their tasks are directed by the teacher.

Socio cultural perspective

In this analysis I specifically focus on the background of the learners, the school and classroom, the problems experienced by the teacher and the learners, and the ways in which the teacher accommodates the learners' socio cultural circumstances.

Miss Tulani said that there were "quite a few" learners in her class that have single parents who "are unemployed" and "are uneducated". The school fees are R60 per year for the senior learners in her class and many do not pay. There is nothing that the school can do with the learners who do not pay their fees. She said that the

"environment is poor" and that "the learners do not have instruments, like protractors and calculators and the school does not have the money to buy these things". The learners come to school hungry. There is a feeding scheme at the school to provide peanut butter sandwiches specifically for the foundation phase learners. However, the sandwiches are also provided to the learners in the senior phase classes. She said that there were other problems in the area like smoking dagga, rape, and abuse. Miss Tulani said:

> There are learners coming from far and there is a lot of drug use in this area and we have been trying to find out the reason because almost all, there are so many boys who are taking these things, they come to class and you can see they have smoked dagga.

She did not know what to do about the learners who take dagga and said that these boys did not concentrate in class. On my second visit, there were only 20 learners in Miss Tulani's class out of 35. She said that on cold days, learners do not come to school because of the long distances that they have to walk. She said that she often repeats the lesson to accommodate those that were absent.

She did not want to talk about the rape and abuse. She said that the girls do not report these cases, but "she knew that it is happening". Another problem she highlighted was the distance that the learners had to travel to get to school. She said that some learners walked 10 kilometres on foot to school. They do try to come to school early.

Miss Tulani appeared agitated that the Department of Education could not provide the school with better facilities. She said that the Department only provided the textbooks and "nothing else". She said that the school is not fenced and this created a problem as anyone can just come into the school. The classroom doors do not lock and therefore "It is not possible to leave anything in the school". The school has electricity, no photocopy facilities, tape recorders and mathematical instruments. Miss Tulani said that she made extensive use of the chalkboard and she encourage the learners to write in their books. This was evident in the lesson on the calculation of the area of triangles where the learners traced the template in their book and calculated the square.

Miss Tulani did not have a chalkboard protractor. In the second lesson she wanted to show the whole class how to use a protractor on the chalkboard, but there was none available at the school. She said that she has to "improvise and sometimes I make some resources". She cited a lesson that she presented on circumference where she gave the learners the formula. She said that that lesson did not work and she had to re-teach the lesson with resources that she had to make. In the calculation of the area of a triangle lesson, Miss Tulani provided the learners with a template that she had made from waste cardboard.

In summary, Miss Tulani faced a number of challenges in her teaching. She was very concerned about learners who came to school without eating. To overcome the lack of resources, Miss Tulani often improvised. However, she felt that certain equipment should be supplied by the Department of Education. To accommodate the learners who were absent from school, she often re-taught the lesson.

Practical perspective

Under the practical perspective I look at the technical aspects of how the teacher implemented the new curriculum. Specifically, I focus on the classroom practice goals of C2005 – for example whether the learners construct their own learning, use higher-order thinking, integrate with other subjects, and develop responsibility for their own learning; and what assessment techniques the teacher employs, how the teacher paces the lesson and the resources that she uses.

C2005 espouses a learner centred teaching approach. In the two lessons, Miss Tulani displayed elements of this approach. In the triangles lesson the learners were seated in groups with the teacher acting as facilitator. Each group used its own teaching resources to measure the angles and sides. Where the groups did not have the necessary resources, teacher borrowed from other groups. The teacher also spent time assisting each group. When the learners drew small triangles she suggested that they draw "bigger and bigger triangles" and she provided an explanation why bigger drawing were required. She attempted to include all the learners in this lesson. The learners supported each other and together they counted the size of the angle. In the second lesson, although the learners sat in groups, they worked individually. Each

learner drew his/her own triangles and the teacher visited each individual pupil. Toward the end of this lesson, when the teacher did not get a response from the learners, she asked them to work in their groups and discuss the problem that she posed. Overall, there is some evidence of moving towards a more learner centred approach.

One of the goals of C2005 is that the learner be given the opportunity to think critically. In both her lessons Miss Tulani encouraged the learners' thinking with a mixture of both lower order questions and higher order questions. In the triangle lesson, she asked the learners very basic questions about the classification of the triangles. Towards the end the lesson, Miss Tulani wanted learners to think about the data they had collected and make a connection between the sizes of the angles and the sides. The learners had difficulty in seeing the connection and the teacher had to direct their thinking. In the calculation of the area of triangle lesson, the teacher struggled to get the learners to understand the concept. The approach she used was to get the learners to discover reasons why they had to include all the centimetre square blocks as well as the parts that were not squares. She did not supply answers, and she encouraged the learners to come up with the answers. Towards the end of the lesson she did provide them with the solution after she saw that the learners were having trouble understanding.

Integration is another of the C2005 goals. Both lessons observed were mathematics content specific – about the dimensions and characteristics of triangles. She said in her interview that she did not use the policy documents and that she preferred to have a syllabus from which to teach. My impression is that Miss Tulani did not believe in the integration of her mathematics content with the other learning areas as espoused in the C2005 policy documents.

C2005 also promoted the use of alternative assessment practices. In both the lessons, I did not observe any formal assessments. In the interview, Miss Tulani said that she used the work the learners did in the class as assessment. She said that "I record what the learners were doing, but it is difficult to do it when they are discussing, I do it after the lesson". She said that she assessed the learners on their accuracy of their drawings in their books although she still based her assessment on a number of tests.

C2005 advocates that learners should take responsibility for their own learning. In both lessons Miss Tulani provided the learners with all the resources and the steps that they were to follow. In the triangles lesson, the teacher started by asking the learners questions about the classification of triangles. She proceeded to the measuring of the angles and lengths of the sides. She recorded feedback from the learners on the board and used this information to further develop the learners' understanding of the concept. The whole lesson was sequentially planned and the learners followed the teacher's instructions. In the calculation of the area of triangles lesson, again the teacher planned the process that the learners were to follow to arrive at the outcome. She gave them time to manipulate the template and count the number of squares within the triangle. At no stage did the learners have the opportunity to deviate and explore other concepts.

C2005 suggests that learners be encouraged to work at their own pace. Miss Tulani's lessons were each 50 minutes long. The teacher planned her lessons so an outcome could be achieved. Miss Tulani provided sufficient time for the learners to complete each activity. In both lessons she continually asked the learners "are you finished?" When learners did not respond to her question, she allowed them more time. In the calculation of the area of the triangle lesson, the teacher appeared to be frustrated and irritated with the learners when they did not understand the concept. She had raised her voice and her anger was visible.

Another aim of C2005 is that the teacher is expected to provide the learner with learning support materials. In the triangles lesson Miss Tulani ensured that each group had the mathematical instruments needed for the lesson. When one group said "we need a ruler", the teacher borrowed a ruler from one of the other groups. In the lesson on the calculation of the area of a triangle, Miss Tulani asked the learners to prepare the grids in their books. She provided triangle templates for them to use. She said that she wished she had a photocopy facility at school so that she could "have some worksheets for the learners". Wherever possible she tried to improvise and provide learners with resource materials.

In summary, there is some evidence that Miss Tulani has incorporated aspects of C2005 into her practice. Her lesson exhibited both the learner centred and the traditional approaches. The triangles lesson, for example, was more learner centred. In the calculation of area of triangles lesson, initially the learners worked individually. However, the teacher did some traditional teaching and thereafter allowed group interaction to take place.

Conclusions

My analysis of Miss Tulani's teaching is based on the three perspectives that I formulated in the theoretical framework in chapter 2.

Under the political perspective, in terms of power outside the classroom, Miss Tulani is moving towards a greater acceptance of the reform. She believed that the advantage of C2005 is that the learners will develop valuable skills and knowledge. Her motivation to implement the educational reform comes from her involvement with the professional development program. She believed that this exposure has helped prepare her for the implementation.

The learners have little power inside Miss Tulani's classroom. While the first lesson was more learner centred and the other a mixture of traditional and learner centered, Miss Tulani controlled most of the activity in her classroom. She decided on the resources and the content. The learners did not respond to the teacher when she raised her voice in an angry tone.

Under the socio cultural perspective, Miss Tulani appeared to be a caring teacher who was very concerned with the socio cultural problems such as hunger, rape, sexual abuse and the use of dagga. Her classroom practices are constrained by limited resources and learners' poor attendance. She is prepared to make her own resources and improvise where necessary. Where learners do not attend school, often she has to re-teach the lesson. She was empathetic towards those learners who have to walk long distances to attend school.

C2005 encourages teachers to use a learner centred approach, and both lessons showed some evidence of this approach. Miss Tulani was aware that the learners need to become critical thinkers and her questioning in the lesson on area appeared to stimulate the learners' thinking. The content of Miss Tulani's lessons were content based and not grounded in the learners' culture and background. Miss Tulani paced her lesson and gave the learners ample time to explore the mathematical concepts. She provided the necessary resources for her learners.

Miss Tulani appeared to be moving towards an acceptance of the educational reform. She understands what is mandated in the C2005 policy documents and is prepared to implement many of the suggested reforms. However, she needed more support and guidance and appealed for a more structured framework for the content to be taught.

CHAPTER 6

MR NONGEZI

Introduction

In this chapter I introduce Mr Nongezi, the third of the study teachers. I use the same format as in the previous two chapters - a teacher profile, followed by a narrative account of the two lessons and an analysis of the lessons in terms of the three perspectives.

Teacher profile

Mr Nongezi is married with one child. He has a teaching diploma and 10 years teaching experience. He entered the teaching profession because he loves children. He teaches grade 8 and 9 mathematics and is the mathematics co-ordinator at a co-educational junior secondary school. The school is 3 km away from the nearest city and has electricity and water. Subsequent to the study Mr Nongezi was appointed as head of department at a rural school 14 km from the nearest city.

First visit

Mr Nongezi's school is situated on a sloping piece of land. There is no sports field and there are two blocks of classes. When I arrived at the school at 8:50am the gates were open. I made my way to the principal's office. She was busy looking through some papers. I reminded her of the reason for my visit and she said that she was pleased that I had come to her school. She informed me that there were 1128 learners in the school with 19 female and 4 male teachers. When I told her that I was interested in teacher professional development, she insisted that I come to her school and present workshops to her teachers about C2005. She felt that, at her school, only Mr Nongezi is benefiting from the professional development programme and she encouraged him to inform and support other teachers in the implementation of

C2005. However, she felt that more government funded programmes should be offered for the other learning areas.

Mr Nongezi arrived at the office and we spoke briefly about the study. When I accompanied him to his classroom, I noticed that the classroom door did not have a door handle and there were a number of broken window panes. I entered an overcrowded classroom with 73 pupils in the class. Given the way the learners were seated in groups, it was not possible for the teacher to rotate amongst the groups. There were no displays on the walls.

Lesson 1: Negative numbers

Mr Nongezi started his lesson by asking the learners what the temperature was. One of the learners said, "12 degrees Celsius".

Mr Nongezi wrote 12° C on the board. Whilst writing he prompted the learners to chorus "12° C". The next question he asked was, "who can tell us what do we mean by temperature?" He then said, "maybe some of us have forgotten".

I wondered whether the teacher had previously taught this lesson or whether they dealt with the temperature concept in science. The learners put up their hands and the teacher repeated the question, "what do we mean by temperature?".

A learner answered, "temperature means how hot or cold the weather is".

Mr Nongezi repeated the statement and asked the learners, "anyone with a different view?"

A learner answered, "temperature is about the atmosphere" and another answered, "temperature is the measuring of the weather".

The teacher repeated each answer and then said, "in other words it is a hot day or maybe it is a cold day". Mr Nongezi tried to elicit many responses from the learners. A learner sitting towards the back of the class raised her hand. Mr Nongezi

recognised the student who said that temperature is about how rainy or how hot or cold the weather was.

The teacher repeated her answer and said, "OK", and thereafter said,

> by temperature we definitely mean, or we are concentrating on the measurement of the hotness or the coldness.

He then asked the learners, "are we together?"

The learners chorused, "yes".

Referring to the 12° C that he obtained from the learner at the beginning of the lesson, he said:

> Now on one day the temperature was measured to 12° C. Now just tell me how hot or how cold it was, how hot or how cold it was?

The learners put up their hands. He directed his attention to a learner and said, "yes".

The learner responded that it was warm.

The teacher continued:

> Now at night in a small town the temperature dropped by 16° C. Now what happened, who can explain to me? Did the temperature rise or did it fall? Did it go up or did it go down?

Mr Nongezi repeated the question. A learner answered and said that the temperature went down. The teacher repeated what the learner said. He continued, "can you think of numbers below 12?"

A learner answered 11 and another 10.

The teacher now said,

> Now the question is, what do you think the temperature would be if it dropped by 16° C, at night? What would you expect it would be? It was 12° C during the day, now what would we expect the temperature to do?

He repeated the question in mother tongue and thereafter said, "Just think, just think". To assist the learners in their thinking he said,

> If I have R5.00 in my pocket, I happen to lose R2.00. Then I don't have more money, I am left with R3.00. Now what is the real or exact temperature at night if it dropped by 16° C?

Some learners put up their hands. Mr Nongezi said, "some of you are not thinking at all, what will the temperature be?"

One of the learners said that it would be cold. Mr Nongezi repeated the word, "cold" and he said, "we all agree that it will be cold, yes?"

The learners chorused, "yes".

Mr Nongezi continued:

> I want the exact temperature. At midday it was found that the temperature was 12° C, and at 12° C we all know it is warm, there is no need to for us to prove that it is warm. We do not have to wear a jersey and jacket. But at night the temperature dropped by 16° C. What is the exact temperature, if it dropped by 16° C?

A learner answered, "4° C".

Mr Nongezi said,

> she should be right because 4° C is less than 12° C, but I don't say it is the exact answer. At least she could be right. At least she is not saying that it could be 16° C or 20° C, because all these numbers are more than 12, because we said the number must be less than 12. Do we agree it could be 4° C?

As he asked the question he demonstrated the movement with hands – 12 being a number in the centre, 4 the number lower than 12, and the numbers 16 and 20 above 12.

The learners chorused, "no".

One learner answered that it could be 0° C; another suggested, "minus zero".

Mr Nongezi faced the board and said,

> Let's write them on the board. So the first one said it will be 4° C. One of you said it will be 0° C and one of you said it will be -0° C. Are we satisfied that it will be 0° C?

The learners chorused the answers as he wrote. There were a couple of minutes of silence in the class before he said, "now I want more responses, what do you think?"

One learner said that it would be 6° C.

Mr Nongezi said, "we want the exact answer".

He pointed to the board and focused on the first answer that he got from the learner. He asked the learner how did she arrive at the answer 4° C.

The learner responded by saying, "you subtract 12 from 16 and you get 4".

Mr Nongezi responded to the reasoning given by the learner:

> now can you see you went through some beautiful operation here, she subtracted 12 from 16 and that is how she got the answer. She is thinking and that is how she got the answer.

The learners chorused, "yes".

Mr Nongezi asked the learner who got zero degrees, how he came to that answer, "don't be afraid, how did you get zero?"

The learner stood up and said, "I think you can't minus 12 from 16".

The teacher interrupted and said that he thought the learner has put the numbers the wrong way round, he asked the class, "can anyone help?", and continuing: "we can't minus 16 from 12 for seemingly we get what he is trying to say". A different learner said that we couldn't minus 16 from 12.

The teacher said, "so we all say that, so for the -0° C".

The learner stood up and said, "I was thinking the same thing as him", pointing to the previous learner who had given the answer as zero.

The teacher said, "OK, we cannot subtract from 12, now which number is bigger, which one is bigger?"

The learner answered 16.

Mr Nongezi asked the class, "so what is the answer of 12-12?"

Many learners put up their hands. He asked one learner who said, "zero".

The teacher repeated, "zero, so how can we think that 12-16 is zero?"

One learner said that 12 was smaller than zero.

Mr Nongezi asked the learners, "class are we saying that when we subtract a big number from a small number the answer will be zero?"

The learners chorused, "yes".

Mr Nongezi asked the next question, "suppose you subtract 100 from 50, the answer will be zero?"

Again the learners chorused, "yes".

The lesson continued in this way. Mr Nongezi asked the learners a number of questions and in each case the learners answered in chorus, "yes".

The teacher then gave a different example. He asked the learners what they thought was the minimum temperature for Umtata (Umtata is the nearest city to the school).

A learner said, "7° C".

Mr Nongezi continued and asked them what they thought was the minimum temperature of Cape Town.

A learner said, "3° C". Mr Nongezi then asked them for the minimum temperature in the Drakensberg mountains or the mountains in Lesotho. A learner said that it could 0° C.

Mr Nongezi asked the learners, "could it go beyond zero degrees?"

The learners answered, "no".

Mr Nongezi asked the learners to put up their hands if they thought the temperature could go beyond zero. One learner put up his hand and said that it could go to minus.

Mr Nongezi probed the learner until the learner eventually said that there could negative numbers.

The lesson concluded at this point, with the introduction of the concept of negative numbers as representing numbers less than zero.

★ ★ ★ ★

In this lesson on negative numbers, Mr Nongezi presented an interactive lesson using a whole class question and answer strategy. He asked stimulating questions and allowed many learners to express their thoughts. He repeated most of the learners' answers and in many cases the follow-up question was based on the previous response. The only apparatus that Mr Nongezi used was the chalkboard. Although the learners sat in groups at no time were the learners ever asked to discuss the questions among themselves.

★ ★ ★ ★

Second visit

Six months later I returned to Mr Nongezi's school. I was informed that he was not at school because he had taken the learners to a choir competition in a village 60 kilometres away. I asked the principal about Mr Nongezi's involvement in the choir. She said that he had taken an interest in the choir and he was interested in many of the other activities of the school. She said that Mr Nongezi assisted her with many things because he is a good organiser.

When I returned to the school the following week, I entered Mr Nongezi's classroom to be greeted by 89 grade 8 learners. Six months earlier I recalled that the class contained 73 learners. The learners sat in groups of about 10 or 12. The room was stuffy, although the windows were open. I noticed that there were textbooks on the learners' tables.

Lesson 2: Right-angled triangles

Mr Nongezi began by asking the learners, "what is the difference between a square and a triangle?"

A learner answered, "a square has four sides and a triangle has three sides".

Mr Nongezi raised the tone of his voice and asked the learners how many sides were there in a triangle.

The learners chorused loudly, "there are three sides in a triangle".

The next question he asked, "What types of triangles are there?"

One of the learner answered, "isosceles triangle".

The teacher asked, "what other types of triangles are there?"

A learner answered, "scalene triangle".

Teacher said, "so all those are different types of triangles we get", and continued:

> so today for this activity problem is going to lead to us into talking about one specific type of triangle, so let us confine ourself to the right angled triangle. Somebody, come and tell us what is a right-angled triangle. What can you say about a right-angled triangle? What is special about a right angled triangle?

Mr Nongezi repeated the question thrice. Some learners put up their hands. The teacher continued:

> Let's have a picture of a right-angled triangle, think of a triangle, it is a figure with three sides, but there are many different figures with three sides. How does it look like, a right-angled triangle?

A learner answered, "A right-angled triangle has got three sides and each side is 90°
Celsius".

The teacher ignored the mistake made by the learner and asked the class,

> Anyone to add to what he said, or a person with a different view? What type
> of triangle is a right-angled triangle? What does it look like?

Only one learner put up her hand, and said, "a right-angle triangle is a triangle that
has three sides and one of the corners is equal to 90°".

The teacher said that the word corner was new.

He asked the class, "anybody to add on to what she has said, to get a clearer picture
of what a right-angled triangle looks like?"

The learners put up their hands and he chose one to answer.

The learner answered, "A right angled triangle has two perpendicular lines which
intersect at exactly 90° and it has one line which is called an hypotenuse".

The teacher said, "hypotenuse, you are bringing a new word, hypotenuse".

A learner put up his hand and the teacher said, "OK, what do you want to add?"

The learner said, "a right-angled triangle has a line, that line is equal to 90°. We
cannot say that it has one corner that equals 90° Celsius".

The teacher repeated Celsius twice, but he did not follow this up and ignored the
mistake.

Another learner offered:

> a right-angled triangle is a triangle which has two lines which intersect at 90°
> with a block, we draw a block, and in that block we do not write 90° because
> everybody knows it is 90°.

The teacher responded:

> OK class, we have been talking about this right-angled triangle, somebody
> must come forward and quickly draw for us a right-angled triangle, come and
> show us now. We have talked about it.

Many learners put up their hands, eager to respond to the teacher's request.

Mr Nongezi asked a learner to come forward and offered the learner a protractor and
a T-square. Then said to the learner,

> use this T-square, I also have a protractor here, quickly draw a right-angled
> triangle. Convince us that it is a right-angled triangle.

The learner only used the protractor. He drew the triangle using the protractor, but
did not measure the angle. The learner wanted to return to his seat, but Mr Nongezi
said that he should wait and said to the whole class,

> When a child is born that child is given a name, is that not so? So, let's give
> the triangle a name.

The learner wrote A, B, C at the three corners and started to write the word
hypotenuse. The teacher stopped her and said that it was not necessary to write the
word hypotenuse.
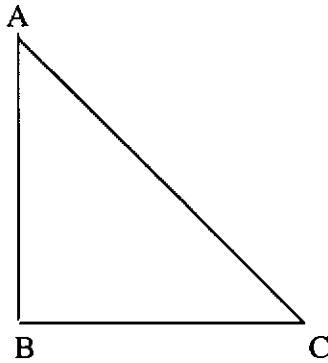
The teacher continued with the lesson and said, "So, she has drawn triangle ABC, am I right to say that she has drawn triangle ABC?", the teacher said in his firm voice.

The learners chorused loudly, "yes sir".

Mr Nongezi repeated the question. The learners again said that they agreed.

He asked them, "why, why, why, do you agree?"

A learner answered that there are three angles.

Mr Nongezi wrote on the board and said, "tri-means three". He asked the learners whether they agreed that this is a right-angled triangle because tri-means three. He continued,

> I want somebody to come and convince us that this is a right-angled triangle, I can draw a triangle like this here, and is this a right-angle triangle?

He drew a scalene triangle and labelled it figure 2. He labelled the other triangle that the learner drew as figure 1.

He asked the learners whether there was a difference between figure 1 and figure 2. The learners chorused, "yes". He asked what the difference was.

A learner responded by saying, "in figure 1 there is a right angled triangle and in figure 2 there is no right angle".

The teacher repeated the answer as a question and the learners chorused, "yes".

A learner put up her hand. She said, "we see in figure 1 there is a block to show it is 90°, we see this block".

The teacher said, "OK, I forgot my block" and drew a block at the corner of his scalene triangle, "OK, what do you say about these two figures now?"

Mr Nongezi's drawing looked like this
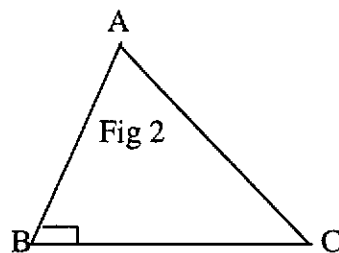
A learner said,

> what I see in the first figure it is 90° C. I am not sure, but I think it is 90° C, the other side we have an acute angled triangle, I can estimate is 70° Celsius.

The teacher said, "I have heard the word Celsius. Where did we use the word Celsius? In science?"

The learners chorused, "yes".

No further discussion about the word Celsius ensued.

The teacher asked the learners again, "is this angle a right-angle", pointing to the block that he drew in figure 2.

The learners said, "no".

The teacher asked the class,

>OK, how do we make that, I am not sure that this angle in figure 1 is 90°? How do we make sure it is 90°? We do not have to be careless, how do we make sure that it is 90°?

A learner answered, "we have our protractors to measure the angle".

The teacher held up the protractor and T-square. And asked the learners which one was a protractor. The learners chose correctly. Mr Nongezi placed the protractor on figure 2 and measured angle B. The learners chorused that the angle is 70°.

He asked the learners what type of triangle he had drawn and the learners answered "acute angled triangle".

Turning his attention to the figure 1 that the learner had drawn, he said,

>I am convinced that this angle is 90°, because it looks like a right angle. Someone said that there must be a vertical and horizontal, which one is the vertical and which one is the horizontal?

A learner said that BC is the horizontal and AB the vertical and continued by saying that where the two lines intersected, the angle formed was 90°.

The teacher now asked the learners to show him, using their arms what a right angle looked like. The learners showed him. Many were unsure what to do. He thereafter asked them to show him an obtuse and an acute angle. I noticed that many of the learners were just sitting and watching the others.

Mr Nongezi said, "OK" and, referring to figure 1, asked the learners, "are you 100% sure that this angle is 90°?"

The learners chorused, "yes".

Mr Nongezi repeated his question and many of the learners said, "no".

The teacher immediately asked, "why?"

A learner answered, "because she had just drawn it without measuring".

The teacher asked a learner to come to the board to draw a right-angled triangle using the protractor.

After the learner had completed the drawing, Mr Nongezi asked the class, "are we convinced that this is a right-angled triangle?"

The class chorused, "yes".

Mr Nongezi asked, "why?"

A learner responded by saying that a protractor was used and she could see that the angle is 90°.

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Mr Nongezi presented this lesson using a whole-class question and answer approach. The focus of the lesson was on the importance of accurate measuring to determine whether a triangle contained a right angle. Many of the learners appeared to be relaxed and responsive to his questions. The learners made use of the teacher's protractor. No other teaching aids were visible. Although some of the learners chorused answers, they appeared lost in the last activity when Mr Nongezi asked them to use their arms to show the different types of angles.

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In this lesson, Mr Nongezi's teaching approach was similar to the previous lesson observed. In the first lesson on negative numbers, he also used a whole-class question and answer strategy. In both lessons, while some of the learners appeared to

be comfortable with his teaching approach, there were several who did not seem to understand the concepts. In the first lesson Mr Nongezi had to use many examples to help learners to understand the idea of negative numbers. In the right-angled triangle lesson, Mr Nongezi spent considerable time helping learners to understand the importance of accurate measurement. I now analyse the two cases using the three perspectives introduced earlier.

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Political perspective

The political perspective is about the exercise of power. In this perspective I analyse two aspects of power. The first looks at the teacher's relationships outside the classroom and the other the teacher's relationships with students inside the classroom. In each of these aspects, I focus on ownership, personal meaning, involvement and negotiation.

Outside the classroom

A question to be asked is whether Mr Nongezi has taken ownership on the new curriculum. According to Mr Nongezi, he is connected with the educational reform. He said he understood that the curriculum reform involved moving from being teacher centred to child or learner-centred. Mr Nongezi said he was happy with the education reform. He expressed some disappointment that the Department of Education had only spent three days introducing C2005. This focused on teachers changing from the "old traditional style" to the new approaches. He said that during the introduction:

> I was scared of what was happening because it was a new thing and big words and the new terminology was difficult, no more syllabus and no more subjects, so I got scared. But now as time went on I understood that this thing is not something to be feared.

Mr Nongezi said that he and the other teachers at his school consulted the policy documents and they determined what outcomes they wanted their learners to achieve. He complained that the policy documents were not easy to understand and that they only supplied one copy per grade. He said that he understood the terminology in the policy document, but the language is a "little bit complex". He did not fully understand the specific outcomes. Mr Nongezi plans his lessons monthly with the other teachers at his school. Mr Nongezi said that C2005 would work, "only if things are done in a proper way, if teachers get the confidence they need".

In terms of personal meaning, Mr Nongezi said that he believed in C2005 and its goal of preparing learners to become "life-long learners". According to Mr Nongezi, C2005 is good for the learners because it made them "curious" and the learners have a desire to discover concepts for themselves. Mr Nongezi compared his teaching approach when he started teaching with the new approach. He said:

> When I started teaching I was the only master in class and I was there to give learners everything they needed. So now I've changed, since I am no longer a teacher but rather a facilitator.

In terms of involvement, Mr Nongezi said that he would like the Department of Education to organise more workshops or even train teachers for longer periods so that teachers can understand the need for the curriculum changes. He said in the interview:

> I, as an educator, am still working hard to understand this constructivism. So I find it necessary that whilst I am still busy familiarising myself with constructivism, I make my learners to do the drill work so at least they can understand some work and keep it in their minds.

Mr Nongezi implied here that he is still getting to know the goals of C2005. In the meantime he continued to drill his learners so that the learners would remember the work that he has taught them.

Although Mr Nongezi agreed with the need for educational reform, he would have preferred to be involved in the development of the curriculum statements in the policy documents. He found out about the educational reform from other colleagues and through listening to the radio. He said that the mathematics teachers should have come together "and been given a chance to say what we can say and influence the curriculum".

In summary, Mr Nongezi said that he was in favour of the educational reform because it promotes life-long learning. However, he would have liked to be included in the policy making process. Although he understands the goals of the new curriculum, his classroom practices are very traditional. He said that he was unhappy with the way the Department of Education informed the teachers about the curriculum reform. His initial reaction to the reform was one of fear of implementation, intimidation with the complex language used and uncertainty about the content to teach.

Inside the classroom

The learners in Mr Nongezi's class have little ownership for the educational changes. In the lessons I observed, the teacher decided on the activity and how the lesson was presented. Many of the learners in Mr Nongezi's class appeared to be happy with his teaching approach and the learners appeared to enjoy the interactive, participatory question and answer method approach. The learners accepted the content of the lessons and did not challenge Mr Nongezi's choice of content. Mr Nongezi appeared to be a confident teacher and followed up any answer given to him by the learners.

Mr Nongezi chose the lessons that he was going to present. The learners in Mr Nongezi's classes did not appear have any personal input into the curriculum content. The ultimate decision lay with the teacher. In the negative numbers lesson, Mr Nongezi used the temperature concept which appeared to be of interest to the learners. However, the lessons were content-based and learner's values and beliefs were not considered.

In terms of learner involvement, it appeared that many of the learners, especially those with a command of the English language, enjoyed Mr Nongezi's approach. Mr Nongezi directed most of his questions to a small group of students who could eloquently answer in full sentences. There were many learners who were passive participants in the lesson and who were not asked questions. It appeared that the learners who raised their hands to answer were those who dominated the lesson.

The learners in Mr Nongezi's class have little negotiation power. The lessons were very much content driven in keeping with the thrust of the old syllabus. He based most of his methods, employing mini tests and exams. In both lessons, Mr Nongezi had firm control over the class, a situation that he appeared to enjoy and acknowledged in the interview.

In summary, Mr Nongezi had control over all aspects of his teaching. He decided on the content, assessment, resources, pace of lessons and when, and how the lesson was to be presented. Although the lessons presented appeared to be interactive and participatory, most of the decisions were made by the teacher. The learners in Mr Nongezi's class it appeared were not well connected to the curriculum.

Socio cultural perspective

The socio cultural perspective deals specifically with the background of the learners, the school and classroom context, problems experienced by the teacher and the ways in which the teacher accommodates the learners' socio cultural circumstances.

Mr Nongezi said that many learners came from single parent homes, often living with their mother or with a grandparent. The mother may be working or the grandparents supported by pension money. The school had a feeding scheme for the junior class learners who are provided with sandwiches three days a week. No provision was made for feeding the learners from the junior secondary classes.

Mr Nongezi complained about the lack of facilities. He said that he had a protractor and T-square. There was no other teaching equipment available for him. He said that the lack of resources is a problem. He referred to the lesson on the right-angled

triangle and said that he would have wanted the learners to draw their own right-angled triangle, but the learners "do not have the instrument boxes". The large classes are also a challenge to Mr Nongezi. In the first lesson observed he had 73 learners and the second 89. He said that these numbers are frustrating because "I can't check on all the learners in the class and the marking is too much". He continued and said, "I can't do this group work because there are 10 or 12 in a group and that is too much".

The large classes restricted learners' opportunities to communicate and interact with their peers. Mr Nongezi said that it was difficult to administer a test because he did not know who was copying in the test. He said that sometimes "the learners answers were the same" and there is nothing that he could do. There were textbooks available in the classroom, but Mr Nongezi did not use them in the observed lessons. He said that there were insufficient books for every learner. Mr Nongezi said that he was aware that some learners were passive, but "at least they are trying". He said that all the classes are large and therefore he does not know each and every learner, but he is "trying to learn their names". The classes are so large that sometimes he did not know whether learners were present or absent.

Mr Nongezi faces many challenges in implementing C2005. He is particularly challenged by the large numbers of students in his classes making it difficult to personally know and understand the socio cultural circumstances of each learner. He said that he might find out about the problems a learner has only if the parent or grandparent had spoken to the principal. The learners do not speak about their problems. Mr Nongezi said that he has involved himself in the administration of the school choir. He said that the learners like to sing and therefore they have many choir groups at the school.

In summary, Mr Nongezi is faced with the challenge of providing quality teaching to a large number of learners in his class. Because of the large numbers, he does not know his learners well and cannot always provide them with adequate support. Lack of teaching and learning resources means that Mr Nongezi is restricted in his teaching strategies. Some textbooks are available but he does not use them because there are insufficient for all the learners in his class.

Practical perspective

As I have done in the previous two chapters I consider the technical aspects of how the teacher implemented the goals of C2005. I examine the teacher's teaching approach, higher order questioning skills, integration of content, choice of content, assessment techniques, pace of lessons and utilization of resources.

Mr Nongezi based both lessons on whole-class question and answer technique. The approach could be described as traditional as he spoke most of the time. Although the learners sat in groups, at no time in the lessons were the learners asked to interact, discuss and explore concepts in their group. There was no room for the teacher to move amongst the groups and therefore it was difficult for him to facilitate the lesson as espoused in C2005. Notwithstanding the teacher centredness of the lesson, many of the learners seemed actively engaged in the lesson. The learners responded to his questioning and were not afraid to answer questions. At no time did he say that the answers were wrong. During the lesson on negative numbers, although the learner gave the solution as 4° C, which was the incorrect answer, he tactfully said

> she should be right because 4° C is less than 12° C, but I don't say it is the exact answer. At least she could be right. At least she is not saying that it could be 16° C or 20° C, because all these numbers are more than 12, because we said the number must be less than 12. Do we agree it could be 4° C?

In the right–angled triangle lesson, Mr Nongezi tried to involve as many learners as possible. He kept asking questions, repeated the question many times, and waited until many more hands responded to the questions. For example, he asked whether any other learners had any other views and he kept asking, "why?" Do you agree?" Although Mr Nongezi asked many good questions he did not seem to notice that several of the students were not engaged in the lesson.

When interviewed, Mr Nongezi said that when he commenced teaching, the learners always sat in rows and now they sat in groups. He found it difficult to do away with the telling method because he still believed in the importance of drilling students.

The learners answered many questions. The questions ranged from low level routine questions to higher order. In the lesson on negative numbers Mr Nongezi asked several questions requiring the learners to think about numbers less than zero. The process of arriving at the solution took a long time, but Mr Nongezi was not deterred and kept asking learners further questions to clarify their thinking and ultimately they arrived at a solution. For example

what do you think the temperature would be if it dropped by 16° C, at night? What would you expect it would be? It was 12° C during the day, now what would we expect the temperature to do?

He spoke in mother tongue and thereafter said "Just think, just think". To assist them in their thinking he said

If I have R5.00 in my pocket, I happen to lose R2.00. Then I don't have more money, I am left with R3.00. Now what is the real or exact temperature at night if it dropped by 16° C?

In the lesson on right-angled triangle, Mr Nongezi clarified concepts that learners could easily have misunderstood. He deliberately made errors that forced learners to think about the solutions they provided. For example, Mr Nongezi indicated that in the scalene triangle there was a 90° angle.

Little integration across the learning areas took place in both Mr Nongezi's lessons. In the lesson on negative numbers, Mr Nongezi integrated this concept with temperature. He referred to the temperature in other places, such as Umtata and Cape Town. In the second lesson, there was no evidence of integration.

The lesson content that Mr Nongezi chose was appropriate for the grade 8 learners. Negative numbers are a difficult concept for learners to understand and the right-angle triangle is an important concept. In the negative numbers lesson Mr Nongezi made a number of observations that were linked to real-life situations. He drew the learners' attention to the concept of temperature, the clothing that a learner should

wear when it is cold and the differences in weather temperatures in different part of the country. Mr Nongezi said that the lesson on right-angled triangles was an introduction to the next section that he is planning to teach, namely, the theorem of Pythagoras and it was for this reason that he wanted to ensure that learners understood the right-angled triangle.

While C2005 encourages the teacher to use a number of assessment tools, Mr Nongezi relied mainly on summative assessment. He said that:

> When I assess my learners, after I have given each lesson, I give them homework. Then at some time I give them a short test, so that I can see what they are doing.

While Mr Nongezi said that he, "gets the learners to do peer assessment", there was no evidence of peer assessment in the lesson observed. He acknowledged that he did not fully understand portfolios and with large numbers it is difficult to implement.

In terms of the pace of the learning, when Mr Nongezi used a question and answer approach, he expected the learner to provide the answer shortly after the question had been posed. In the lesson on negative numbers, Mr Nongezi repeated the question and in this way provided the learners with a few more seconds. Also he said "Just think, just think", to allow learners more time. However, the lessons were not learner centred and the pace of the lessons was controlled by the teacher. Mr Nongezi's perception, however, was that he allowed them sufficient time. He said:

> I engage my learners in activities where they discover things without me telling them. They discover it themselves. I make sure I give them enough time to discover, but I assist them with carefully planned instructions and questions.

C2005 advocates that the teacher provide learning support materials. In both the lessons Mr Nongezi did not provided any resources. In the lesson on negative numbers Mr Nongezi could have used thermometers in the lesson, and in the right-angled triangle lesson the learners could have folded the ends of paper together to

make a right angle. Mr Nongezi insisted that the learners should measure the angle and that they should use the protractor. However, he did not provide protractors or request the learners to bring protractors to class. He said, "right now I am struggling with instrument boxes for them, very few of them have those".

In summary, Mr Nongezi is a traditional teacher. The two lessons were based on a teaching approach that Mr Nongezi appeared to enjoy. He believed that this approach allowed him to involve as many learners as possible. He made extensive use of questions and kept probing for further clarification of concepts. As in the previous two cases studies there was little integration across the learning areas. Mr Nongezi determined every aspect of the teaching and assessment. There were no signs of a variety of assessment practices and few learning support materials.

Conclusions

From a political perspective the main reason given by Mr Nongezi for accepting the C2005 educational reform is that it promotes life-long learning. However, there was a mismatch between his beliefs and his practice. Mr Nongezi has control over all aspects of the curriculum. He decided on the content, assessment, resources, pace of lessons and when, and how the lesson was to be presented. Some learners, especially those who were eloquent, dominated the class and the passive learners were less evident. Although the lessons presented appeared to be interactive and participatory, the condition under which the lesson was presented was decided by the teacher.

From a socio cultural perspective, single parenting and hunger are dominant social problems in Mr Nongezi's class. At school, Mr Nongezi is faced with the challenge of providing quality teaching to a large number of learners in his class with limited resources. The large classes present a number of logistical problems. Mr Nongezi said that learners often copy in tests and exams, there are insufficient textbooks for all learners, and he often does not know whether learners are absent or present in his class. He is unable to assist individual learners with problems because he does not know when they have problems.

Mr Nongezi is a traditional teacher. While many learners appeared to enjoy his question and answer approach, others were not involved in the lessons. Mr Nongezi likes this approach because he wanted the learners to be critical thinkers and precise in their thinking. Mr Nongezi was aware of the goals of the mandated curriculum, but implements very little of it. There was no group work, little integration of knowledge, no evidence of alternative assessment techniques and no learning resources.

CHAPTER 7

MISS NOLUWAZI

Introduction

This chapter is about the fourth of the study teachers. Miss Noluwazi's case is different from the previous three cases because she moved schools during the course of the study. I first observed her teaching a grade 5 class at a township school, but six months later she was teaching grade 8 at a rural junior secondary school. I will firstly, present a teacher profile, followed by narratives of the two lessons I observed. I thereafter analyse the narratives in terms of the three perspectives that I have described earlier in chapter 2.

Teacher profile

Miss Noluwazi is a teacher with 12 years' teaching experience. She is a single parent with 2 children. Her decision to become a teacher was influenced by her teachers from the secondary school she attended. At the township school she taught grades 5, 6 and 7 mathematics. The school had water, electricity, and a photocopy machine. During the study she transferred to a rural school 250 km away from Umtata. She traveled every weekend to Umtata to attend her teacher professional classes. While she was away from school, her colleagues supervised her classes.

First visit

The school where Miss Noluwazi taught is situated in the township, just outside the city. When I arrived at the school, I noticed that the school was fenced. There were a number of children walking around. This co-educational junior and high school had an enrolment of 1432 and a staff complement of 36. On arrival at the school, I spoke briefly to the principal who said that Miss Noluwazi was a very motivated teacher. There were a number of parents waiting to see him, so my meeting with him was short. As we walked to Miss Noluwazi's class, he spoke to me about the school and his problems with vandalism, burglaries, learner absenteeism, and the task he has of

solving other people's problems. He said that he was more of a social worker than a principal.

I entered the classroom and greeted 52 learners. There were four learners in each of 13 groups. There were no charts on the walls. I spoke very briefly to the teacher, Miss Noluwazi, who commenced with the lesson.

Lesson 1: Money

Miss Noluwazi wrote the word shopping on the board. She said to the class that when something is purchased it has to be paid for, with money. She wrote the word money on the board and next to it she wrote the word, cash. Next to the word cash she pinned up a R10 note. She told the learners that, "some [people] used credit cards" and wrote the word cards on the board. The teacher said, "There are various types of cards, some are from where, where do you get the cards?"

A number of learners put up their hands and she immediately accepted an answer from a learner who said, "from the shop".

Miss Noluwazi repeated the answer and mentioned a number of shops saying, "they use the card to buy or to pay". She asked the learners, "what else do people use to buy, you use a card, you use cash, what else do people use to buy?"

A learner answered, "cheque" and the teacher wrote the word on the board. She stuck a copy of a used cheque next to the word on the chalkboard. The teacher displayed a chart that had a number of ladies advertising new clothes. Each piece of clothing was priced.

The teacher said,

> I want to go and shop in town. I have a chart in front of me. It has got a lot of things. Can you see the prices and the things on the chart?

The learners chorused, "yes teacher".

She continued and said that she wanted to buy all those things. She asked the learners where could she buy these things. She accepted the names of local stores from the learners. She asked them, "what type of shops are these, food shops or clothes shops?"

The learners chorused, "clothes shops".

She said that she wanted to buy one dress costing R149.00. The question she asked was, "what notes and coins can I use, if I want to buy that dress worth R149.00. Which notes and coins could I use?"

A learner said, "R100 note and a R50 note".

She asked the learners, "and then, what change do I get?" The learners put up their hands. She chose a learner who answered correctly and then she asked, "How did you get R1.00?"

The learner answered, "The exact amount is R149.00. I paid with R150.00, so I subtracted the R149.00 from the R150.00".

The teacher asked, "is it you or is it somebody else?"

The learners chorused, "somebody else".

Miss Noluwazi asked, "Who is that person and what is she called?" and told the learners to put up their hands. She asked one learner who said she is called the till. The teacher responded by saying she is not called a till, but did not offer any further explanation about the word, till. She asked a different learner for his response.

The learner said, "she is called a cashier".

She started handing out some blank A4 papers and told learners that they should choose any two items they wanted to buy in their groups and get the amount you can pay, meaning the total amount.

There was some discussion in the groups. She repeated the instruction and the learners interacted with each other. One learner was the scribe. The other learners gave input. The teacher circulated and reminded the learners that the values of the dresses are only from the chart in front. Miss Noluwazi gave the learners about three minutes for the activity before she said, "OK, most of the people are finished, most of the people are finished".

Many learners did not pay any attention to Miss Noluwazi. They continued talking and doing their calculations. A couple of minutes later the teacher said, "many people have chosen different items". She asked a learner which items were chosen. The learner said that the group chose an item for R109.00 and another for R299.00. Miss Noluwazi wrote these two amounts below each other on the board. She asked the learners in the group what their total was.

The learners from the group chorused, "R408.00".

The teacher asked another group for its choice. One learner stood up and answered that the group chose a dress for R360 and shoes for R105. The teacher asked what the total was and the learners answered, "R465.00".

The teacher handed out a pamphlet to each group that she obtained from a local supermarket. She had prepared an A4 page with her instructions. These were her instructions:

Using an advertisement, in your groups
1. Estimate the total cost of the shopping
2. Find the actual cost
3. What is the difference between your estimated cost and the actual cost?

Miss Noluwazi said to the learners that she wanted to see only one sheet on the table and said that one person should write and one person should "be talking at a time". The pupils immediately started working.

The teacher rotated from group to group assisting the learners. After about 10 minutes, she allowed the learners to report. She asked a learner to come to the board and said to the whole class, "she is ready to tell us what happened in her group". The learner came to the front and stuck her pamphlet on the board and her calculations. The learner told the class what she planned to purchase and the total amount that she would pay. The learner gave her values and shared the estimated cost, the actual cost and the difference between the estimated and actual. The other learners in the class clapped their hands at the end of the learner's presentation. Miss Noluwazi allowed another three groups to come to the front of the classroom to present their findings.

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Miss Noluwazi presented a lesson on money. She used a question and answer method in her introduction and used relevant teaching aids, for example, a cheque to help the learners become aware of other means of payment. She referred to shops in the town where clothing could be purchased. Miss Noluwazi showed the learners a large chart that she had prepared, with different clothing pieces on it with realistic prices. The other resource she used was an advertising pamphlet from a local supermarket. She provided each group with one set of instructions to follow when they worked in the group. She reminded the class that only one person should scribe and one person should talk at a time in the group. She asked the learners to report on their work at the end of each task.

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Second visit

Prior to my second visit Miss Noluwazi took a cross transfer to a rural junior secondary school, 250 km from her previous school. Her reason for the transfer was that she purchased a house so that she could be together with her children. When she taught at her previous school, she was renting a room. She worried about her children and is now happy to be with them, so that she can help them with their schoolwork.

The new school is situated 17 km from the nearest town. It is a large school with 1200 learners, 23 female teachers and 8 male teachers. The school does not have

electricity, running water or proper toilet facilities. It has a water tank that runs dry during winter months and the school has pit toilets.

I parked my car 200 metres from the main road and walked 300 metres to get to the school. The road leading to her school is in a poor state. I met the principal who was pleased to have Miss Noluwazi on his staff. He spoke very highly of her. As I had not informed him of this research, I spent a while discussing the study. He gave me his support and accompanied me to Miss Noluwazi's class. We spoke about her attending classes over the weekends and he was supportive and said that Miss Noluwazi has been running workshops at the school and he appreciated her efforts in informing other teachers of the changes in the curriculum. The principal said he had given her permission to attend professional development classes and arrangements had been made for her classes to be shared amongst the other teachers. The school timetable is based on a 10-day cycle and therefore the same classes were not affected every week.

As I entered Miss Noluwazi's Year 9 classroom I noticed that there were nine groups, with six or seven learners in each group. There were a number of mathematics charts on the back wall of the classroom. There were charts on prime factorisation, integers and fractions. The classroom was large enough to allow the teacher to rotate amongst groups.

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Lesson 2: Arithmetic sequences

Miss Noluwazi commenced the lesson by writing the word patterns on the board.

She asked the class, "what happens if we have an arithmetic sequence?" and wrote the words, arithmetic sequence on the board.

There was silence in the class. She asked again, "what happens, what is the rule of arithmetic sequence?"

There was no response. She called on a learner to answer.

The learner did not say anything.

She continued by asking "do we add or multiply if it is an arithmetic sequence?"

Some learners said, "add".

She followed on and said,

> meaning you do the same thing. To get a pattern, you do the same thing. If you are adding, you have to add until you get all the terms of the sequence

She said "right".

The learners chorused "yes Miss".

She continued:

> in front of me I got many, many investigations. Where you would have to investigate and the groups will be getting different investigation?

She distributed A4 photocopied pages to each group. To two groups she provided a number of 3-D shapes. She then stood in front of the class and the learners came up

to her to collect blank sheets of paper to write down their solutions. The learners commenced their investigations. Some of the learners worked with calculators.

In one group of seven learners, only four learners who were sitting around the end of the table were engaged in the discussion. Two performed calculations on their calculators, one learner wrote and the other provided some input. The other three learners appeared to show little interest.

The teacher said after a few minutes, "another fifteen minutes, I am sure the time keeper is keeping time".

Miss Noluwazi circulated from group to group. After a few minutes she said, "if you need, put up your hand and call me". She went to a group. The learner asked for clarification. She read the question and asked the learners to "discuss in their groups". Miss Noluwazi did not provide them with any further information before moving on to the other groups and assisted them when she saw that they needed help. She guided the group's thinking and then left them to continue with their investigation.

I focused on one of the groups. A learner took charge of the group and with a ruler in her hand, explained to the other members in the group what was to be done. I noticed that in the other groups, learners were now working in subgroups of four and three or three, two and two.

The teacher continued to rotate from group to group to check on the learners' progress.

Fifteen minutes later she said, "you have five minutes left".

The learners were still busy writing down their findings.

In one group, the learners were debating about what to write on their page. One learner explained and convinced the others in the group that she was correct and they accepted her explanations.

The teacher kept reminding the learners that, "time is running out".

The learners regrouped and returned to the initial format of one large group. The teacher stood in front of the classroom and asked "is any group ready?"

She approached a learner in a group and told the learner to take her question paper to the board. The learner drew a table on the board and began filling in the details.

The teacher then said, "somebody can go and help her and write the other things going down".

Another learner from the group walked to the board and assisted in the writing.

They wrote the following:

Name	Tetrahedron	Hexahedron	Octahedron	Decahedron
Number of vertices	4	8	8	8
Number of faces	4	6	6	8
Number of edges	8	8	8	10

The first learner returned to her seat whilst the second explained what they wrote.

The teacher asked the second learner to read the question.

The learner read, "In the question we have...".

The teacher interrupted and said, "just listen please", to the whole class.

The learner continued to explain what she wrote on the board.

The teacher asked the class,

anything that you have observed in the number of vertices, edges and faces? Members of the group can help. Did you observe anything? Any pattern?

There was no response from the learners in the group.

Miss Noluwazi explained to the class that the learners had calculated the number of vertices, edges and faces in the shapes that she provided. She pointed to the board and said, "in the tetrahedron there are four vertices, four faces and eight edges".

She asked the learners whether they saw any patterns.

There was no response.

She continued by saying: "Or we can ask other groups to come and report and the questions can come later". The teacher asked a group to report. The learner walked to the board and wrote the following:

$$1 + 2 + 3 = 6$$
$$2 + 3 + 4 = 9$$
$$3 + 4 + 5 = 12$$
$$4 + 5 + 6 = 15$$
$$5 + 6 + 7 = 18$$
$$6 + 7 + 8 = 21$$

The learner read the instructions from the page.

The teacher asked the learner to tell the class what the group did and how it got to the rule.

The learner started on the fourth row and said, "you add the four to the five to the six and you get 15". He continued to the next row, "five add six add seven you get twenty one" and he read out the last row as well.

The teacher asked, "What rule can you make from this? Do you have anything to say? Is someone willing to help the group? Can I ask someone to help him?"

A learner raised her hand.

The teacher asked her to respond.

The learner said that each time three is added.

Miss Noluwazi went to the board and pointed at the sum at the end of each row. She said, "this is our sequence" and wrote the numbers 6; 9; 12; 15; 18; 21. She continued by saying, "which means you add 3, right?"

She asked the learners what kind of pattern did they see.

A learner answered and said, "a pattern of multiples of three".

She said, "OK, thank you".

She asked another group to report.

A learner came to the board and wrote the following:

1. 1, 3, 4, 7, 11, 18, 29, 147, 179, 323
2. 29 X11 = 319
3. 2,3,4,5,6,7,8,9,10, 11=
      8 X11 = 88

The teacher asked the learner, "what did you find about the pattern?"

The learner said, "we find that we should add 3"

The learner said:

$$1 + 3 = 4$$
$$3 + 4 = 7$$
$$4 + 7 = 11$$
$$7 + 11 = 18$$
$$11 + 18 = 29$$
$$18 + 29 = 147$$
$$29 + 147 = 179$$
$$147 + 179 = 323$$

The learner continued and said, "29 X 11 = 319".

At this point, another learner raised his hand and asked, "I want to know how they got 147, when they add 18 to 29?"

The learner at the board used her finger and rubbed out the 147 and replaced it with 76.

The teacher said, "OK". You have seen the rule. Have you seen the rule?"

She asked a learner, "Have you seen their rule, what they have done?"

The learner did not answer. Miss Noluwazi said to him, "stand and say something if you want to say something".

The learner said that if you added the sum of 179 and 47 you do not get 323.

The teacher said, "OK, right". The question says add the 10 terms, what did you get?" she asked the learner.

The learner looked at the teacher. The teacher asked, "Did you add the terms?" She repeated the question.

The learner said, "No".

The teacher told the learner to sit down and she asked the class to clap hands for the groups who reported.

★ ★ ★ ★

Miss Noluwazi presented a lesson on arithmetic sequences. The learners sat in groups and interacted as they completed the task required. Miss Noluwazi provided the students with worksheets and three-dimensional models. The learners used their own calculators and reported on their findings at the end of the lesson. No formal or informal assessment was conducted during the lesson.

★ ★ ★ ★

I have presented two accounts of Miss Noluwazi's lessons. The lesson on money was taught at a township school to grade 5 learners. The teacher had sufficient resources and the learners managed the task the teacher gave them to do. The learners participated in the lesson and the teacher asked the learners for feedback at the end of the lesson. In the lesson on arithmetic sequences, presented to rural learners, the learners were actively engaged throughout the lesson. They were provided with photocopied information. The lesson revealed that learners did not have a good understanding of the concept of arithmetic sequence.

★ ★ ★ ★

Political perspective

As I have done in the previous three chapters, I will look at the teacher's relationships outside the classroom and relationships inside the classroom, particularly focusing on issues of ownership, personal meaning, involvement and negotiation.

Outside the classroom

In terms of ownership, Miss Noluwazi said in the first interview that initially she was reluctant to implement C2005. She said,

> I don't want any C2005. I was saying to the trainers that C2005 was going to end before the time and that this thing was not going to reach grade 9.

When I interviewed Miss Noluwazi during the second school visit she said that she was more positive about the C2005 educational reforms. However she said that she was concerned about the other teachers in her school.

She said,

> I think teachers have a problem, they can't understand what is happening. They are not guided directly by the trainers because they are trained for a week and nobody is following them up to the classroom to see what exactly is happening there.

Miss Noluwazi emphasized that teachers needed support in the classroom. She said that, "no-one is following the teachers in the classroom and therefore they are confused".

She continued by saying,

> teachers do not know what to teach. They say there is no syllabus, nothing.
> But if you unpacked the specific outcomes correctly, you know what to do,
> you know the performance indicators you want to do in a lesson.

Miss Noluwazi was unhappy that teachers were making excuses and not attempting
to understand the curriculum reforms. She said that she used her policy documents
regularly, although they were not easy to understand. She said that the understanding
of the policy documents depended on the trainer who trained the teachers. She said
that she had a good trainer who "unpacked the outcomes so that everyone
understood".

In the interview after the second lesson, Miss Noluwazi used many of the technical
terms in the policy documents, for example, learning programs and performance
indicators. She said that she had a "good" understanding of the C2005 policy
documents and that she has benefited initially from the University of Port Elizabeth
program and thereafter, from the training organised by the Department of Education
for the grade 5 teachers. She said that she had experimented with OBE teaching
practices in her grade 5 class before the implementation date.

In terms of personal meaning, Miss Noluwazi said in the second interview that
C2005 is good for the learners:

> I think they could prepare them for life long learning if the learners have
> achieved the outcomes correctly because if whatever you are doing, like if
> you are doing measuring on that day they would know how to measure even
> in real life situations not necessarily in the classroom.

In her lesson on money Miss Noluwazi attempted to make the lesson more relevant.
She discussed how learners could pay their bills and showed them examples of cash
and a cheque. Her lesson to the rural learners was not connected with the learner's
conceptual understanding of the topic. The learners were not able to connect to the
mathematical concept the teacher wanted them to learn. The teacher's choice of

investigation activities did not help the learners to understand the concept of arithmetic sequences and how it could be connected to real-life situations.

Miss Noluwazi was critical of the Department of Education and the way it introduced C2005. She became more involved in C2005 but said that her initial reaction to C2005 was that it was not going to work. She clarified her statement and said that the Department officials who introduced C2005 had been out of the classroom for many years and they should have asked teachers to help them with their training. Miss Noluwazi said that there were many teachers who could explain C2005 better than the Department officials.

Miss Noluwazi was not involved in the negotiation of the policy documents. She said that the policy makers should have consulted the teachers who were going to implement the reform. However, having been exposed to the reform she is now more favorably disposed towards it.

In summary, Miss Noluwazi appeared to have taken on the ideas of C2005. Although initially she was not in support of the reform, over the period of the study, she changed her perception. She was unsympathetic towards other teachers who were not embracing the educational reform. Her involvement with the intervention program offered by the University of Port Elizabeth and the Department of Education helped motivate her positively towards the educational reform.

Inside the classroom

Miss Noluwazi appeared to allow the learners opportunities to take ownership and connect to the curriculum. In the lesson on money, the teacher provided the learners with a range of resources so that they could proceed with their task. At the end she asked them to report. The learners appeared relaxed and the lesson appeared to be conducted in a warm and friendly environment. In the first lesson, the grade 5 learners sat in their groups, interacted with each other and appeared to have achieved success at the end of the lesson. In the lesson on arithmetic sequences in the rural school, Miss Noluwazi provided resources for the lesson, arranged the learners in groups and encouraged the learners to discover the concepts. The learners were free

to ask questions. For example, when the learner made a mistake she saw the learner put up his hand and allowed him to ask his question.

The learners in both classes followed Miss Noluwazi's instructions. In the first lesson the topic was relevant and of interest to many learners. She gave learners the choice to choose any two items that they desired to purchase. In the second lesson, the learners appeared a little confused at the end of the lesson. The teacher introduced arithmetic sequences and the first group that reported was unable to find any patterns or sequence. The teacher did not address this issue and moved on with the lesson. This lesson lacked personal meaning for the learners.

In terms of involvement the teacher guided the learners in the tasks that they completed. The learners were told by the teacher what task they were to do and the period in which they were to complete the task. In both lessons the learners were engaged in their tasks. In the lesson on money the learners were more relaxed and appeared to have more confidence. The reason for this may be twofold. Firstly, it might be that the learners had been exposed to the "new" espoused C2005 approach for a longer time and secondly, the learners had a better command of the language because they lived around the city. One reason that Miss Noluwazi provided for the learners' lack of involvement in the rural school was that it is considered disrespectful for black learners to question adults. According to Miss Noluwazi this practice still exists in many black, rural homes especially where the parents are uneducated.

The learners in Miss Noluwazi class did not have negotiation power in terms of the content that was presented. The teacher decided on all aspects of their learning. While she gave them a few choices in the first lesson, Miss Noluwazi was still the dominant person in the classroom.

In summary, the learners in Miss Noluwazi's class performed the tasks determined by the teacher. She was the dominant person, and although she experimented with a more learner centred approach, she decided almost every aspect of the teaching and learning process. Miss Noluwazi was selective about her choice of resources to ensure the learners were able to learn the concepts.

Socio cultural perspective

In this analysis I specifically focus on the background of the learners, the school and classroom context, the problems experienced by the learners and the teacher, and the ways in which the teacher accommodated the socio cultural circumstances in her teaching.

Many of the parents of the learners that attended the township school were working. Miss Noluwazi said that they were far "better off" than those from the rural areas. She said that "maybe someone in the family is working or doing something". On the other hand the parents of the rural learners,

> are labourers, domestic workers, very poor. In fact the environment is poor. The parents cannot pay their fees of R50 per year. I have observed that most of the learners stay alone because their parents are working far away. They are not educated, just domestic workers.

The conditions of the township school were more conducive to learning. Her opinion was that the learners were more exposed to life in the city and many of the learners wanted to learn. They could talk more and were not "shy" like the learners in the rural areas. In the city, resources were available like the pamphlets that she used in the lesson on money. At the rural school, the school did not have enough classes for all the learners. The buildings were dilapidated. The one block of classrooms was a mud building and needed to be replaced. Miss Noluwazi said that when she arrived at this school there was no science and mathematics equipment. She said that she had to improvise as best she could and that she had to bring equipment from her home for example, jugs and measuring cylinders. She repeated that the children stayed alone at home and that their parents worked either in Johannesburg or Durban and there was not always food available. Another problem that she highlighted was that the learners walked long distances to come to school. Some of the learners had to cross a river to reach school. She cited an example where a learner passed away and the teachers crossed a river to reach the learner's house.

Miss Noluwazi highlighted the fact that when it rained then learners do not come to school. The absenteeism rate was very high and this created problems for her. However, she said that the biggest challenge is the learners that come to school hungry. She said that they sat in the class and did not participate. Miss Noluwazi said that she was not able to give the learners any homework. All work had to be completed at school. Many of the learners did not have electricity and they arrived home late and therefore were not able to do homework.

Money is a topic that would interest many learners. Miss Noluwazi chose a very appropriate lesson for grade 5 township learners who would want to learn about money and also about fashionable clothing. For the lesson on arithmetic sequences, the learners could not relate the application of the tasks to their own cultural background. While the teacher used appropriate strategies, she was unable to relate the lesson to the learner's cultural background.

In summary, Miss Noluwazi was faced with a number of teaching and learning challenges. Miss Noluwazi said that the lack of resources and hunger are some of the challenges that she faced. She said that she could improvise the teaching resources but the hunger is out of her control. The rural school did not have much money to assist because only half the parents pay the R50 per annum school fees. She also had to choose learning tasks that were applicable to the learners. This was not always easy with limited teaching resources.

Practical perspective

In this section I look at the technical aspects of how the teacher implemented the classroom practice goals of C2005. I look at a number of aspects. I examine the teacher's teaching approach, including higher order questioning skills, integration of content, choice of content, assessment techniques, pace of lessons and utilization of resources.

Miss Noluwazi used the question and answer approach and the learner centred approach in the lesson on money. For example, in her introduction to the lesson she asked the learners questions, "what type of shops are these, food shops or clothes

shops" and "what notes and coins can I use, if I want to buy that dress worth R149.00. Which notes and coins could I use?" She then asked the learners to work in their groups. In the lesson on arithmetic sequences, she had the learners working in groups from the start of the lesson. She facilitated throughout the lesson and guided the learners. It was at the end of the lesson, in the report back stage, that she experienced problems. Miss Noluwazi lacked the content knowledge to be able to quickly sum up a content related problem situation and guide the learners to a solution.

In the lesson on money the teacher had asked basic, routine questions to the grade 5 learners. The learners could easily answer the questions. In the lesson on arithmetic sequences, the formulation of a formula and discovering a pattern is difficult. Learners need practice and need to be guided, especially if they have not previously performed this type of exercise.

One of the goals of C2005 is the integration of mathematics with the other learning areas. In the first lesson, the teacher used the idea of shopping. One of the C2005 learning areas is Economic and Management Sciences and this topic could be integrated with the mathematics learning area. There was no evidence of integration in the second lesson.

The content that Miss Noluwazi chose for the first lesson on money was appropriate. The approximate age of these learners was 10 or 11 years and these learners were interested in money and shopping. In the second lesson, Miss Noluwazi's choice of topic of arithmetic sequence was a good one. However, shapes such as Tetrahedron, Hexahedron, Octahedron and Decahedron are unfamiliar, uncommon terms and therefore the lesson presented by the teacher had little relevance to the learners. At no stage during the lesson did the teacher point out the relevance of the content to the learners.

The learners in Miss Noluwazi's classes followed her instructions. Their responsibility was limited to performing the assigned tasks. The learners were not involved in any decisions about the teaching and learning processes. There was little

opportunity for some of the brighter learners in the class to challenge the teacher in terms of the choice of content, especially if the desired outcome was not achieved.

Miss Noluwazi said in her interview that she assessed the learners at the end of the period. In the two lessons observed, no assessment took place. She said that she used multiple assessment tools for example, peer assessment, group assessment and she also gave the learners projects and assignments. She said that her assessment was dependent on her presentation. She said that for both her lessons she planned to use group assessment that she normally did at the end of the lesson.

The teacher controlled the pace that the learners performed their tasks. She allocated a period of time for them to complete the task and reminded them when to finish. However, she did not strictly adhere to this time and was flexible. In the lesson on arithmetic sequences, she initially gave them 15 minutes, but when she saw that the learners were still busy, she allowed them another five minutes to complete the task.

Miss Noluwazi complained about the availability of resources at her school. She said that she had to improvise and make her own resources. For her lesson on money she made a chart of the clothes she wanted the learners to purchase, she prepared a worksheet, she showed the cash and an old cheque and she brought copies of a pamphlet. In her lesson on arithmetic sequences, she provided the learners with copies of investigations that she photocopied and she also provided two groups with three-dimensional shapes. Miss Noluwazi said that when she prepared her lessons, she considered what resources she needed and how best she could improvise when the resources were not available.

In summary, Miss Noluwazi appeared to be a dedicated teacher who understood the teaching goals of C2005. She practiced group work in her classes, provided the learners with stimulating tasks to develop their thinking, looked for opportunities to integrate her lessons, chose relevant content, paced her content and provided the learners with appropriate teaching resources. In general, this was good evidence that Miss Noluwazi had made good progress towards embracing the goals of C2005.

Conclusions

From the two lessons observed, the interviews and the enthusiasm that Miss Noluwazi displayed it is evident that she has taken on the ideas of C2005. This teacher appeared willing and enthusiastic about the education reform. Like the other teachers in the study, the intervention program offered by UPE too, has influenced her. In the classroom, Miss Noluwazi was the dominant person and decided every aspect of the teaching and learning process. This was evident in both the township school and the rural school. The learners completed the task chosen by Miss Noluwazi. The learners were not involved in any of the decisions about the presentation of lessons. The teacher presented both her lessons in a learner centred approach, and allowed learners to discover the concepts. Miss Noluwazi did not do any assessment in either of the lessons observed. The second lesson appeared to discourage the learners as no satisfactory solution was found.

From the socio cultural perspective Miss Noluwazi was aware of the challenges – lack of teaching resources and the poverty of the learners. There was not much that she could do about the poverty and hunger, but in terms of lack of resources she improvised. She was prepared to bring teaching resources from her home, make charts and provide resources to stimulate and accommodate her learners. However, this practice was not always easy with the limited teaching resources available to the teacher.

From the practical perspective, there was evidence that Miss Noluwazi had made good progress in implementing the teaching goals of C2005. In both her lessons she practiced group work, provided the learners with tasks to develop their thinking, integrated her lessons, chose relevant content, paced her content and provided the learners with appropriate teaching resources. However, Miss Noluwazi appeared to lack the content knowledge to support the rural grade 8 learners and therefore, her lesson did not meet with success.

CHAPTER 8

DISCUSSION, IMPLICATIONS AND CONCLUSION

Introduction

This study examines the teaching and learning of mathematics in four rural South African classrooms in the context of national mathematics curriculum reform. A constructivist interpretative case study approach to data construction and analysis was conducted using narrative inquiry. Data included interviews with study teachers, field notes and video records. These were collected during two visits to each school. Narratives of two lessons from each of the four classrooms were constructed and analysed using a multiple perspectives approach. In this final chapter, I first provide a summary of the four case study teachers. Second, I discuss the findings by looking at the various levels of curriculum encountered in each case and how the political, socio cultural and practical perspectives impinge on each level. Thirdly, I present the conclusions to the study. In the final section, I consider some implications for teachers, learners, professional development, policy formulation and for future research.

Summary

In this section I present a summary of the four study participants – focusing on their profiles, their school settings, and the lessons I observed.

Mrs Nkosi

Mrs Nkosi was an experienced teacher with 19 years experience teaching mathematics and science to grades 4, 5 and 6. She was a caring teacher interested in providing her learners with experiences that incorporated the use of learning resources. Mrs Nkosi viewed herself as a facilitator of learning rather than a transmitter of knowledge. She encouraged her learners to discover mathematical

concepts for themselves, work in groups and manipulate the teaching resources she provided. She evaluated her learners' work at the end of the lesson – her justification for not applying formative assessment strategies was that her learners were too young for other forms of assessment. Mrs Nkosi made it clear that she was not in favour of C2005 when it was introduced and considered resigning from teaching at this time. She subsequently changed this view attributing this change of heart to her involvement in the professional development program.

The school in which Mrs Nkosi teaches is a co-educational rural school lacking equipment such as typewriters, computers, telephones and teaching aids. Although the classroom appeared large enough to accommodate all her learners, Mrs Nkosi was unhappy with its size, saying that the classrooms were too small for her to freely rotate amongst the groups. She had large classes ranging from 47 learners in her grade 6 class, to 61 in her grade 5 class.

The topics of the two lessons I observed were fractions and multiplication. Mrs Nkosi's lesson on fractions incorporated both direct instruction and some facilitation. Her lesson on multiplication was mainly facilitation and she responded to her learners immediately when they called for her. She provided the learners with learning resources. Because the school had limited financial resources to purchase and provide learning resources, she was prepared to spend her own money to buy additional resources. Although Mrs Nkosi presented, what appeared to me to be simple, content-based lessons, the learners still experienced difficulty in grasping the concepts.

Over the course of the study Mrs Nkosi appeared to become more positive towards the implementation of the educational reform. When C2005 was introduced, Mrs Nkosi said that she was initially not interested in its implementation because of a lack of training and her limited understanding of the document. However, she came to appreciate that the goal of C2005 was to prepare learners to get better jobs and skills to be job creators. She was encouraged to implement the reform because she did not want to deprive her learners from getting a "better education".

Miss Tulani

Miss Tulani was a teacher with 12 years experience. She taught mathematics to grade 7, 8 and 9 learners at a co-educational junior secondary rural school situated 20 kilometres from the nearest town. The school had electricity and chalkboards but no computers, typewriters nor telephone. There were no adornments on the classroom walls and the school is fraught with social problems such as dagga, rape and sexual abuse. Miss Tulani enjoyed teaching mathematics because she studied it at school.

Both of the lessons I observed were on triangles. She used a more learner centred approach in her first lesson on the classification of triangles where she had all her learners sitting in groups and they interacted with each other. The second lesson challenged the learners and although Miss Tulani provided them with the template to trace the triangle in their books and do the calculations, they were not able to come up with the solution and the lesson ended with Miss Tulani providing the answers.

In her classroom practice, Miss Tulani was moving towards the implementation of the new curriculum. However, Miss Tulani was eager to teach the mathematics content to the learners. She considered a content-based curriculum appropriate and wanted a syllabus to guide her choice of topics for her lessons. Although she was in possession of the curriculum documents, she did not regularly consult them because she considered the outcomes unrealistic and difficult. She used summative assessment in her class. Miss Tulani appeared genuinely concerned about the learners who had to walk long distances and sometimes endure unpleasant weather conditions. Her teaching was hampered by the many social problems she experienced and the poor infrastructure at the school.

Mr Nongezi

Mr Nongezi was a teacher with 10 years teaching experience. He taught grade 8 learners in a co-educational school. He had recently taken up a new position as head of department in a rural school 14 km away from the nearest city. The school has few teaching aids and Mr Nongezi made extensive use of the chalkboard when teaching. Mr Nongezi admitted that he was anxious about C2005 when it was first introduced

and indicated that there were "big words" and the "new terminology was difficult". However, he supported the educational reform because "it made the learners curious". Mr Nongezi only used summative testing because of the large class sizes.

Mr Nongezi had large classes. It was difficult for him to move freely amongst the learners in the classroom and he opted for a question and answer teaching approach. A noticeable characteristic of Mr Nongezi's teaching style was his questioning technique. It provided him with a tool to assess his learner's prior knowledge and allowed the learners to think about the questions he asked. In addition, Mr Nongezi was never satisfied with only one solution and encouraged a number of learners to express their point of view. Mr Nongezi said that he used the question and answer method to overcome the problem of large numbers of learners in his classes. He realised that he was expected to implement more learner centred methods, but given the context, he was unable to do so.

Mr Nongezi presented lessons on negative numbers and the right-angled triangle. Both of these lessons were interactive and Mr Nongezi posed a number of open-ended questions throughout his lesson to encourage his learners to explore the possibilities of different answers. He accepted the learners' answers and further probed in order for them to develop depth in their understanding of the concept. In the lesson on right-angled triangles, he drew a block at the end of an acute angle and then said to the class that the angle had to be a right angle because there now was a block. In this way he tried to prevent learners developing a misconception of the concept.

Mr Nongezi believed that he facilitated his lesson – although in both lessons Mr Nongezi was the dominant figure and his teaching approach was teacher centred. He admitted that he still used the drill method in his teaching and was of the opinion that this is the best method for learners to "understand some work and keep it in their minds". Mr Nongezi did not provide the learners with learning resources to assist their construction of knowledge.

Miss Noluwazi

Miss Noluwazi was a teacher with 12 years teaching experience. Her own secondary school teachers were her role models and they influenced her to take up teaching. During the course of the study she transferred from a township school to a rural school. Unlike the rural school the township school had water, electricity and photocopying facilities.

In her first lesson on money, Miss Noluwazi brought a sense of enthusiasm to the class. She employed a combination of activities including oral question and answers, worksheets and hands on activities to help the students to interact and share ideas. Miss Noluwazi used both teacher and learner centred methods during the lesson. After observing Miss Noluwazi teaching the grade 5 learners, it appeared that she was practicing some of the principles of OBE in her teaching. This notion was confirmed after seeing her second lesson where she had the learners interacting in their groups, using worksheets and reporting on their investigation. However, this lesson did not meet with much success in terms of learners understanding the concept she was teaching. This second lesson was taught to grade 8 learners and the teacher appeared to lack the content knowledge required for the lesson. Her choice of learner resources was not well matched to the intended outcomes.

In the first lesson on money Miss Noluwazi attempted to make the lesson relevant to the learners' world. She used pamphlets to depict clothing items that could be purchased at clothing shops. She also asked the learners the title of the person that collects the money at these shops. Through these links she attempted to integrate the lesson. The topic of the second lesson I observed was arithmetic sequences. Although she had prepared her lesson, the choice of the worksheets did not connect to the topic under discussion. When the learners reported at the end of the lesson, Miss Noluwazi seemed unable to guide the learners or respond to their questions. This indicated to me that she lacked the required content knowledge for this lesson.

Miss Noluwazi said that she was concerned about her colleagues and other teachers who were not implementing C2005. She had an understanding of the policy documents and this was evident in the way she used the technical terms in the

interviews. The principal at the rural school informed me that she was running workshops on the curriculum reform at the school. Miss Noluwazi believed that all teachers would perform better if they got classroom support.

Discussion

In this thesis I have focused on the teaching and learning of mathematics in South African rural schools in the context of a major national curriculum reform – Curriculum 2005. C2005 is the first reform initiative of its kind in South African history because it aims to take into account all learners from every part of South African society. While the focus of this thesis is on the teaching and learning of mathematics, and the examples given are from the classrooms of four rural teachers, it is quite clear that the reform forms a major backdrop for what is happening in these classrooms and other classrooms throughout the country.

What I have attempted to do in this thesis is investigate the teaching and learning of mathematics from three different perspectives – the political, the socio cultural and the practical. Reflecting on the findings from the four case studies, it became clear that while the focus of the study was on the classroom, the context of C2005 and the teachers' connection with, and participation in, reform activities was an overriding concern. It became clear that the teachers in this study interpreted the curriculum at different "levels" – for example, the curriculum came to the teachers as a formal document, was interpreted by the teachers, translated into practice by the teachers, and hence experienced by the learners. These four levels I refer to as the formal, perceived, operational and experiential curriculum – after Goodlad, Klein and Tye (1979) and van den Akker (1998). All four of these curriculum levels were in evidence in this study. In the discussion of my findings I will use these four levels of curriculum as a way of organising my thoughts and re-presenting the political, socio cultural and practical perspectives.

Formal curriculum

The formal curriculum incorporates that which is intended by the curriculum designers, but more significantly it covers the explicit goals of the curriculum as set down in the actual document. Here I interpret the goals of C2005 in terms of the three perspectives – the political, socio cultural and the practical.

From a *political* perspective C2005 is clearly about empowering the population and trying to bring South Africa into the 21st century. Its overriding concern is equity for all; and the application of the principles of co-operation, critical thinking, social responsibility and the participation of all individuals in all aspects of society. For example the *National Education Policy Act,* (NDE, 1996) states that the purpose of the education system is to:

> ➢ contribute to the full personal development of each student, and to the moral, social, cultural, political and economic development of the nation at large, including the advancement of democracy, human rights and the peaceful resolution of disputes;
>
> ➢ provide opportunities for and encourage lifelong learning;
>
> ➢ achieve an integrated approach;
>
> ➢ cultivate skills, disciplines and capacities and encourage independent and critical thought. (p. 4)

In order to implement these goals, C2005 serves as a "strategic intervention designed to facilitate and guide the development of a transformed education and training system in a practicable and sustainable way". The C2005 takes as its point of departure:

> that successful modern economies and societies require citizens with a strong foundation of general education, the desire and ability to continue to learn to adapt to, and develop new knowledge, skills and technologies, to move flexibly between occupations, to take responsibility for personal performance, to set and achieve high standards, and to work cooperatively. (p. 3)

From a *socio cultural* perspective the reform is clearly focused on achieving equitable outcomes across the socio cultural spectrum and encouraging teachers to acknowledge and respond to the values and lifestyles of their learners. The general premise is that schools and teachers can make a difference in every learner's life by providing the conditions necessary for each learner to achieve success. It is stated in the *National Education Policy Act* (NDE, 1996) document that the education system shall:

> ➤ Contribute to the full personal development of each student, and to the moral, social, cultural political and economic development of the nation at large.

> ➤ Achieve equitable education opportunities and the redress of past inequality in education provision, including the promotion of gender equality. (p. 4)

The basic assumption here is that all learners in South Africa should have equal access to educational opportunities irrespective of class, gender, race and ethnicity and every teacher is expected to be an agent of social change. The *Manifesto on Values, Education and Democracy* (NDE, 2001) identified social justice as one of the values of the Constitution of the country. It is stated in the Manifesto that:

> Children, specifically, enjoy the inalienable right to basic nutrition, shelter, basic health-care services and social services and to be protected from maltreatment, neglect, abuse or degradation. (p. 14)

From a *practical* perspective, the C2005 document is explicit about the kinds of strategies that teachers are expected to use. The document sets out strategies that are particularly focused on encouraging learner centeredness. The document adopts the philosophy of outcomes based education (OBE) and sets out a series of critical outcomes that learners should achieve as a result of teaching and learning. It is envisaged that learners should be able to:

> ➤ Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made.

> ➤ Work effectively with others as a member of a team, group, organisation, community.

➤ Organise and manage oneself and one's activities responsibly and effectively.

➤ Collect, analyse, organise and critically evaluate information.

➤ Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation.

➤ Use science and technology effectively and critically, showing responsibility towards the environment and health of others.

➤ Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation. (NDE, 1997, p. 15)

The assumption behind the outcomes approach is that learners will be held accountable for their learning and responsible for achieving the outcomes (made explicit to the learners by the teacher). The outcomes listed in C2005 are underpinned by a set of learning principles. These include:

➤ Learner centeredness (putting the learner first, recognising and building on their knowledge and values and life style experience);

➤ Critical and creative thinking (promote the learner's ability to think logically and analytically as well as holistically);

➤ Integration (a view of learning that rejects a rigid division between academic and applied knowledge);

➤ Relevance (the content of lessons should be relevant and appropriate to current and anticipated future needs of the learner); and

➤ Learning support material (adequate learning support material is essential for the successful implementation of the new curriculum. (NDE, 1997, pp.1-19)

In summary, the C2005 curriculum and supporting documents have political, socio cultural and practical threads interwoven throughout. The formal curriculum was designed to anticipate the future needs of the individual learner, society, commerce and industry. The aim is for South Africa to become a leading competitor in the global economy served by a well educated population with the necessary competencies and skills. These overarching goals are to be achieved via particular teaching strategies and learning outcomes designed to develop learner responsibility.

Perceived curriculum

The perceived curriculum includes how teachers make sense of the formal curriculum and connect to the related teacher development activities. The perceived curriculum is the curricula of the mind. What has been stated in the formal curriculum is not necessarily perceived and enacted. Again I will interpret this curriculum level from the three perspectives.

From a *political* perspective the four teachers in this study are products of the apartheid regime. They are from a formally disadvantaged population – the Transkei – so they come from regions where teaching and schooling were sites of resistance. Now they see the curriculum as a form of empowerment. When I interviewed the teachers, they regularly used the word "empowered" when talking about schooling and curriculum. I was not surprised by just how prepared the teachers were to use this language as they saw C2005 as a hopeful way of moving forward towards reforming the nation and giving the learners hope.

Notwithstanding the above sentiment Miss Tulani, Mrs Nkosi and Mr Nongezi initially expressed reservations about the reform for several reasons. First, they were not involved in the formulation of the policy document, second, they did not understand what was expected from them in terms of their teaching and learning and, third, the language used in the document was confusing and complex. Miss Tulani said the curriculum reform was "forced upon her". Mrs Nkosi considered resigning as she realised that she had to alter her teaching practice and Mr Nongezi said that he "feared" C2005. Miss Tulani said that when C2005 was introduced she was negative and believed that the traditional system was better because she had access to a syllabus which guided the content taught in her class. She also said that some of the outcomes in the policy document were unrealistic and difficult for the learners to achieve. However, over the course of the study Miss Tulani's perceptions changed and she gradually began to understand the thinking behind the implementation. Each case study teacher mentioned the influence of the C2005 workshops run by the Department of Education and the two-year UPE teacher development program. Mrs Nkosi and Miss Tulani said that they were "motivated" and Miss Noluwazi said that she has "benefited" from these programs and that they were developing a better

understanding why C2005 is to be implemented. Each participant reflected on their understanding of C2005 and their motivation for accepting the C2005 reform. In general, they said that C2005 is good for the learners and would prepare them for lifelong learning. Mrs Nkosi believed that the reform could prepare learners as job creators and Miss Tulani believed that C2005 would build the skills, attitudes and values of learners.

In *socio cultural* terms the teachers understood that the learners were from very poor backgrounds and they did many things in their schools to compensate. For example, Mrs Nkosi realised that many learners came to school hungry. She believed that learners cannot learn when they are hungry and she suggested that the school raised funds so that the learners could be fed. Mrs Nkosi and Miss Tulani perceived that learners' absenteeism, and the availability of resources were challenges that needed to be addressed. Because she had teaching experiences in both the township school, Miss Noluwazi was aware that the township learners talked more than the rural learners. She said that the rural learners are shy and therefore did not participate in the class. Miss Noluwazi and Miss Tulani said that learners walked long distances to school and some had to cross a river. Miss Noluwazi also was aware that learners did not come to school when it rained. The absenteeism rate was very high and this created problems for her.

One of the factors that I alluded to earlier is that rural learners are shy and reluctant to ask questions. To accommodate these learners, Miss Noluwazi regularly used the term "right" or "OK" to establish that they understood the task or the point she was making. The learners would respond by chorusing "yes".

Miss Noluwazi chose a very appropriate lesson for the grade 5 township learners who would want to learn about money and also about fashionable clothing. For the lesson on arithmetic sequences, the learners could not relate to the application of the tasks to their own cultural background. The teacher implemented the desired learner centred strategies, but was unable to relate the lesson to the learners' cultural background.

Practically, the teachers were beginning to come to an understanding that their pedagogy had to be significantly different from their practices in the past. I offer two examples of the teachers' thinking – from Mr Nongezi and Mrs Nkosi. The first example relates to assessment techniques used. Mr Nongezi said that he was formerly a traditional teacher and the only "master in class and I was there to give learners everything they needed. So now I've changed, since I am no longer a teacher but rather a facilitator". Mrs Nkosi acknowledged that she had to do group work in her class although she was concerned about the effectiveness of group work as a teaching approach. She said that, "that some of the groups were slightly slower, and I'm not sure whether all the children are learning".

In summary, all four teachers perceived the curriculum as an instrument for the liberation of learners from the previous inequitable education structures. After some initial reluctance they appeared to embrace the reform and were implementing it according to their understanding. The teachers were conscious of the struggles that rural learners face. However, issues of basic nutrition and shelter were beyond the control of the teachers. The teachers seemed convinced that C2005 offered a 'new way' and that anything different from the 'old' would be better.

Operational curriculum

The operational curriculum – sometimes called the implemented or enacted curriculum – is about how the teacher puts the new curriculum ideas into practice in the classroom. What teachers perceive the curriculum to be and what they actually do may be quite different. The operational curriculum is what goes on daily in the teacher's work in the classroom. Again, I analyse this curriculum level in terms of the three perspectives.

From a *political* perspective, I am interested in how well the teacher is connected to the curriculum. Although initially, the teachers felt they had a limited amount of training, they appeared to be more connected to C2005 at the end of this study. Here I offer three examples. First, Miss Tulani said that the Department of Education only trained them "for a short period, and that it was not possible to learn a lot within a short period of time". However, she appeared more positive at the end of the study

165

and she said "I am motivated, especially after the training from the University of Port Elizabeth". There appeared to be a mismatch in her thinking because in her interview she later admitted that she "didn't always consult the policy documents". Second, Mrs Nkosi and Miss Noluwazi appeared to be willing to accept, especially in their teaching practices the ideas of C2005 and learner centred teaching. Mrs Nkosi and Miss Noluwazi appear to have made the greatest progress in terms of the way they facilitated their lesson, used multiple teaching resources, and allowed learners the opportunity to interact with each other. Miss Tulani felt very secure in her teacher-centred teaching and although, she facilitated the one lesson I observed, she appeared to have more teacher centred teaching allegiances. Third, according to Mr Nongezi, he is connected with the educational reform. However, although he saw the curriculum reform as moving from teacher centred to child or learner-centred, both the lessons observed were very much teacher centred.

From a *socio cultural* perspective the teachers made some adjustments in their teaching to accommodate the needs of the learners. For example, Mrs Nkosi collected second hand clothing to distribute to needy learners, she purchased teaching aids with her own money in order to assist the learners to understand the concepts and she repeated lessons for those learners who were absent for a day or two. She also repeated her questions in the learners' mother tongue to ensure that they understood the questions. To accommodate her rural learners, Miss Noluwazi regularly used the term "right" or "OK" to establish that learners understood the task or the point she was making. The learners responded by chorusing "yes". This chorusing also took place in Miss Tulani's classes.

From the *practical* perspective the operational curriculum is about how the teacher implemented the goals of C2005. These goals encourage the teacher to use group work, be a facilitator in the classroom, promote higher order thinking skills, integrate the teaching and learning, use relevant content, allow learners to take responsibility for their learning, teach at a reasonable pace, and use appropriate learning resource material and assessment techniques. Some of these goals seemed to receive more attention than others. In general terms, I saw more evidence of learner centred teaching, pace of learning and use of resources than integration of knowledge, learner responsibility and appropriate assessment.

For example, Mrs Nkosi and Miss Noluwazi appeared to have made the greatest progress in terms encouraging learner centeredness. They provided the learners with multiple teaching resources, informed them what task to perform and then walked around in the classroom assisting those who were having difficulty. Miss Tulani, on the other hand, felt very secure in her teacher-centred teaching and, although she facilitated one of the lessons I observed, she retained many of the characteristics of a teacher centred teacher. She did not seem prepared to allow the learners to discover concepts for themselves. On one occasion, she became angry and raised her voice with the learners when they were not able to respond to her questions. However, the reason for her becoming angry was because her questions were non-routine and challenging for the learners. The learners in her classroom were expected to think deeply about the task at hand and answer questions related to its application. In terms of the pace of learning, Mrs Nkosi appeared to have prepared her lesson so that she could achieve what she planned to do within her teaching period. She allowed the learners to work in their groups and did not pressurise the learners to work faster. To ensure that she did not move on too quickly to the next task, she determined whether the learners had completed the task by asking, "are you finished?" With the exception of Mr Nongezi, all the case study teachers used some learning support materials during the lessons observed. Mrs Nkosi and Miss Tulani used resources that were from the environment, for example, bottle tops and template of triangles respectively. Miss Noluwazi in her lesson on money also made a chart and managed to get pamphlets for her lesson.

Very little significant integration of knowledge took place across the learning areas. Mr Nongezi, in his lesson on negative numbers, integrated some science and geography in his lesson. However, in each of these examples, the integration was superficial because the teacher only referred to the concept and did not expand or use it for any further development of the mathematical concept. Mrs Nkosi wanted to learn more about integration and suggested that the teachers in the district should "come together" to help each other plan the integration of lessons. In terms of learner responsibility, in each of the teacher's classrooms the learners followed the teacher's instruction and performed tasks as directed. The teacher determined most aspects of the teaching and learning. The learners appeared to have little responsibility for their learning, falling well short of the intended curriculum goals of having learners

construct their own knowledge and plan their own learning outcomes. None of the study teachers used alternative assessment techniques. Mr Nongezi admitted that he used summative assessment and found that that was the best system that he could apply in his large class. The other three teachers alluded to using alternative techniques, but none were applied during the lessons observed. Mrs Nkosi said that she did not use alternative techniques because her learners were still too young.

In summary, from a political perspective, all of the study teachers seemed to have a good appreciation of the goals of C2005 and this was reflected to varying degrees in their practice. From a socio cultural perspective teachers' were constrained by many social problems including drug abuse, non-attendance and sexual abuse. However, given these constraints, teachers were making some attempts to accommodate the learners' circumstances. From a practical perspective, there was some evidence that teachers were making progress on some of the goals of the reform, particularly making lessons more learner centred, pacing their lessons, and using many more teaching resources.

Experiential curriculum

Experiential curriculum refers to the actual learning experience of the learners. Again, I analyse this curriculum level in terms of the three perspectives, namely the political, socio cultural and practical.

From the *political* perspective I focus on learner empowerment. Here I present 3 examples from the case studies. The first example, the learners in Mrs Nkosi's multiplication lesson involved themselves in the curriculum and therefore appeared to have some power over their learning. Mrs Nkosi provided the learners opportunity to work in their groups and interact with their peers. They could call upon her at any time and she provided them the help they needed. Miss Noluwazi had a similar approach. The learners were able to call on the teacher at any time and she would assist. In Mr Nongezi's class, it appeared as if he was in charge of every aspect of the teaching and learning processes. Learners did not interact with each other. He determined when the questions were to be asked and who should answer. In his class, at no stage did any of the learners ask any questions. When a learner used the term

Celsius instead of degrees, it was apparent that the other learners were aware of the error the learner had made. However, no other learner displayed the courage to stop the lesson and give the correct solution. Notwithstanding these examples, in general it appeared that learners in this study did not have much control over the curriculum. All four teachers decided on the content, assessment, resources, pace of lessons and when, and how the lesson was to be presented.

From the *socio cultural* perspective the learners responded to the curriculum at different levels. It is quite clear there was a high level of absenteeism, so students in a sense voted with their feet. When they were in attendance they were involved, but did not say very much and did not question the teacher. The learners got excited about some aspects of the lesson, but not others. In Miss Noluwazi's class in the township school, the learners got excited that they were working with money. The lesson was within the realm of their experiences and they could relate the lesson to their daily lives. However, the lesson that she presented in the rural school was abstract and the learners did not connect with the concepts. The learners from the township schools were more exposed to life in the city, they could talk more and were not as "shy" as the learners in the rural areas. In the city, more resources were available like the pamphlets that Miss Noluwazi used in the lesson on money. Mrs Nkosi often purchased teaching aids from her own coffer as she did in her first lesson with the oranges. In both her lessons she made use of cheap, local resources.

In Mr Nongezi's class, because of his teacher centred approach, there were learners who were not given any opportunity to answer a question. If the learners were experiencing socio cultural problems, then they were further disadvantaged by not being noticed by Mr Nongezi in the classroom. Although the lessons presented were outwardly interactive, the content and strategies were tightly controlled by the teacher.

Practically the learners in Mrs Nkosi's, Miss Tulani's and Miss Noluwazi's classes were exposed to some elements of learner centred teaching and learning, particularly group work. It appeared that the learners from Mrs Nkosi's and Miss Noluwazi's class were regularly exposed to this approach. The learners in Miss Tulani's class did not appear very happy with this approach, possibly because the teacher still

controlled most aspects of the lesson. Mr Nongezi's learners were not exposed to the learner centred approach. The topics of Mrs Nkosi's lessons were fractions and multiplication. These are important mathematical concepts for grade 4 learners. Her learner centred approach to the lesson involved the use of apparatus to build the learners understanding of these two important mathematical concepts. The two lesson presented by Miss Tulani were content focused. Triangles are an important concept, because its application is universal and used in other scientific disciplines. Miss Tulani wanted the learners to discover the concept; be knowledgeable about the classification of triangles and the calculation of the area of triangles. Mr Nongezi's two lessons on temperature and the right-angled triangle were content focused and through his question and answer approach he tried to develop the learners' thinking. Miss Noluwazi presented her lessons on money and arithmetic sequences. In her lesson on money, the learners were able to relate to clothing shops and clothing purchases. In this lesson the learners were connected to life outside the classroom. They were able to respond to questions about payments when goods are purchased. In her second lesson, on arithmetic sequences, she introduced the learners to investigations in order to challenge their thinking. The learners in this lesson did not appear satisfied with the way Miss Noluwazi wrapped up the lesson. There appeared to be an abrupt conclusion to the lesson, leaving the learners confused about the outcome.

In summary, from a political perspective, the learners had little control over the activities in the classroom and over the curriculum. In this sense the enacted curriculum fell short of the empowerment goals of the formal curriculum. The move to empower students to be responsible, independent citizens who are critical and analytical thinkers was not achieved and the four teachers controlled most aspects of teaching and learning. The teachers determined when, what and how things were to be done. Socio culturally, there was little evidence of the learners connecting the lessons to their everyday experiences. In many cases learners voted with their feet and voices, with high rates of absenteeism and passivity in class. From a practical perspective, the learners experienced very few of the goals of C2005 and its OBE philosophy.

Implications

This study examined the curriculum practices of four rural South African mathematics teachers. These four teachers from the rural Transkei together represent a microcosm of rural teachers across the nation. The insights gained from these teachers lead to some broader understandings about mathematics curricula in South Africa. I will now look at the implications of this study for teachers, learners, professional development, policy formulation and future research.

Implications for teachers

The multiple perspectives approach leads to three different kinds of implications. The political perspective focuses on teacher connectedness to the educational reform, and learner empowerment and responsibility. For teachers to be connected, they need opportunities to reflect, examine, and experiment with new practices as espoused in the new education policy documents. Teachers need time to explore and form new ideas in their planning and execution of the curriculum. For the most part, these rural teachers still determine the content and pace of the teaching and learning process. Teachers should be encouraging learners to accept more responsibility for their learning and the teacher should negotiate the criteria on which they assess the learners. For teachers to grow professionally they need to become actively involved in curriculum reform issues in order to change their mindsets. This would lead to greater acceptance among teachers and learners of the national reform.

It is clear that rural teachers teach under difficult circumstances as have been highlighted in this thesis. The socio cultural perspective deals with how the teachers attend to the social needs of the learners. The implications here are that teachers need to:

> ➤ consider the cultural values of the learners and take into account the language abilities of learners;
> ➤ recognise the learning potential of their learners and adapt their lessons accordingly;

- build the lessons to embrace prior and social learning experiences of the learners;
- consider the individual home circumstances of the learners;
- provide a nurturing environment that allows learners to speak about their social difficulties which frustrates their learning; and
- be sensitive, empathetic and compassionate to the learners who may be faced with multiple socio cultural problems that frustrate them learning effectively. These problems include absenteeism, hunger, drugs, rape and sexual abuse.

From the practical perspective, it is clear that the C2005 goals place many demands on teachers. For teachers to accept the new reforms, they need to develop new ways of teaching and learning. Fundamental changes in practices and beliefs take time because there is much to unlearn. Teachers need to become more experimental and use open-ended approaches to teaching. They need to create situations where they

- move beyond learners sitting in groups working on low level routine questions;
- integrate their lessons with the other learning areas; and
- provide appropriate learning resource material.

Implications for learners

From the political perspective, learners are the recipients of the curriculum reform, yet they are generally not involved in the curriculum from its inception to implementation. Teachers and learners should consult each other about issues around the curriculum pertaining to content, practice and assessment. The teacher can guide this process. For learners to become more empowered and take more responsibility, they need to become less dependent.

From the socio cultural perspective, learners should attend school regularly and inform teachers of the problems that would result in them not learning effectively. They should feel free to ask teachers to repeat questions and statements that they do not understand in their mother tongue.

The practical implications of this study are that the learners need to participate actively in their lessons. For too long have learners been socialised to be passive recipients of information. Learners need opportunities to freely communicate their ideas. Initially this process may be difficult, but learners need to be challenged and encouraged to ask questions. Learners need to move away from chorusing, "yes" to the questions that teachers ask and confirming what the teacher does. Learners need to ensure that they are provided with learning resources to stimulate their learning.

Implications for teacher professional development

The political perspective is about involving teachers in the design, management, and conduct of the professional development. The teaching context is crucial to the success of the professional development programs and therefore should be included in the design of the professional development. Teachers' knowledge about the learners and their teaching conditions are important considerations. For example, the reality of having no electricity means teachers cannot photocopy and prepare worksheets for a lesson. Teachers also teach in classes where children find it difficult to see. These aspects need to be taken into account during professional development.

The socio cultural perspective it is about tapping local teacher expertise so that C2005 can be adapted, refined and modified to take local circumstances into account, for example, language, material and analogies. While professional developers have a broad array of knowledge it may not be related to the specific teaching context. Local expertise can inform the professional developers of the local milieu and together the curriculum can be translated into practice that is best suited to the characteristics and resources of the local district.

The practical perspective is about skilling people to carry out the teaching strategies of C2005 – using contemporary models of professional development – incorporating a variety of contexts, theory and practice, experimentation, reporting back and action research. These models need to include practice with teaching the new curriculum. This is essential because the new teaching approach is significantly different from traditional practices. Also because teaching is a complex activity, teachers need opportunities to reflect and report to their peers on their teaching.

Implications for policy formulation

From a political perspective the emphasis should be on intensive consultation, negotiation and feedback. The goals of the curriculum need to be piloted with focus groups that are situated in different teaching circumstances. Teachers should be included in this process to ensure that they share the vision of the anticipated reform. Also, there should be wide-spread dissemination of information using multi-media so that teachers do not feel excluded and marginalised. It is important for agencies such as the mathematical associations and teacher unions to be included in the dissemination of information related to the development of the curriculum.

From a socio cultural perspective the document must be sensitive to local needs. The document should be flexible, with guidelines for different groups.

From a practical perspective it is important to include clear guidelines as to what is expected of teachers. Teachers want a practical, flexible, easy to read document with lots of examples. Teachers are always looking for a syllabus to guide their teaching. Included in the document may be the resources that teachers need to have in order to teach the lesson.

Implications for future research

The three perspectives provide different opportunities for future research. Most of the research focus so far in South Africa has been on the practical (for examples, see Taylor and Vinjevold, 1999). Other research possibilities may include:

> longitudinal studies that should determine the progress made by learners in the successive years of the implementation of C2005; and

> whether OBE style teaching is the preferred approach especially for grade 12 learners where they are externally examined.

The socio cultural perspective is a potentially fruitful area for future research, particularly given the cultural diversity of the South African population. The research possibilities include:

> the relationship between the learner and the teacher;
> the factors affecting student attendance at school;
> the explanations that teachers use to connect with the learners; and
> the relationship between the community and school.

Politically, research on empowerment and learner responsibility may include:

> the attitudes of the community to schools in the transition from the school as an instrument of resistance to an instrument of empowerment;
> the role of the school in the new South Africa; from an instrument of social upheaval to social conformity; and
> how mathematics instruction might lead to economic changes in the new South Africa.

Conclusions

Undoubtedly, curriculum reform and implementation is a complex endeavour and its full understanding requires that it be viewed from many perspectives. There is no simple solution that will bring about a marked change in the teaching and learning. In order to learn what is happening in schools we need to focus our gaze on the teachers and the learners. This is what I have tried to do in this thesis, to examine the classroom practices of four rural teachers in the context of national curriculum reform.

The process of transforming the South African curriculum from its difficult political past is an important one that has been filled with difficulties. There has been problem with the interpretation and understanding of the policy document and with its implementation. Teachers are expected to explore and form new ideas about teaching and learning. However, the job of translating the curriculum into the classroom and daily classroom practice is made difficult because of the existing

school systems and poor infrastructure. Teachers are also faced with the constructivist paradox (Wallace & Louden, 1994). The constructivist paradox involves the way that teachers balance the desire to have students construct their own knowledge with the need to stay faithful to the content. The constructivist paradox also involves the mismatch between the way teachers are treated as vessels of reform versus what they are expected to do in the classroom.

Finally, it needs to be understood that teacher change is a very slow process, proceeding gradually and hesitantly by the extension of teachers' horizons of understanding rather than sudden leaps of insight (Wallace & Louden, 2000).

This study has revealed some enormous challenges faced by South African rural teachers as they implement the new reform. The three curriculum perspectives – the political, the socio cultural and the practical – show that while much remains to be done, teachers are making some progress in reforming their practices.

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