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Perceptions and beliefs in grade one mathematics: the teachers' perspective

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PERCEPTIONS AND BELIEFS IN GRADE ONE MATHEMATICS: THE TEACHERS' PERSPECTIVE

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DECLARATION

I Nontobeko Temba declare that this research is my own original work and that I did it without any assistance from another person.

ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr. Carol Ann Macdonald for her tireless guidance and the courage she gave me. I want to thank my husband Martin for keeping the family together while I was busy with this work, my cousins Sizakele and Mbulelo for making themselves available when I needed help, my brother Ndumiso for being a shoulder when things were hard. I cannot forget my parents for being supportive throughout this period. Most of all I would like to thank the Creator for the life that I have.

ABSTRACT

Mathematics Education in South Africa is in a state of crisis. Due to the legacy of Apartheid, Mathematics in black schools is in a comparatively poor condition. A number of factors contribute to this crisis amongst them, it is alleged that there aren't enough competent Mathematics teachers. In attempting to understand the extent of the crisis it is acknowledged we cannot focus an one area, but we need to have a collective understanding of the situation at all levels. It is with that background that I have written this project.

The purpose of this project is to look at the beliefs and perceptions of Grade One teachers in Mathematics. What attracted me to Grade One teachers was the important role that they play in creating impressions about Mathematics in a child and the low esteem they hold in our society. In this paper I am looking at Grade One teachers as an important initial link in the chain of improving Mathematics. This project attempts to analyze and understand their situation, bearing in mind that we have no formal data on teachers before they are exposed to NGO in-service programmes. Most of these programmes operate with unanalyzed preconceptions about the teacher and her craft. Facilitators could extract issues that would be of assistance in their intervention with teachers.

In my data collection I observed four teachers in their classrooms and then interviewed them about their everyday internal and external activities. In the findings it was confirmed that Mathematics is also in a crisis state at the elementary school level. The findings reveal that the teachers, even though exposed to similar conditions in background and teaching, are different and they do things differently. What I found to be common was that their Mathematical content knowledge was lacking and that their perceptions about what Mathematics is, constrained their teaching of the subject.

While working with the schools I was overwhelmed by the scope of research the data provided. One of the issues that was fascinating was the issue of changes of roles in the pupils; the role of pupils changed in the minds of teachers according to time, and place. They were regarded as both competent and incompetent. There were also issues of terminology which were important. What I found striking in the classrooms was the way issues are so intertwined, one cannot avoid stumbling into issues that one had never anticipated. I found that the real challenge in this endeavour was to remain focused but still acknowledging some of these factors.

In working with these teachers I realised that they have been exposed to the language of innovation that most teachers are using, but those ideas remain at a superficial level, and are not successfully integrated into their practice. Having discovered that, I make an appeal to facilitators not to provide teachers with terms that have little or no meaning to them. They should not simply replace one form of indoctrination with another, and should make a long-term commitment to working for change with individual teachers. Finally, they should personalize their interventions to suit the needs of individual teachers.

KEY WORDS

mediated action, activity, classroom, appropriation, mastery, constructivism, pupil-centeredness, space filler, effective learning

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

The aim of this study is to determine what the perceptions and beliefs of Grade One teachers in Mathematics are. There have been speculations about what the perceptions and beliefs of teachers are about Mathematics and writers (Adler 1993; Skemp 1972; Breen 1991; Stoker 1991) have written papers based on these speculations. This study is going to focus on uncovering what these perceptions and beliefs are. In dealing with the teachers I would like to state that it is not my intention to portray the teachers as being problems or failures in the learning process. My aim is to give a holistic perspective of what is happening in the classroom. The insight that I shall reap should help the educationists in their attempts to conduct informed intervention in Mathematics situations.

There has been a concern amongst educationists about the standard of Mathematics teaching in schools (Stoker 1991, Breen 1991, Adler 1993). Mathematics teaching was characterised by what Stoker (1991) terms "drill and practice" Adler (1993) terms 'tell and drill'. The crisis is perceived to be created by what happens inside the classrooms where Mathematics teaching is rule bound and pupils' innovation is restricted (Adler 1993, Breen 1991, Stoker 1991). The majority of teachers encouraged only instrumental understanding where their only concern was *"some kind of rule for getting the answer"* (Skemp 1972: p 21) and paid less time to encouraging pupils to understand the ground work or processes leading to the answers.

Most teachers have been using, in Mathematics, what Freire (1970) refers to as a 'banking approach'. In the banking approach teachers present themselves as being at the opposite end of pupils, they are knowledgeable whereas pupils know nothing. There isn't any acknowledgement of the pupils' background and needs and as a result pupils are alienated

from the subject. The role of the teacher in a classroom is that of transmitting knowledge and the involvement of the pupils is limited to "receiving, filling and storing the deposits" (Freire 1970: p 39) and regurgitating it when required to.

The teachers' practice was influenced by ideas similar to those in behaviourist theories which argue that human behaviour can best be understood in terms of Stimulus-Response (Thorndike 1922 in Stoker 1991), where there was no cognisance taken of what happens in a person between those two processes. Below, we shall see what mediation theory can help extend such a limited understanding.

The curriculum that was prescribed by the Department of Education (DET) before 1995 encouraged teachers to emphasise facts, rules and results. The schemes of work prescribed exactly what a teacher should teach on a certain week; they also stipulated the time limits for teaching and learning concepts. Examination results at the end of the year determined whether a pupil proceeded to the following class or repeated a class. Pupils' debates on concepts simply didn't exist as they were not deemed necessary. The mode of operation for most teachers was **Tell, Drill, and Test**. The Interim Curriculum which was introduced in 1995 has, in my observation as a teacher facilitator, had a limited effect in changing how most teachers operated. Even though it encourages pupils' participation it has been met with resistance by most teachers. Teachers still cling to the comfort of the old curriculum.

In methodology papers for some time, there has been is a shift from a situation where Mathematics is perceived as rules and methods which pupils have to memorise and apply, to one where pupils are encouraged to take a more active role in constructing their own Mathematics knowledge (Stephen 1993, Jaworski 1989, Wheeler 1975, Yager 1991). The shift among some educationists has been influenced by the relevance and recent interest enjoyed by the constructivist paradigm in the field of education. Constructivism postulates that "knowledge is actively built by the cognizing subject; it is not passively received" (Von Glaserfeld 1989). 'To know' requires active participation in knowledge by 'the knower.' People should be given opportunities to reorganise their experiences in an attempt to solve their problems, in that way knowledge will have more meaning and humans will be able to

use and or apply it in a variety of situations (Cobb, Yackel and Wood 1988).

Mathematics learning is now perceived as an active process influenced by both the teacher and the pupils where teachers have to facilitate learning and pupils construct their own meaning. Teachers have to be encouraged to adopt practices where different ways of thinking and solving problems are encouraged (Jaworski 1991, Adler 1993), and they have to provide opportunities for pupils to explore those ways (Yager 1991). To facilitate change in the learning and teaching of Mathematics there is a need to focus on teachers as 'agents of change' in schools. Teachers' development is a key to resolving the crisis. To achieve deeper and sustainable change in Mathematics, teachers will have to change their beliefs about what Mathematics is and how it has to be taught.

Researchers (Thompson 1982,1984, Cooney 1988, Feldt 1992) have found that teachers' beliefs about Mathematics play an important role in shaping their practice. Beliefs partly determine how the teachers view Mathematics and how they are going to teach it. If a teacher thinks that Mathematics is a discipline of fixed methods, rules and rote memorisation, she or he is likely to emphasise rules, impose methods and promote memorisation in her teaching. An example of this happened in a Grade One class where a teacher said "Mathematics requires good memorisation". She thought it was sufficient for pupils to do rote counting, whether pupils understood what they were counting was not an important issue. I asked her whether she thinks pupils have a number concept if they count in a correct sequence, and she said they did. This teacher proceeded to facilitate other concepts like addition where pupils are supposed to use their number knowledge. She was shocked to discover that some pupils were unable to cope with the activity and she did not know what the problem was.

Ernest (1991) found that changes in teachers' beliefs are always accompanied by changes in their level of consciousness. As teachers become more conscious they tend to reflect more on their practices and in turn have the opportunity to change them. He says consciousness will help bridge the gap between theory and practice. It will add appropriation on top of mastery.

The teachers' knowledge of the content should not be ignored. It is a fact that most teachers

in Black schools have been through pre-service (PRESET) and in-service training (INSET) which was dominated by 'tell and drill' and they were not allowed to question any Mathematics content and processes (Adler 1991). INSET is a service for qualified teachers which is provided by the Department of Education (DET) and other interested organisation like Non Government Organisations (NGO) (the NGOs got involved at a late stage). The aim of INSET was to help teachers to improve the teaching of subjects and to update them on new developments in their subjects. Some teachers resort to authoritarian ways of teaching because they themselves struggle with understanding the Mathematics content. To memorise rules and methods doesn't require a person to have a broad understanding of concepts. Rather what is required is an ability to memorise. When educationists are thinking of changing the teachers' practice they should not ignore the content knowledge of the teachers. Insecurity about content can easily block innovations.

Mathematics in elementary classes (Grade One in this study) has unfortunately not been exempted from the crisis currently being experienced in Mathematics education as a whole. Teaching of Mathematics in Grade One has been characterised by teachers concentrating on teaching arithmetic. Teachers focus more on teaching computational skills like how to add, subtract, divide or multiply than Mathematics issues such as finding relationships between numbers, finding patterns, justifying one's answer or drawing conclusions from activities. In my experience with Grade One teachers, most believed that Grade One pupils have to be told and helped with any number activity they need to know. Teachers spend time letting pupils memorise and their answers, e.g. 2+3 =5, they test pupils on the sums that they (pupils) memorised. Teachers go further to do corrections and let pupils copy them. In contrast a number of studies done abroad on mathematics in elementary pupils have shown that pupils are able to work independently with minimal assistance from the teacher. They **can** find relationships and patterns in activities (Maher; Davis; Martino 1992), **do** investigations, **reason** and **justify** their answers (Jones 1994). Teachers have to believe that pupils are able to do these things and create situations in their classes where these skills can be developed. "*Our classrooms need to provide more opportunities for conceptual growth and meaningful learning*" (Adler 1993: p2 supplement).

This project attempts to look at the perceptions and practices of Grade One teachers in Mathematics teaching. From the research I hope to discover:

- who the typical Grade One teacher is.
- how the teacher perceives Grade One pupils
- the teachers' beliefs about Mathematics
- the teachers' perception of how Grade One pupils learn Mathematics
- how teachers teach Mathematics in Grade One

CHAPTER TWO

LITERATURE REVIEW

Constructivism as a philosophical perspective attempts to answer the question of how humans get to know, how they access knowledge. Constructivism places the burden of knowing and the limits thereof on human beings. It argues that humans have to thank themselves for the perceptions they have of the world and the knowledge they possess. Knowledge is a tool that humans actively construct for themselves. Through constructing knowledge humans are involved in the processes of making meaning of their world. Von Glaserfeld (1994) sees knowledge as an instrument that humans use to organise, gives meaning and stabilise the world they live in.

Von Glaserfeld's thinking is a radical departure from the metaphysical realists who argue that through knowledge one is able to uncover the realities and the absolute truths of the world. Von Glaserfeld (1994) would argue that what we term the 'truth' or reality is our own construction. He uses an analogy of a lock and key to illustrate the difference between constructivism and the metaphysical realists. He says in humans' endeavour to access knowledge, the concern is not about finding the right key which matches the lock, like the metaphysical realists do. People should not be preoccupied with finding the right key that matches the lock. The concern should not be the lock but should be opening the door using whatever key that is available to 'get to the loot' Von Glaserfeld (1994: p 21) says, that is what constructivism is.

Piaget and Vygotskian theories have provided discourses that are consistent with constructivist thinking in that both of them acknowledge that humans are not passive receivers of knowledge, they are actively involved in their construction of meaning and knowledge. According to Piaget the construction of knowledge is an individual process which happens as a result of the development of mental functions. Humans need to have developed appropriate biological structures to be able to actively make meaning of their world.

Teachers cannot hasten the development of mathematical concept in pupils (Duckworth 1979). The pupils will only make meaning of the concepts when they have reached the appropriate developmental level.

Piaget's theory downplayed the importance of social interaction, language, culture and context in the construction of mathematical knowledge and gave more priority to individual development (Stoker 1991, Ernest 1993, Mercer 1995). Following Piaget's theory too literally became problematic in that a number of factors that characterise pupil-teacher relationships in the Mathematics classroom are neglected. In the classroom teachers share knowledge with pupils in the form of new mathematical content. Pupils talk and share mathematical ideas with their teachers and with peers. Apparatus on its own is not sufficient to mediate learning they still need the intervention of a peer or a teacher. Looking at these broader issues Piaget's theory is not adequate for explaining the dynamics that occur in Mathematics classroom but on the other hand, it was never intended to be.

Vygotskian theory argues that human learning and development is always influenced by and based on culture. The learning process is not an individual process it is a process of interaction of pupils and sharing of ideas and knowledge (Mercer 1995). The school based cognitive development of pupils is something that does not happen on its own, it has to be facilitated and enhanced by other humans and tools around them. It is important to understand that Vygotsky does not imply that human are empty or that they have to be filled with culture. Vygotsky made a distinction between elementary mental functions and higher mental functions which are also referred to as cultural functions. The elementary functions appear in a person as a result of biological evolution. They form the first set of explanatory principles on which further learning and development can occur and from which, higher mental functions emerge.

The higher mental functions develop out of the person's interaction with the social world. They are influenced by one's cultural and historical context. A human, through interaction with other fellow humans, has access to different types of knowledge and actions which will later be internalised and owned by that person. The emergence of higher mental functions

does not eliminate the elementary functions, they get transformed into cultural functions. What we see in human activity cannot be explained in terms of elementary functions but rather in cultural or higher mental functions.

When one looks at a Mathematics classroom situation one needs a theory that can reflect the energy or the process that exists in it. It has to be a theory that accounts for the relationship between the teacher, the pupil and the Mathematics content, the context and the relationship between peers. It also has to account for the negotiation of meaning and the use of language in the classroom.

I have briefly looked at both Piaget and Vygotsky as both being constructivist theorists. Piaget's theory is not sufficient to explain the relationships that emerge from the classroom. His emphasis on the development of an individual, and the lower priority he gives to the influence of the external on development, limits the applicability of this theory in this project and conceals its purpose. Piaget perceives teacher intervention in the child's learning as an act of dominating the children and robbing them of chances of developing. He argues that adaptation plays a major role in the development of a child and not the intervention of a teacher (Wertch 1984).

Vygotsky differs from Piaget in that he does not focus only on an individual, he looks at the reciprocal influences that exist between a child and his or her cultural context. Our intellectual development is influenced by the people and things we interact with. Vygotsky in Crawford (1994) used the term "co-knowledge" to stress social origins of knowledge. He (Vygotsky) argues that we owe our cognitive development to our socioculture as much as our culture owes its development to us.

The notion of **activity** as defined by Vygotsky forms a link between the development of an individual and that of the sociocultural. Activity theory will provide a theoretical framework for looking at the Mathematics teacher in his or her classroom. It is appropriate in that it puts the teacher in a position where she **influences** the pupils' cognitive development and in turn he or she **has been influenced** by his or her sociocultural environment. Let me give an

example with a local context. Most of the Mathematics teachers in primary schools have been through college education where Mathematics was taught in a authoritarian way. As college students they were taught rules and laws of primary school mathematics and encouraged to prepare "perfect" lessons. Some have been through a schooling system that puts emphasis on the transmission method. This history has had an impact in their perception about Mathematics and in a way they teach it. They teach rules and emphasise instrumental understanding in their classes.

The origins of the concept of activity can be found in Vygotsky's earliest work (Kozulin 1986). Vygotsky's notion of activity has gone through different transformative stages since its original inception. In 1930 the Kharkovite group of Soviet scholars, which were Vygotsky's disciples came up with their own version of the Activity Theory. One of the most outstanding scholars amongst them was Alexei Leontev. At first some scholars thought Leontev's theory was the same as Vygotsky's, that his was the elaboration of Vygotsky's work. It is only in 1970 that Leontev's theory was put under scrutiny by other scholars. They discovered that Vygotsky and Leontev's theories had theoretical differences. One of the differences was that Leontev downplayed the importance of psychological tools such as language as mediators of human activity. He argued that practical activities are responsible for the generation of cognition. Vygotsky, on the other hand dealt with both language and practical tools as being responsible for human action and for the emergence of consciousness.

In this discussion I wish to confine myself to Vygotsky's perspective of activity theory as it contains aspects that are useful and relevant to my discussion. Human action can be both observable (external) or unobservable (internal). It is naïve to believe that what counts is what we can see. It is not only confined to an individual, it can also incorporate a group. Wertsch (1995). At the centre of human action is the concept of **mediation** or what Wertsch refers to as **mediated action**. Engestrom (1991) refers to mediation as the "cell" of activity theory.

The idea of mediation enable us **not** to interpret human action as a **product** of either 'mental functioning' or 'sociocultural settings'. It highlights and emphasises the importance

of the relationship between an individual and the sociocultural context in human **action.** Engestrom (1991 p11) puts it:

Mediation is an idea that breaks down the Cartesian walls that isolate the individual mind from the culture and the society.

Wertsch (1995) sees mediation as a mechanism for avoiding the reductionist perspective that is prevalent in the copyright age, where human action is either reduced to the mental functioning or to the sociocultural setting. Mediation is able to connect individual action to collective activity, it accounts for how an individual gets to embrace and internalise the activities of the semiotic environment. It is through mediation that one can explain how the pupils learn and appropriate aspects (whether negative or positive) from the teacher.

According to Vygotsky mediation is facilitated by tools and signs. Tools like needles or saws mediate between objects and people. These tools have been invented by man and their use is also determined by man They are outwardly orientated and they enable humans to have control over their physical world.

The other form of mediation is through signs or psychological tools. Vygotsky calls this type of mediation semiotic mediation; **speech, text, mnemonics and symbols** are examples of this. Semiotic mediation is what makes Vygotsky's theory unique or else it could be thought of as an extension of Marx's or Engel's theory. At the core of semiotic mediation is how signs, especially speech, can control human activity. Vygotsky views communication as having some cognitive impact in a life of a person. One does not only accumulate new knowledge but one's cognition gets transformed and reorganised. Semiotic mediation is responsible for the psychological reorganisation of development. It provide an account of how elementary functions turn to higher mental functions. How does that happen? As soon as natural line of development comes into contact with semiotically mediated processes they develop new meaning and turn into higher mental function.

Vygotsky in Wertch (1983: p 24) says

Although children's use of tools during the preverbal period is comparable to that of apes, as

soon as speech and the use of signs are incorporated into any action, the action becomes transformed and organised along entirely new lines.

What used to be a meaningless activity in a child can gain new meaning in a child after an intervention from a parent, a teacher or a peer.

Vygotsky differentiates between two situations of mediation. He argue that there is a difference between mediation at home and mediation in school. Home mediates everyday or 'spontaneous' concepts and school mediates scientific concepts. He sees mediation at school as an avenue that intentionally gives a child access to knowledge and metacognitive skills that she wouldn't otherwise have at home. Mediation at home is almost never planned, it arises on a spur of the moment. It always emerges in a context as a response to some activity prevailing at that moment or on an object being present. Vygotsky argues that at home only everyday concepts are mediated and that they are necessary but not sufficient for cognitive development. He recommends mediation of scientific concepts for the ultimate development and transformation of cognition.

Mediation of scientific concepts according to Vygotsky occurs at a school situation. Mediation at school is 'always' planned with a purpose to teach a certain concept in a certain way. Mediation of scientific concepts is not confined by what is present in the class at that moment, concepts can be mediated out of their immediate context they transcend any situation. In scientific concepts, concepts are used to mediate other concepts. Using scientific concepts one is able to show the hierarchical relationship of concepts. Furthermore at school metacognitive skills can be intentionally developed. Skills to analyse, compare, summarise, criticise or discuss can be given as tasks for pupils to do at school. However, whether schools do develop these skills is still an open question.

Another scholar who has made a contribution to the idea of human action is Kenneth Burke. Burke according to Wertsch (1998) unlike other scholars was not confined to any particular discipline. It was difficult to locate him in any particular discipline. Burke took human action as the phenomena to be enquired about and analysed. According to Burke, human action

should be coupled with a 'motive'. There is a motive in any action whether internal or external that humans get engaged in. In Wertsch (1998: p 7) Burke says he is concerned with *"what is involved , when we say what people are doing and why are they doing it".*

Burke in his analysis tried to cover a wider perspective in which human action is located, his method was careful not to be limiting. He devised a method called the **'pentad'** (pent means five). This method isolate five aspects as organising principles. These aspects are the **act**, the **scene**, the **agent**, the **agency** and the **purpose.**

The **act** refers to what happened. In the classroom this refers what the teacher and the pupils did, their implicit and explicit thoughts. The **scene** refers to the classroom as an environment in which the teacher is operating. The scene by virtue of its distinctiveness determines the type of act that should happen within it. The **agent** refers to the players in the classroom, the teacher and the pupils. The **agency** refers to the mediational means used in the class. In a class, talking and gestures using objects are some of the means that the teacher use. The pentad tries to answer the following questions in human action: what is happening, where is it happening, who is doing it, how is it being done, and for what purpose?

This pentad should not be taken as the sole reflection of how human action is, it has to be seen as one amongst many instruments that we can use to analyse human action. The pentad in my opinion forms a unit of analysis. If we isolate one aspect of it we won't get a whole picture. The individual aspects of the pentad directly or indirectly have an influence on the other aspects. A **school as a scene** will determine the act, the purpose, the agent and the agency. Since I am going to look at the classroom discourse my nucleus will be the relationship between the agent and the agency.

Wertsch (1995: p 90) elaborated further on mediation. He argued that "all human action is mediated action" except of course the early stages of development. In his analysis of human action he made claims about mediation. Wertsch (1995) argues that the relationship between the agent and the agency is not as simple as we may think. He talks about tensions that exists between the mediational means and their use by an agent (individual). He argues

that there is an irreducible tension between the agent and the mediational means. You cannot understand an agent outside her mediational means and in reverse, the mediational means cannot cause action on their own, they need an agent to do that. I call the relationship between an agent and the mediational means 'a marriage of convenience'. Their being together is not always harmonious, but their divorce will lead to reductionism.

Wertsch (1995) further sees mediational means as both empowering and constraining. What he means is: whether we like it or not we cannot use what we don't have. As Wertsch (1991:p 93) says "*We cannot speak from nowhere*". We use the cultural tools at our disposal to discover new things and transform ourselves, but that doesn't mean there is nothing better or different out there. The problem is that as long as we are not conscious of new cultural tools we would not care about them. It is only when we become aware of their presence that we can recognise how much we have been missing, and how much our present mediational means have been constraining us. Wertsch (1995) alerts us that mediation does not always produce the results in which they were intended for. What you put in does **not always** guarantee what comes out. There can be incoherence between the intention, the mediational means, and the outcomes. Mediational means cannot guarantee specific outcomes, some unintended outcomes would always be a spin-off.

In 1998 Wertsch further expanded his analysis on mediation. He progressed from his 1995 paper and came up with more characteristics of mediated action. In this paper he made it explicit that he was using Burkes' pentad. Wertsch (1998) said he was going to concentrate on the agent and the agency but if you look carefully at his analysis you can see that the other three aspects of the pentad are also prominent.

These are some of the claims that Wertsch (1998) has added about mediated action:

1. Mediational means are material. He argues that both written and spoken language has materiality; that is why we can interact with it. The materiality of spoken language unlike written language appears momentarily and can evaporate quickly. Due to the nature of the materiality of spoken language it is difficult for people to grasp it. Wertsch (1998) further argues that the external properties of mediational means has implication on how the internal

processes come into existence.

2. Mediated action has multiple simultaneous goals. Wertsch (1998) here talks about the goals that we intend to meet and also the goals that we don't intend to meet but end up meeting. When we are involved with any activity we may not be aware that there are many goals that we are fulfilling, some of them might even conflict with other, and some may complement each other.

3. Mediated action is situated on one or more developmental paths. Mediated action is always located within a certain historical context. If you remove that historical context you run the risk of removing the meaning of the event or distorting the event. Every action has to be viewed within its particular context.

4. New mediated means transform mediated action. Mediated action is not static, as soon as better mediational means are introduced in the relationship, there is a potential for the whole mediated action to be transformed. When computers were introduced people started to work faster and more efficiently.

5. The relationship of agents toward mediational means can be characterised in terms of mastery. Mastery requires an agent to understand the rules of the game, and play by the rules. It happens more often that a person can follow rules without believing or understanding them.

6. The relationship of agents toward mediational means can be characterised in terms of appropriation. Appropriation is different from mastery. It involves having an in-depth understanding. It involves ownership of the content and the processes.

7. Mediated action is associated with power and authority. Both the agent and the mediational means carry with them a certain power and authority.

Activity theory has been elaborated by a number of educationists, Adler (1993), Scribner (1985), Jarwoski (1989), and many more in a classroom situation. In certain instances some educationists Breen (1991), Cobb (1991), Freire (1970), Stoker (1991), Adler (1993) have used the concepts arising from activity theory in their writings. Adler (1993) wrote about the student she was supervising. The student used the concept of activity together with methods of action research to illustrate the dialectical relationship that exist between the his **subject's actions and the perceptions**. In his study the student teacher used a video to reflect on his

action in the classroom. Initially he had thought that he was treating boys and girls equally. He discovered that he focussed more on boys than on girls. He discovered some disparities between what he thought he was doing and what he was actually doing. Through some reflection on his practice he, for the first time he discovered that he was gender biased and that he was dominating the pupils' interaction in the class. The insights he gained became useful in his later interaction with his class. It made more conscious and it improved the effectiveness of his teaching. What the student discovered about himself helped him to alter his perception. Scribner (1985), like Adler (1993), illustrates the reciprocal relationship that exists between knowledge and actions. She argues the knowledge that one possesses has an ability to guide the actions that an individual can take. On the other hand actions can determine the knowledge that one needs.

Other writers (Jaworski 1989, Schoenfeld 1989, Breen 1991, Ernest 1993) and others have attempted to show how the teachers' belief about Mathematics influence the pupils' beliefs. Breen (1991) in 'Concerning Mr Smith and his (very brief) reign of terror' takes a position of an authoritarian Mathematics teacher and puts his students through the trauma of being their teacher. The students' feedback after the lesson reflected how their Mathematics teachers influenced their perceptions. This is what some students said:

My parents swear that she (teacher) did more damage to my creativity and normally cautious nature than anything else. (G.L in Breen 1991: p 33)

My maths class became one of those terrifying dark days in my life which were overwhelming yet which I couldn't avoid, being forced to attend (A.K in Breen 1991: p 34).

What was common amongst the students was that in one way or another their authoritarian teacher did alter their perceptions and behaviours. This also shows us the importance that affect plays in mathematics.

CHAPTER THREE

SITUATION ANALYSIS AND THE RATIONALE

Activity theory enables us to look at a person and try to understand the influences his or her socio-historical environment has had in his or her beliefs and perceptions. If one looks at most teachers and tries to understand why they lack competency in mathematics, why they rely on transmission methods, one can unfold a number of reasons. Education amongst South African Blacks has been in a crisis since the 1950's. The introduction of the Bantu Education Act in 1953 by the National Party (government) spelled disaster for the education system. Some implications for the Act were:

- Control and denial of access to some professions, especially those responsible for economic empowerment.
- Limit access to Mathematics
- Inequality of teacher education
- Inequality of infrastructure and resources.

Bantu Education outlined explicitly that that the primary aim of Black Education was to produce unskilled workers (Miller 1987). This policy continued for more than 40 years. Due to that Act and consequence, the level of Mathematics teaching and learning in African schools became poor and the schools never benefited from new methods. Stereotypes around Mathematics emerged: it was perceived as a difficult subject which was for the elite. The state of Mathematics today is still a hangover from that era, I think.

The college education that most teachers underwent embodied the policy of the government which was to maintain the status quo. Black teachers were supposed to remain subservient and also continue to provide education that will produce docile and subservient pupils. Unfortunately that education had an opposite effect on the pupils. The college education that teachers underwent were divided across colour lines. There was college education for Black teachers which was different to that of white teachers. Prior to 1980 the entry qualification for Black Primary teachers' course was Std 8 and there was two years of training. Only in 1980

did the entry level become Std 10 and training duration expanded to three years. The White counterparts had to have Std 10 as the entry standard and they trained for four years. The Mathematics syllabus which was done at the college was based on the work of the standards one had to teach. If, for an example, a student was doing Senior Primary Diploma she or he was exposed to a Std 1 to Std 5 syllabus. Instead of the colleges introducing teachers to Mathematics content and debates that would further improve their competencies, they were confined to the content of the standards they were going to teach. Issues such as integration, and thematic approaches were hardly heard of.

In my experience at the training college (I was a student at Transvaal College of Education between 1980 and 1983 doing Primary Diploma) more emphasis was put on the methods of teaching, how to plan and present a perfect lesson, there was also emphasis on completing a register and how to make a mark schedule and reports. The majority of lecturers from my college were Afrikaans-speaking and they themselves were trained in historically-Afrikaans universities. These universities had a strong tradition of Fundamental Pedagogics. Fundamental Pedagogics perceives itself as a scientific educational theory. It regards teaching as a Science. Like science it attempts to move education away from being subjective into a situation where it is objective, it presupposes the existence of truths in knowledge. Teachers as adults had to lead children to adulthood. Fundamental Pedagogics created an impression that adults know everything and that they have to know the correct way to transfer knowledge. The system of lecturing was authoritarian; little time if any was spent open-ended discussions; issues were presented as categorical.

In 1995 I was talking to a college student who had come for practice teaching to a school I was facilitating. In our discussion she told me that at the college they were taught that there need to be a limit in the numbers that you can teach in Grade 1, she said it was 9, one is not supposed to exceed 9 when teaching Grade 1. In the same year I had a privilege to get into a class where a student teacher was presenting her criticism lesson.(A criticism lesson is a lesson presented by a student teacher at a local school and the lecturer has to evaluate it). It was the most organised lesson I have ever seen with pupils being quiet, attentive and sitting in neat rows, the teacher with all the teaching aids standing in front teaching, and the lecturer

sitting at the back of the class taking notes. I thought to myself "nothing much has changed at the colleges".

The junior primary school teachers were paid less than the secondary teachers, the female teachers were even paid lesser than the male teachers. The junior primary teachers became more of a female terrain than a male one. There is an explicit feeling amongst teachers themselves that the standard of teaching in a junior primary section especially Grade One was of a lower quality than teaching in a secondary school. Whether this belief was reinforced by the disparity in the remuneration is not known. A Senior Primary school teacher at a mathematics workshop at Kathorus college said:

"Our children cannot do Mathematics in Std 3 because instead of you (junior primary teachers) teaching them, you play with them".

He added that teachers should start teaching pupils the real Mathematics, which is not what they are currently doing. When we asked him to explain what he was saying he talked algorithms, tables, and correct methods of finding solutions. I was made to believe that his perception was a shared by a number of teachers at that workshop because they did not object to his comment.

There appears to be a culture amongst combined (Grade One to Grade Seven) schools' principals that if a teacher is not performing well in senior classes she is demoted to teach Grade Ones. In a recent Maths Centre for Primary Teachers (MCPT) conference I attended in Soshanguve (22 September 1996) the presenter talked about a teacher who was not doing her work and the principal demoted her to teach the Grade Ones as "there wasn't much work there".

If a principal, says the teachers, wants to block the progress of a teacher, or if a teacher is old and incapacitated she (principal) sends her to teach Grade One. Most junior primary school teachers are studying themselves out of primary schools in order to teach in high schools. As soon as they get degrees many seek positions in high schools.

The Grade One teachers may have low morale because the society they are living in doesn't have high expectations from them. They can fulfil the expectation of the society by themselves having low expectations for their classes and thus not fulfilling their own and the learners' potential. It is obvious that this can have a spill-over effect to pupils and subjects like mathematics. One way in which this can manifest itself is when teachers put no value or respect on what the pupils know, and in the process deny them opportunities to be independent and confident. This we see in most primary schools that I have worked with, where Grade One pupils are so dependent on the teachers that they don't even trust their own answers. There is also lack of reciprocity between the teacher and the pupils in Mathematics classes. These practices of the teachers inevitably seed a barren ground for pupils' perceptions about Mathematics to emerge.

The previous paragraphs have provided some rationale for looking at Grade One teachers. It also accounts for why I am going to look at their Mathematics teaching. I have chosen Grade One teachers because this is the area that is least written about in South Africa, and thus least known. These are the teachers that have been marginalised by most researchers, and there is also a perception in schools that Grade One teachers are not only different but they are deficient.

There is relatively little research done on beliefs and perceptions of teachers in Mathematics in South Africa. There is reference made by writers (Adler1991, Stoker 1991, Breen 1991) to what the situation is. Amongst the papers there was not any study that was devoted to giving insight into the beliefs and perceptions of primary teachers in Mathematics and I have not seen any that looked specifically at the Grade One. A study done by Wits University in their initiative to introduce computer assisted learning in Soweto the CAAR Project 1982-1984 discovered that teachers found difficulties in solving the problems that were meant for Standard Five pupils. Even though the aim of the study was to introduce computers, this was a revelation about the competence of Mathematics in teachers. A number of teachers were found wanting in their Mathematics knowledge. That revelation partly explains why teachers are not inclined to entertain discussions in their Mathematics classrooms.

A number of Mathematics Non-Government Organisations (NGOs) looking at the situation have taken the initiative of intervening in the schools, some work with teachers in a form of workshops some using classroom-based intensive facilitation. The questions I often ask myself about the situation is: how much do we know about the existing situation with teachers, and how relevant are the interventions? Do these interventions always address the genuine underlying issues?

I shall use the data that I will gather to give a picture of the classroom dynamics i.e. the teacher, practice, obstacles, awareness, etc. The results should serve to lay foundations from which innovations can be implemented.

CHAPTER FOUR

4.0 METHOD

4.1 Observations

The criterion that I have set for the teachers that I was going to work with, is that they should not have had any working background with any Mathematics NGO. In working with the teacher I used the observations and the interviews. I had an observation sheet (Appendix 1) which I gave the teachers before the actual observation session. In the observation session I used a video camera to capture what was happening in the class. The teachers were aware that I was going to video-tape their lessons, and they gave their consent. The observation part took place during the teachers' usual teaching time, I did not schedule a special session for doing it.

4. 2 Interviews

The interviews were conducted a few days after the video sessions. I did this deliberately, since I believed that if the interview came before the observation session, I would get a distorted picture of their classroom practice, the teachers' level of consciousness would be raised and thus affect their practice. During the interviews I used an interview sheet (Appendix 2). I gave the teachers the questions beforehand. The interviews were done after school. During the interviews we followed the questions on the interview sheet. There are instances where I asked follow-up questions, or I requested more clarification, on such occasions I deviated slightly from the interview sheet.

It was a difficult and a time-consuming task to find teachers that were willing to work with me. A number of teacher mentioned 'time' as their reasons for not wanting to work with me, they said they were busy. Most of the teachers told me that they do not want outsiders to observe and criticise their classes.

The four teachers that I eventually worked with were more than willing to work with me. They saw this as an opportunity to improve their teaching. It was a coincidence that all the teachers who agreed to work with me had never been invited to any Gauteng Department of Education workshop. They knew there were changes in the curriculum but they did not know much about those changes. They were hungry to know more. Before the beginning of the research I visited their classroom to familiarise myself with the pupils and the teacher. The other reason is that I wanted to minimise the pupils' sense of novelty on the day of the observation. During our working period I had a good relationship with the teachers.

In this paper I shall look at Burkes' pentad and Wertsch's claim about mediated action and use them to analyse the classroom discourse. I shall also make a brief reference to Pedro da Pointe's (1992) paper where he constructed an analysis of the teachers' practical knowledge. I have looked at one individual teacher at a time and tried to analyse her classroom context. In my conclusion I shall bring all my insights about the teachers together and give a broader analysis of them. To protect the teachers' identity I refer to them as Teacher 1, 2, 3, 4. The numbers do not indicate any order of preference, they reflect the order that I followed for my observation. The transcripts of the observations and the interviews will be found in Appendices 3-10.

4. 3 LIMITATIONS

One of the problems that I encountered during in this research was to find teachers who were willing to work with me. I approached a number of teachers but in most instances the teachers had reservation in working with me as a researcher. One of the reasons that the teachers stated was that they do not have time, they are busy with other things. Other teachers told me bluntly that they don't want a person who is going to come into their classrooms and observe how they are teaching. The subject advisors left a legacy in teachers that when teachers get visits in their classroom the purpose was to belittle and or criticise the teacher, not to assist the teacher. This is one of the reasons why teachers have an aversion to

visitors in their classrooms.

In the past two decades there were a lot of people doing research in the Soweto schools. There is an allegation amongst the teachers that these researchers used them to generate money for themselves and the schools or teachers did not benefit from those researchers. After doing the research the researchers disappear. From talking to a colleague she told me that teachers in her case had argued that they could co-operate with her but, when she gets her degree what are they going to get?

While working with the schools I was overwhelmed by the scope of research the data provided. One of the issues that was fascinating was the issue of changes of roles in the pupils, the role of pupils changed in the teachers according to time, and place. There were also issues of language which was important. What I found striking in the classrooms was the way issues are so intertwined, one cannot avoid stumbling into issues that one had never anticipated. I found that the real challenge in this endeavour was to remain focused but still acknowledging some of these factors.

Lastly I found that the language that one uses can either make or break the research. The teachers asked what language I would be using because they said if they use English they would not be able to express themselves well. They suggested that I should use their medium. It was fortunate that I was able to use their language, it would have been very unfortunate if a person who did not speak their language worked with them.

CHAPTER FIVE

5.0 FINDINGS

When I used to reflect on the classroom the first thing that came into my mind was 'the teacher'. To me a teacher epitomised a school. At times things in the school do not proceed as expected and the first person to get the blame was a teacher. In most communities the best way of analysing the school was " blame the teacher". While working with teachers I realised what a reductionist I have been by losing sight of the many perspectives within the classroom that are at play. In my endeavour to understand the classroom I realised the complexities and the tensions that are involved within it. These tensions are not limited to what is observable but they also filter what has become unobservable. If we look at the teacher in isolation we may get a glimpse of what is happening in the classroom, but we won't understand a full picture. If we look at the pupils alone we still would not get the whole picture of the classroom. Gusfield (p10) in Wertsch (1997) says 'no one perspective in isolation is likely to provide an adequate account of human action'.

To learn more about what is happening in the classrooms we need to look, combine and analyse all the perspectives that characterise human action in the classroom so that we can get closer to a fuller picture. In our attempt at looking at these perspectives we need to link but not reduce these perspectives to another.

5.1 TEACHER 1

5.1.1 Making the teacher real.

5.1.1.(a) Who is the teacher

Teacher 1 is 56 years old. She has been teaching for 35 years in the junior primary school. She has taught Grade Three and Grade Four, but she has been teaching Grade One for 12 years . She has Primary Teacher's Certificate (PTC) as a professional qualification. After completing her PTC she studied Std 10 (commonly known as Matric, now called Grade 12) part time and proceeded to do a teachers' upgrading course to improve her qualification. Teacher 1 said she enjoyed learning mathematics at school and at the college, and she enjoys teaching the subject in Grade One. She said it was her choice to teach Grade One unlike other teachers who did not have a choice. This is the reason she gave about why she chose Grade One.

"Ndiyathanda ukubeka I- foundation ndiyapreferisha ukuqala abantwana besebancane - rather than ufumane sebegqibile esikolweni"
I like laying a foundation in pupils. I prefer to deal with pupils when they are still small rather than finding them when damage has been done.

Teacher 1 sees Grade One as a level where she could have a great deal of impact and influence in the lives of the pupils. She believed it was important to set a good foundation, to make it easier for the pupil to cope in latter Grades.

5.1.1.(b) Inside the classroom

In a conference I attended in 1994 which was attended by Nursery and Grade One to Three teacher. One of the issues that was discussed was that junior primary schools were not ready for the pupil. The nursery school and Grade Nought (pre-school) teachers lamented that they

work hard to develop pupils who are confident, innovative, happy and who have a positive attitude to challenges. They observed that there is change after only a few weeks when those pupils enter formal schooling. The pupils become scared, quiet, subservient and are scared to venture forth.

Their concern was that Grade One teachers always tell them that their pupils are not school ready, but they believed that it was **the teachers who were not ready for the pupils.** They complained that **schools are not pupil friendly.** At that time I did not fully understand the extent of the nursery teachers' concern, but now I would like to believe that I do understand and appreciate their concern. They are now pupils who speak when spoken to by the teacher. They are not allowed to interact with their peers. They only give answers that are "school friendly". In Teacher 1's class I saw how the school has transformed active bodies to obedient submissive bodies. The pupils I saw in the classroom of Teacher 1 were different from pupils that I see running and playing in the streets of Soweto. They were different from pupils who go to shops to buy good for their parents even at that young age. Pupils who sell sweets and vegetables for their parents. Pupils who makes rules and decision about the games they play.

Before the start of the lesson the pupils sat quietly and they were facing forward. They didn't even speak or whisper to each other, they waited for "the opportunity to learn" their eyes were always following the teacher. It was early in the morning but some of the pupils looked bored. This is but one of many lesson that these pupils have attended. It is possible that at the beginning of the year the pupils were socialised into what is expected in a school system. They have to behave the way they have been taught. In school they have to sit down quietly be attentive and listen to the teacher as she is the only source of knowledge. This perspective is well illustrated in Macdonald (1990) who went to a school at the beginning of the year. The pupils were spontaneous, they came to her, held her hands pulled her skirt and wanted her to kiss them. The principal got embarrassed and said to her "Carol, I am sorry, if you come again in 6 weeks the children will have learned to **behave properly**" (p5)

If you look at the video it becomes easy for one to pick up that pupils on the left side of the classroom are slumped and scared whereas those on the right were upright and bold in face. My impression was that the pupils were divided into homogeneous groups. The reaction of the teacher to these groups showed that she saw them as being fixed. The pupils were placed into different boxes. On the right it was clear that the pupils were in the **'intelligent box'**, in the middle they were **average** and on the extreme left they were in a **'less desirable box'** of the year. The amount of attention the teacher gave the groups was different. Her body language and her questions were more to the 'intelligent group'. She had to consciously remember to pose questions to the less desirable group.

For teaching and learning to occur in the classroom both teacher and pupils will have to understand the \)ute of the lesson even though not necessarily agreeing on it. Wertsch refers to that as: **intersubjectivity**. Intersubjectivity is a situation where people create a common situation definition from which they are going start together. In a learning situation it is important for pupils and the teacher to agree on the direction they are going to take. The danger in not establishing an intersubjectivity is that people may think they are talking about the same thing whereas they are talking about different things. An example of this can happen when a teacher use the word 'ithanga' which is a Xhosa word meaning either a pumpkin or a thigh. If during the process of teaching the teacher talks of pumpkin and the pupils think she is talking about a thigh, the discourse can lose some of its meaning.

The teacher told the pupils that she was going to teach shapes. It was the only time that the teacher gave pupils access to what they were going to do. The teacher operated in a gate keeping process, she held the cards of what she is going to teach close to her . As the lesson progressed the pupils had to uncover more about the lesson. Throughout the lesson the pupils were dependent on her on which aspects were going to follow. During the lesson there was a distinct role division, the teacher was the **knower** and the pupils **did not know**. The pupils had to try to establish any additional information for themselves to get through the lesson. They had to be attentive to do that. The teacher did not regard it as a priority to establish how much pupils do understand about shapes, how much can they could relate to shapes. If she had allowed pupils to demonstrate that they were able, this would have

threatened her role as the most able, that is, the one who knows. It might have been possible for her to either abandon that lesson or change it. That was a lot of work and this was probably the risk she could not take. It was better to assume that pupils do not know anything about shapes.

Due to the implicit ground rules, pupils even though they knew something about shapes they had to assume a position of not knowing anything. They had to look interested rather than confront the teacher with what they know. What they knew was irrelevant in the lesson. **What was important is what the teacher was going to teach.** There is an immediate demarcation happening between what the pupils come with to school, and what they learn in school. In the text there is an instance where a pupil wants to deviate from "school knowledge" and tamper with "home knowledge". The pupils says '*a circle looks like a half moon*'. By half moon the pupil meant a moon. Another pupils said '*a triangle looks like a halfbrick*'. Instead of the teacher appreciating and building on that, she ignored it and sent a message that she does not need spontaneous answers. Later in the discussion I shall illustrate the school correct answers that pupils give to school questions.

This lesson was divided into three distinct parts. In the first part the teacher introduced shapes. In the second part the teacher some pupils were called to the front to demonstrate shape pieces and in the third part the pupils had written work. I think the concept of shapes is complex to teachers in that one gets the feeling that it is used synonymously with specific shapes like rectangles, circle and triangles. I was not convinced that both the pupils and the teacher understood what the word 'shape' meant.

Teacher 1 asked pupils to look at e.g. the door. She asked the pupils to define the sides of the door. The answer that came from the pupils was that the sides 'awalingani' meaning *the sides are not equal.* If you look at the discourse one can pick up that this answer was not owned by most of the pupils. When one pupil has answered the other pupils continued to repeat her answer even if the teacher thought it was not desirable. It was as if they wanted to have a share in the answer. The teacher asked the pupils to give her reasons for saying that the sides are not equal. Reason!! There was this look of amazement in the pupils' faces. It

was difficult for pupils to understand what the teacher meant. This we see in the answers that pupils give. Some indicated using their hands how the sides a

One boy said 'anje nanje'. [He was demonstrating with his hands].
The boy meant: *they are vertical and horizontal.*

This to me was exciting, I was waiting for the teacher to use that input, especially for better understanding of rectangles. She was not able to use it. She ignored the answer. I interpreted that as a lost opportunity for everybody.

This is the conversation from the class concerning why the pupils say the sides are not equal:

Teacher: "Khawutsho, uwabona enjani Zinhle?
Zinhle , how do you see the sides of the door?

Zinhle: "Mm....."

Teacher: "Anjengantoni anjenge rectangle?"
Are they similar to a rectangle?

Class: "Yes"

Teacher : "Ubona ngantoni ukuthi ayi rectangle, ubona ngantoni Busisiwe? stand up!"
Why do you say they are similar to a rectangle?

Busisiwe: "Njenge ah..i..e triangle"
They are like a triangle

Teacher "Ubona nge triangle?" [laughing] "ubani omnye ofuna ukuphakamisa sive ukuthi ubona nge triangle [sarcastic] Nkosana andiva, ndibona abanye basaphakamisile"
You think they are like a triangle, I can see that some of you still have their hands up. Nkosana, what do you say?

Pupil: "Nge circle"
They are like a circle

The previous experiences of the pupils in the class has helped them to develop expectations about how the next lesson will look like. The pupils have internalised the manner in which the teacher teaches. When you observed the pupils of this class you notice that most of them had expressions of amazement as the teacher was teaching. That led me to suspect that there was something unusual, they were not used to the way the teacher was conducting the lesson, The teacher had deviated from the way she used to teach. She is asking for reasons!

Huidende (1990) refers to this deviation as "phenomena of interest". He says when pupils are used to a certain expectations, when there is a deviation from the norm the deviation stands out. The pupils can feel it and they will react to it. The reaction of pupils to the deviation was their expression of amazement as if asking themselves 'what is happening'? This deviation from the expected is not only problematic to the teacher but it is to the pupil. It is as if one party has broken the rules of operation without consulting another party. The situation definition between the parties become different, the pupils operate in the situation predetermined by previous experiences whereas the teacher is functioning within a new one . This creates a delay in establishing intersubjectivity as the pupils have to struggle to align themselves with teacher's new situation definition. All of a sudden they have to cope with questions that demand skills like observing, describing or defining a shape and using language to express themselves.

Some pupils were quick to get onto the bandwagon of the teacher. There was a boy who gave an answer that showed that he has been through cognitive processes. He used his hands to demonstrates how the door was like. The teacher ignored that response. Another example Teacher 1 asked pupils to look at the corner of the school and tell her what they can see. Most of the pupils did not know exactly what they should observe, one pupil demonstrated an angle with her hands. In both cases the teacher was not receptive to the answers. Even though the teacher put demands on the pupils, when some pupils did meet the challenges, the teacher did not have the skill to appropriate the pupils' answers and facilitate further understanding.

As the teacher proceeds with her teaching, it becomes apparent she is constantly monitoring or checking as to whether the pupils are listening. The teacher from time will ask question such as, 'Do you understand?' or 'Are you with me?' This happen after a teacher has made a statement which she regards as important for the pupils to note. The pupils will answer in an affirmative way, 'Yes teacher'. Pupils answer in a chorus some without looking at the teacher. The answer is spontaneous. They do not spend time thinking about the question. This should not be interpreted as meaning "we understand what you are saying" but it is an indication that they are attentive. I am saying this because when the teacher asks the pupils whether they understand, she doesn't portray an attitude of genuinely wanting to see those pupils who have problems. She utters the statements while in the process of continuing to say other things. There is no time gap between the teacher's question and the pupils' response. The teacher uses another gate keeping strategy, she will start a sentence and finish it. Her following move would be to repeat the same sentence but she would not complete it. The pupils know that they are expected to complete it.

5.1. 2 Theoretical Analysis

Teacher 1 defines Mathematics as counting and knowing the four basic operations. Even though there are shapes and colours all those are defined in the context of being counted. When I asked why she thought it was important to teach Mathematics to Grade One she said because she wants them " to know how to count". She saw the other mathematical concept e.g. shapes in the context of counting. Her understanding of Mathematics was consistent with Arithmetic which dealt with computation. She had a limited and also a limiting view of Mathematics. She did not see Mathematics as a discipline, that involves greater skills that counting. Mathematics involves patterns and relationships in patterns. It is a different way of thinking about things - which involves a lot of abstractions. People observe, compare , represent things and also draw conclusion. It is broader and bigger than counting.

The problem with this kind of interpretation is that the teacher may ignore the other facts of mathematics and focus on her own interpretation This explains why the teacher was not able to appropriate the good answers that came from some pupils. Her perception about what

mathematics is, constrained her from accessing and valuing the pupils' contribution which were in my opinion very mathematical.

The teacher sees herself as a custodian of the pupils. She sees pupils as being dependent on her for knowledge. In the interview she said pupils cannot develop their strategies, they have to depend on her for everything; when handling new problem she has to show pupils how the problems are done and let the pupils do the same problems. The teacher's belief is caught up in a vicious circle. The teacher does not have high expectations about pupils. Pupils do not perform well because there are no demands set on them . When the pupils do not perform well, the teachers' beliefs about get reinforced. If you look back, you can see that the teacher directly or indirectly was responsible for her beliefs. Her beliefs and perceptions about what Mathematics is and how pupils learn are a hindrance to the pupils and their development, she closes down opportunities for pupils to demonstrate any initiative. By so doing, she gets trapped to her beliefs and it would be difficult for pupils to transcend the beliefs of their teacher. This is a situation of self fulfilling prophecy.

When we reflect on her classroom practice we can see that her belief about the pupils has a great deal bearing on her practice. The new thinking in education is to involve pupils, and the teacher was conscious of that. In her intervention she wanted to bring the two aspects together, but she failed. She wanted to disseminate power to the pupils but at the same time she did not have any confidence in the pupils. The mediated action in her classroom shows tremendous tension between her and the mediational means she uses. The purpose of the agent was to me not clear, thus the mediational means did not successfully translate the purpose of the agent into practice. The agent was locked between her beliefs about teaching Mathematics, the pupils and the contemporary 'correct practice'. To me she lacked integrity because she wanted to be fashionable whereas she did not know how to deal with the situation. In the process she sent messages that were conflicting and confusing to pupils. She further caused unnecessary stress to herself. My instinct is that with this new Outcome Based Education (Curriculum 2005) a number of teachers will find themselves in this situation.

Classroom discourses occur within sociocultural situations. Sociocultural situations are never neutral. There is mediated action happening within them. That in itself indicates that there are aspects of power and authority interacting. When people talk of power they always associate it with the agent, in this case the teacher. This is a reductionist view of power because if you take a quiet emotionless teacher and put her in the classroom, he or she may generate power in terms of her professional status. She may hold less power and authority than a teacher who uses a stick to control her class. The question then is asked, where is power and authority actually located in the mediated action? When we talk of a powerful speech what are we talking about? Mediational means in isolation from an agent? What do we mean when we talk about a powerful agent, do we talk of it in isolation from the mediational means? Can we have a less powerful agent presenting a powerful speech or a powerful agent presenting a less powerful speech? These are some of the examples of the irreducible tension that exists between the agent and the mediational means. In the Teacher 1 situation the weight of power rests more on the agent than on the mediational means. The mediational means of the teaching is falling apart but what keeps the class going is the control and power that the teacher exerts in the class.

Bakhtin (1981) deals with the issues of Power and Authority in his account on authoritative discourse versus internal persuasive discourse. The authoritative discourse demands that power and authority are vested in certain aspects e.g. "Word of a teacher" one needs not to argue with it or question it. One needs to agree or disagree with it. In a Grade One class pupils can disagree with the teacher only if the teacher has created an environment where they are allowed to. In the absence of that, the possibility of differing with the teacher is limited.

Internal persuasive discourse is about the pupil appropriating what is relevant and discarding what is irrelevant. In this type of discourse one engages with the mediational means. Do both discourses exist concurrently in the mediation situation? If they do, how do they survive each other? At the beginning of the lesson the teacher can impose the content and deny pupils the opportunity to make contributions. During the lesson the teacher can allow the pupils to make meaningful contributions towards the lesson.

Willower, Eidel and Hoy (1967) see control in the classroom as either custodial or humanistic. The custodial perspective is characterised by strong inclination to maintenance of order, watchful mistrust; punishment and 'lack of respect'. The humanistic perspective is characterised by self discipline; trust; respect etc. I would like to believe that power and authority have an implication to control. Henderson (1982) believes that pupils who are used to custodial control tend to be externally-orientated with their control. They would not initiate issues, they would depend on external control aspects to control their behaviour.

I am aware that when we look at mediated action there is always an irreducible tension between the cultural tools and the agents, but for the sake of knowing more about the discourse we can first analyse the agent and look at the role she plays in the discourse

The teacher by virtue of being the teacher in her class holds special power and authority. Let us look at the historical perspective of being 'a teacher'. Teachers were taken in African communities as second parents. They possess the knowledge and help shape the nation. Parents knew the 'teacher authority', and that was passed to the pupils. Teachers should be respected, probably in young minds they cannot do anything wrong. There are certain ground-rules in the class that both pupils and teachers understand. These were probably not explained in the class but imposed. That is the first level of power that teachers cover themselves with. The second aspect of power that teachers utilise in the classroom is the power of the mediated means, in this case the language that she uses.

The teacher pupil discourse in the Teacher 1 classroom is characterised by what Mehan (1979) refers to as **'IRE'. Initiation** by teacher, **Response** by pupils and **Evaluation** by the teacher. The teacher is the only one who initiates the learning and who controls the interaction. She is the only one who gives instructions interaction and asks questions to pupils. The pupils' participation is constrained to listening to the teacher and bidding for turns for answering the questions that the teacher is asking. They also wait for the teacher to confirm whether the answer is correct or not. The teacher holds the power to evaluate the pupils' responses. After giving the answers the pupils always look at the teacher for confirmation. This links up with what Henderson (1992: p 82) said about pupils who are

socialised into custodial control and looking externally for control. What happens when the pupils answer is incorrect?

The teacher ignores the pupils' answer when it doesn't fit her frame of reference and fishes for what she regards as correct. There is another battle emerging in the classroom. It is about studying the teacher and looking for clues and guessing what the teacher wants, not what is necessarily the correct response. The pupils are shifting from addressing the task to reading the mind of the teacher.

Wertsch (1998) argues that spoken language has materiality, that is why we can interact with it. The materiality of the spoken language unlike the written language appear momentarily and evaporates quickly. It makes it difficult for people to grasp.

Teacher 1 has the materiality of a spoken word to pass the new information. The materiality of cultural tools can have diverse effects when it reaches the audiences. It can create the feeling of "I understand" which happens when there is coherence between the agent, the mediational means and the purpose. It can also create a feeling of great desperation and confusion. In the case of Teacher 1 the language instead of bridging the knowledge or bringing relief, created conflicts within the pupils. She also uses it as a tool to dominate in the class. Even though the pupils have the full use of the spoken language at their disposal, due to the asymmetrical position that exist in the classroom, they do not use it.

Materiality of spoken language even though it is momentarily can possess more power than the written language. In the classroom the materiality carries with it the attitude and emotions of the teacher, the presence of the teacher, her tone, the presence of classroom and the history of previous interactions. Listening to the teacher is different from listening to the radio. What interacts with the pupils is not only the materiality but it is also the other aspects within the class. If you look at Teacher 1 the pupils' interaction with the mediational means is constrained. The teacher dominates the interaction. The pupils' participation is limited to passive acceptance of the fact that they have to interact with the spoken language and respond to it as the teacher stipulates. There are instances when the teacher is forced to interact with

the materiality of mediational means from the pupil. In instances where the pupils' materiality conflicts with that of the teacher the teacher often ignores the pupils and goes back to her own way.

Wertsch (1998) further argues that the external properties of the materiality of cultural tools has implication on how the internal processes come into existence. The teacher materiality helps shape how the pupils understand what she is teaching. It is no surprise that there is misunderstanding and confusion in the faces of the pupils. I attribute that confusion to the complexity, lack of organisation and the unstableness of the teacher's mediational means. When the teacher realises the confusion she has created instead of relieving the pupils, she provides cues that allows the confusion to slide further into despair. If you observe what the pupils do, they wait for one pupil to provide the answer and consequently all the pupils after that pupil, will echo the first pupil's answer. This happens even if the teacher demonstrates that, that is not the answer she wants them to conclude with.

The explicit aim of Teacher 1 lesson was to teach shapes. Did she fulfil her aim? This cannot be easily answered unless we consider other factors. Mediated action may look on the surface, as if it contains one aim. 'To teach shape' but, there may be many goals implicit and explicit that the teacher is working towards. Lets look at Teacher 1. The explicit aim was to teach shapes but, another aim could have been to present a model lesson for me. She could have wanted to show me the good relationship that exist between her and her pupils. She had a variety of learning aids for her pupils to use which I don't think she uses in her daily classroom life. She tried to involve during her teaching pupils that were marginalised but she frequently forgot them. She used pet names to refer to her pupils e.g. 'Ntombazanyana yami, tata, baba'. The pupils looked amazed at what the teacher was doing. I saw her use of pet names as a mechanism to 'soften the blow' and neutralise her impact in pupils. Her other aim was to have control over the interaction. I acknowledge that there has to be a measure of discipline in the classroom to make the lesson successful. Pupils cannot learn in a chaotic situation. Some failure of lessons can be attributed to the teachers' lack of control. In this class control became an inhibiting factor. It took away spontaneity and limited diversity. Wertsch (1998) argues in his paper that goals can conflict each other in the mediated action.

In Teacher 1's class there was tensions between wanting pupils' creative responses and wanting to maintain control. In most instances the teacher was working against herself.

Do pupils participating in the classroom have aims? I think they do, even though the aim of the lesson is predetermined and shaped by the teacher. We may assume that the aim in this class was to learn shapes as the teacher's intention was to teach them. In the course of teaching we were also able to see a multiplicity of aims emerging from the pupils. One being to listen or be seen to be listening, to raise their hands even though to repeat the answers of previous speakers. Raising your hand is associated with knowing the answer and therefore being intelligent. In an ideal situation the pupils have to be creative in their responses to answer from the teacher, in this classroom the aim of the pupils is to study the teacher and come with the answer that may fit with the teacher's answer. There is conflict between the teacher's aim and the pupils' aim.

The concept of appropriation was introduced by Vygotsky's colleague Leontev (1981) but it was later taken up and developed by Newman, Griffin and Cole (1989). Mercer (1991) argues that Leontev introduced the concept of appropriation as an alternative to Piaget's assimilation. The concept of appropriation shows the interdependence that exists within humans, it portrays the ideas of an individual buying into the already developed sociocultural situation. Mercer (1995) said humans do not have to reinvent the wheel. Appropriation is a process where a pupil or an adult embraces practices and ideas from the society and make them her or his own. The process of appropriation in a class happens at different levels: at one level the teacher can **appropriate the ideas and concepts from other sources**, at another level the teacher can **appropriate the ideas from the pupils for the sake of helping them**, and lastly the **pupils can appropriate ideas from their teacher**. The latter two processes can occur concurrently. Appropriation at the first level can determine the latter two processes levels.

To say one understands and can apply the knowledge I assume that one has to own that knowledge. When Wertsch (1998) talks about appropriation he refers to a situation where one embraces another person's cultural tools and progresses to own t' n. The process of

owning is not a passive process but it is characterised by a process of scrutiny from the agent which could result in either adopting, rejecting, or improving the mediated action. In the case of accepting there could be partial acceptance or full acceptance leading to the assimilation of the new dispensations.

A situation can arise where there is a conflict between the mediational means and the agents. In some cases the conflict may not be caused intentionally by the agent. Let us take for example: language. The agent could have appropriation over the concept but lack mastery in the language she uses. She can use terms that she is not familiar with and thus make the discourse lose its meaning. This was not the case in this Teacher 1. The teacher used Xhosa which is the language that she is familiar with.

Secondly conflicts can be caused by lack of appropriation and mastery of the concept. The agent may think that she understand the concept well and can apply it whereas what she has is a superficial understanding of it. I think this is the case with Teacher 1. She has a superficial appropriation of what child centred learning is about, she doesn't own it. She has a limited understanding of the principles underlying it and thus she finds it difficult to implement them. If we look at her we can see that she is aware of the new innovations in education, but she does not have adequate control of such mediational means. Teacher 1 lacks integrity; her body presentation is relaxed she uses warm new friendly language, but all these are coatings of authoritarian and autocratic thoughts.

I want to use an example of a cake to illustrate Teacher 1 situation The confectioner uses incorrect ingredients to bake a cake, the end product becomes a bad cake. The confectioner does not throw the cake away, she decides to cover it with the best icing to make it look exceptionally attractive. If one eats the cake and goes past the icing she realises that the cake is not as good or delicious as it looks. I take the coating to be the teacher's gestures, the pet language she use to pupils and her manner of wanting to involve pupils. The cake is the subtle autocratic way of teaching that she uses and the lack of pupils' development that can be seen in her classroom. If one can reduce the volume of the video and watch her going through her process of teaching, one can fail to recognise the discrepancy that happens in her classroom.

Sometimes an agent may possess a feeling of appropriation i.e. she may believe that she owns the process, but when an audience gives an assessment of the process, the results may come out negative.

The teacher lacks the skill to appropriate ideas from the learners. Bruner in Tharp and Gallimore (1988) in his discussion of classroom discourse utilises the concept of scaffolding. Scaffolding "represents the kind and quality of cognitive support which an adult can provide for a child's learning" (Mercer 1995). In a classroom the aim of the mediating process is for the pupils to achieve a specific skill or understand a certain concept which the teaches. In a scaffolding situation one of the criteria is that a teacher has to be sensitised to the level of competence of the pupils. She has to have competence in what she has to teach, and be conscious of the development of that concept. She has to have skills that will complement the pupils' problem areas. With scaffolding the teacher doesn't have to volunteer all the information, or do everything for pupils as in traditional methods. She has to provide some information which could help the pupils understand the core concept. Her questioning skills have to assist pupils to the desired end point. What happened in this class is that the teacher asked question which neither led nor assisted pupils. One had a sense of **absence of progress**. Some pupils gave answers which showed lack of understanding. Instead of the teacher assisting them towards better understanding, she simply indicated disapproval with her gestures, abandoned them and went for other answer. There were also pupils who showed that they have an idea of what the teacher was asking 'Mzwakhe response'. The teacher was also unable to pick the answer up and use it towards achieving the aim. This resulted in a situation where there was a disintegration of learning.

The pupils spend a considerable percentage of time in their classroom. For them to survive, they have to appropriate behavioural aspects that will ensure their smooth functioning in the class. One aspect that they have had to learn is that: they have to do what pleases the teacher, not themselves. Even if they are bored, they have to look interested, they should not question or disagree with the teacher. They have to play along with the teacher. Their responses must synchronise with those of their teacher. The pupils have had to learn that they have to take up position of not knowing even if they know what the teacher is talking about. I found it

disheartening when the teacher asked pupils to describe the shape of the door and the pupils were not able to do so. If these pupils were given the same task at home wouldn't they be able to complete it? I thought they would but, the constraint put on them in the classroom constrains them from valuing their experiences and their thoughts. Mercer (1991) found that pupils will respond to the same question differently depending on where they are. In schools pupils provide answers that are "school wise" where as at home they will provide their own answers. I am certain that outside the classroom these pupils would have had more to say about the shape of the door.

Teacher 1 had changed only a certain part of her interacting but she has subconsciously left her old ways intact. I have mentioned at the beginning of this discussion that the teacher has not mastered and appropriated the concepts that inform her teaching thus she shows these discrepancies. Teacher 1 has been within a teaching system for more that 30 years, during that time she slowly internalised that system. She internalised the system to such an extent that it became her second nature. I am saying this because when you look at the interview one gets the sense that there is tension between the teachers' own voice and voice of the system under which she has been operating. I want to illustrate that with a example when I asked the teacher why she has to find out the pupils' prior knowledge before teaching them. she said "pupils have to move from the known to the unknown", which is a popular term in teacher methodology in colleges. She found it difficult to explain what she meant with that statement.

What I found alarming with this teacher was that she has accepted a position of less power , in determining her destiny i.e. acknowledge her power she has compromised her freedom, her ideas are strongly overshadowed by the ideas of the then education system. I found that she had difficulties in providing reason for the answers she gave me. My interpretation of the teacher is that because of her lack of power she is subconsciously trying to put pupils in a position that is similar to hers. She appropriates their power because hers has been appropriated.

5.1.3 Summary

Teacher 1 has been a teacher for 30 years of which more than a third was devoted to Grade One. Her classroom discourse indicate that she still holds the authoritarian beliefs about teaching. What makes her unique is that she shows awareness of the new approaches but, she finds it difficult to integrate the authoritarian approach with the pupil centred approaches. Both approaches sit in isolation and they do not impact on each other at any point. At first glance Teacher 1 is deceiving, she can be confused with an open minded teacher. It is only when you spend time with her that you can realise the autocratic way she manages her class.

5. 2. TEACHER 2

5. 2. 1 Making the teacher real

Teacher 2 comes from the same socio-historical background as Teacher 1. Both these teachers have been through the same education system and they have been exposed to similar teaching conditions e.g. township education. However, we must not assume that because they come from the same socio-economic background they are the same. There are multiple factors that are responsible for shaping an individual.

5. 2. 1 (a) Who is the teacher

Teacher 2 is 52 years old. She has been a teacher for 30 years. Throughout her life she has taught Grade One. Her exposure to other Grades was only when she taught at the rural school where Grade One was combined with Grade Two. She studied her Primary Teachers' Course (PTC) in 1965. PTC was a two year course and was done after passing Std 8 (the equivalence of Grade 10 today). During her teaching she studied Std 10 part time and went further to take a teachers' upgrading course. In our interview she said she studied Mathematics up to Standard 10.

Teacher 2 was frank in her interview. She sounded genuine in her responses. Like Teacher 1

there are times where she would go back to the rhetoric when answering questions. She expressed that she does not particularly hate mathematics but in her words she said:

"Andiyizondi, but hayi ukuthi ndingambulala umntu xa engathi ndingatitshi iMaths"
I would not particularly kill a person if I wasn't given an opportunity to teach mathematics.

Teacher 2 said she did not choose the class that she was teaching, the principal gave it to her. She expressed the lack of decision-making powers that were prevalent in schools. Later she said, if she was given a choice of choosing the standard to teach, she would have chosen Grade 1 because she likes it. She said in Grade One pupils play, and they **do not hold grudges** against the teachers.

My impression about the teacher is that she did not have anything to hide. She said everything with good intentions. She believed that she was providing a good service to the community. To me the teacher revealed herself as a person who has integrity.

5. 2. 1. (b) Inside the classroom.

This classroom had a relaxed and an enjoyable ambience. There were attractive pictures on the wall. The pupils were sitting in groups and they were facing each other which meant that there were some pupils who had their backs facing the chalkboard. Nevertheless, this classroom gave me a feeling of the existence of co-operation between the pupils and the teacher. Before the lesson the pupils were conversing with each other in a controlled way and the teacher did not seem to mind.

The teacher was going to teach different shapes. She had a variety of material on her table which she was going to use for her lesson. She had 2D and 3D shapes at her disposal. She had boxes, a ball and some charts. She started her lesson by calling all the pupils to attention. She asked other pupils to turn their chairs, face forward and look at her. There was a look of anticipation in the eyes of the pupils. I think this was brought by the material the teacher had and also by the fact that they did not know what the teacher was going to teach. The teacher

initiated the conversation by introducing the researcher. That made me think that she (teacher) had told the pupils that I would be visiting them. I interpreted that as a sign of valuing the pupils as that didn't occur with other teachers with whom I worked.

Teacher 2 presented her whole lesson in English. There wasn't a feeling of despondency in the pupils as the teacher only used simple sentences, and the sentences were in relation to the objects that the teacher was showing to the pupils. She started the lesson by using 2D shapes to explain the properties. She immediately after that used the 3D shapes like the ball and the box. There was consistency in how she conducted her lesson. She would take a shape or term and introduce it to the pupils.

Teacher: "Now we are going to learn about shapes"

She would drill what she has introduced. The drill was introduced in a form of the teacher asking the pupils what she had said and the pupils repeating.

Teacher: "About what?"

Teacher and class: "shapes" (the pupils repeat five times with the teacher indicating the pace.)

Teacher: "What are these ?"

Class: "These are shapes".

When the teacher was 'satisfied' she progressed to teaching a circle. The pattern of introduction of a shape- pupils' repetition- properties of the shape-repetition emerged.

Teacher: "Here I brought a shape. This shape is a circle" (holding a round board)
"What is this?"

Class: "Circle" (six times)

Teacher: "This circle is round like a ball (four times)

This circle is round like a .....(The teacher does not finish the sentence)

Class: "Ball"

Teacher: "This is a ball. What is this?"

Teacher and class : "This / that is a ball" (five times) (*my comment: this is drilling getting out of hand because the pupils know a ball)*

Teacher: "A ball is round like a circle." (Five times)

"A ball is round like a ..... (four times with the pupils saying "circle")

This form of interaction continued through out the lesson. The other shapes conformed to this pattern of teaching. While the teacher was teaching the pupils were enjoying themselves in repeating what the teacher wanted. If we recall the classroom of Teacher 1 there was an expression of unfamiliarity in the eyes of the pupils as if they were saying "what is the teacher up to today?" In this class that unfamiliarity was not there. My interpretation was that the teacher was teaching in a way that the pupils were used to, there were no elements of surprise.

I think the teacher was not conscious of the differences between the 2D and the 3D shapes. She had a rectangular and square prisms. When she was saying "a rectangle has 2 long sides and 2 short sides", she had problems in knowing exactly where to point. She would point at the edges and alternate that with pointing to the faces of the prism. She did not have a sense that a rectangular prism is made out of 6 faces which are all rectangular. That process continued with the square where the teacher also did not know where to point. At the end of the lesson I was not sure as to whether the pupils would be able to point out the differences between the two boxes or what is rectangular about a rectangular box and what is square about a square box. I thought to myself that maybe this was not the intention of the teacher.

During the classroom discourse I did not see any frustration in the faces of the pupils, but, maybe there wasn't any opportunity for the pupils to show it. The whole interaction was quick. The pupils were concentrating on what the teacher was saying and waiting for their turn to repeat it.

During the teacher's presentation she taught every shape as an isolated entity. She did not attempt draw relations between the shapes. She did not pose questions to individuals. She treated the class as a singular unit. Whenever she posed a question she posed it to the whole class. The pupils knew that they had to answer in a chorus. This did not create chaos, in fact drill was done in unison, the pupils would be quiet after doing it. The teacher allowed pupils to stand up during the lesson. There seem to be an understanding between the pupils and the teacher of when to stand. When the teacher introduces a sentence, the pupils would all be seated, but during drill they could stand up. This pattern is visible throughout the lesson.

5. 2 .2 Theoretical Analysis

Teacher 2 conforms to what we term an authoritarian teacher. She is what Newstead (1996) will refer to as a traditionalist teacher. He says such teachers see Mathematics as a body of fixed rules and procedures. For successful results to be achieved the teacher has to drill these rules and facts to the pupils. Pupils are taken as objects who have to believe what the teacher says and passively absorb and at the appropriate time be able to regurgitate the information that has been taught (p13). When observing the classroom process the teacher in this classroom has a powerful position in that she does not only determine the purposes and goals of learning but she also determines ways of attaining them.

There is a danger with this teacher in that we researchers might be blind to what she was doing. We can reduce everything she does to a stereotype of being a typical traditionalist teacher and miss the richness in the discourse. What we need to do is to move our perception of her away from the state of being familiar to the state of being unfamiliar (Macdonald: pers

comm.) to be able to pick out certain aspects in her practice.

There is a tendency to associate an authoritarian teacher with a teacher who is being feared and who causes tension in the classroom Breen (1991). That perception is probably fuelled by the amount of power that authoritarian teachers assume to themselves. This is different with Teacher 2, there is a happy mood in this class. Even though the pupils assume a lesser position they (pupils) are still happy with what they have. They are spontaneous in their interaction with the teacher. During the lesson they are allowed to stand and move around, the teacher does not seem to mind. **This is welcome release from our stereotype.**

Teacher 2 unlike Teacher 1 did not have to use any control language and she did not experience any disruptions like Teacher 1. Can one deduce that in an authoritarian way of teaching there are aspects of control that are generic to it? An authoritarian method has a built in mechanism for control. Implicit in it is a strong aspect of monitoring and sustaining attention. Teacher 2's pupils were always kept on their toes in terms of being kept engaged, they did not have an opportunity to 'stray'. Sustaining attention and enthusiasm in pupils is one of the aspects that is responsible for success in the classroom but, it is a complicated issue. In pupil centred approaches sustaining attention and enthusiasm is the function of both the pupils' tasks and the teacher's mediation. Due to the inherent differences in pupils and the increase of the teachers' workload, the issue of control remains problematic in pupil centred methods. With authoritarianism, control is in the hands of the teacher, the quality of the task does not have the same consequences for the loss of attention..

Teacher 2 interprets Mathematics as counting and using operations. In more than one instance she used Mathematics as synonymous with counting. Whenever she talked about Mathematics she talked about counting. She saw her brief in Mathematics as being to teach counting and operations. The teacher did not know why she was teaching shapes, she saw shapes in terms of counting their sides. This is a limited view that excludes some richness that one finds in Mathematics. Looking at patterns, looking at similarities and differences, designing and building things, these are some of the aspects that Grade Ones lose out. One of the shortcomings of this limited view of Mathematics is that there can be a transference of

this belief to the pupils. There is a likelihood that pupils may grow up thinking that mathematics is only counting. This view can further limit the development of other cognitive skills that pupils might have developed had the teacher's been broad.

The teacher's view is also a handicap to her, even though at this moment she is not conscious of it. It constrains her from putting into practice concepts that she would otherwise use had her views about mathematics been broad. Her views are not a disadvantage only to the pupils they also limit her own development in Mathematics. When Wertsch (1998) was talking about the constraining effect of the mediational means he was referring to such instances. The agent is bound and constrained by the means she uses. At the same time the agent also constrains the mediational means she uses. Until one aspect moves out of this vicious cycle the opportunity to improve will be minimal. When the mediational means is at an equilibrium with the agent change in the mediated action is not likely to happen. In relation to Teacher 2: if the teacher is comfortable with the method she uses, she is unlikely to change it.

If the agent gets exposed to different and better mediational means she has an opportunity to transform her mediational means. The change in one aspect may result in the change in the whole mediated action. I want to make it explicit that the change of the mediated action is more complex than the way I have put it at this point. There are always tensions between the agent and the mediational means that might put constraints on transformation.

The above discussion shows the amount of power and authority the mediational means and the agent enjoys in the classroom. Through the mediational means the agent is not only able to determine what counts as knowledge, she further determines how the knowledge should be assimilated by the pupils. Through the mediational means the teacher can also strip pupils of any power that they are left with. Not giving pupils time to engage with the discussion is in a way taking away their initiative to claim responsibility for what they are learning. The consequences of the teacher's action is the nurturing of dependency in pupils and the creation of a dichotomy between their knowledge and the teacher's knowledge.

The explicit aim of the teacher was to teach different 2D shapes. In my opinion the name

'shape' was not given its meaning. A circle, a rectangle, a triangle are amongst other shapes that pupils are confronted with. A shape is a **form**, a leaf has a shape, a hand has a shape etc. The teacher portrays 'shapes' as if they are specific shapes. Would the pupils know that their hands or feet have shapes or the designs on their dresses have shapes ? I do not think so. One of the aspects that teachers are faced with is the lack not only of reflection but also of appropriate content knowledge. This can result in teachers exposing pupils to misconceptions that would be difficult to remove. When the teacher said 'shape' what exactly did she mean, triangles, rectangles or their build or form? When she said a box is like a rectangle, was she aware of the little rectangles that make up a box? It is important for the teachers to sharpen up not only their means but also their knowledge of the subject. It is futile for the teacher to teach in the most beautiful way but mediate misconceptions. Effectiveness covers both the **'what'** and the **'how'** of teaching.

This debate gives us insight into the debate of the tensions that can exist between the agency and the agent. In authoritarianism the mediational means does not protect the agent against mediating misconceptions. It becomes an accomplice to the misconceptions. In certain methods like situations where there is more pupils' involvement, the mediational means can sometimes minimise the chances of mediating misconceptions, instead they can expose them. Pupils through explorations can uncover misconceptions and also help the teacher to uncover them.

It was the opinion of the teacher during the interview that pupils need to understand what they learn instead of memorising it. She felt that the use of concrete material help the pupils to understanding. I.' the absence of concrete material, she argues, pupils would be forced to believe what they are being told and have no opportunity of verifying. I had reservations about the teacher's understanding of 'understanding'. There was some discrepancy in what she believed and what she did. In her classroom practice she diverted from what she said, she drilled pupils and encouraged them to memorise. She superimposed her understanding of the content and the interpretation of the concrete objects on the pupils. Pupils had to memorise the properties of the shapes the way the teacher wanted them.

My impression of the pupils during the lesson was that they were operating in an automatic mode. They knew when to repeat and what the teacher wanted them to repeat. The pupils were doing what Macdonald (1985) refers to as Rote Rhythm method. A teacher would say a full sentence "A ball is round like a circle" She would repeat the same sentence and leave out the last word. " A ball is round like a ....." The pupils will know that they have to complete the sentence by saying "circle". The teacher would also ask a question "What is this?" and answer the question herself "That is a box". When she asks the question again the pupils knew that they had to repeat her answer. The teacher indicated the pace that pupils were supposed to follow while they were repeating. This worked like magic in the class. This type of interaction did not provide opportunities for pupils to make any input into the lesson.

Wertsch (1998) distinguishes between mediational means that have permanency and those that are temporal such as spoken language. He argues that the spoken language because of its temporality, lacks permanency and it is more difficult to grasp. Teacher 2's impact on the class is dependent entirely on the spoken language. Her emphasis on drilling subconsciously acknowledges the fact that spoken language is difficult to grasp and therefore she has to implement **a strategy that would ensure some permanency.**

The teacher's intentions about the pedagogic value of concrete objects were valid. The presence of concrete objects gives pupils opportunities to touch them, smell them, feel them and compare them. In that process there is learning happening. In Teacher 2's situation, the presence of concrete objects did not promote any learning. She was the only person who had access to the objects. She superimposed what she wanted pupils to observe and influenced the pupils' interpretation of the objects. Instead of the objects being tools for the pupils' learning , they became the **tools to reinforce the teacher's ideas.** In my opinion the tools created misconception instead of creating understanding.

One of the dangers that our teachers are confronted with is that, there is a tendency to link the presence of resources to effective learning. I want to argue that good resources do not necessarily lead to good teaching. They do not automatically bring understanding, in fact they can do the opposite. Good and appropriate resources are necessary for effective teaching

but, they are not sufficient, something more is required. You need an agent who has to have knowledge of how to maximally utilise the resources available. Resources should open up learning opportunities rather than close them. They should help pupils **uncover new concepts** instead of **covering old concepts.**

During our interview the teacher acknowledged that pupils are different. They come to school being different and, their performance inside their classroom is not the same. The teacher was more articulate in outlining the differences that existed in pupils and she gave reasons for those differences. Some pupils are generally more intelligent than others, they cope well with school. Some pupils need more motivating for them to learn. Some pupils do not cope not because they are 'slow' but because they are underage. Lastly, some pupils need special learning. During her teaching as I have mentioned before, the teacher showed little cognisance of those differences. She treated pupils as if they were a homogenous group. She asked them questions as a group and did not make efforts to differentiate between them. There was a discrepancy between the her practice and her belief. Even though she was articulate in how the pupils were different, she found it difficult to translate that into practice. Her inability to reflect accurately on her beliefs made it impossible for her to equate her beliefs to her practices. The up side of this approach, not that I am condoning it, is that it is 'fair". It is, because it does not favour certain pupils and overlook others. Every pupil in the class gets the opportunity to respond to the teacher. All the pupils take pride and ownership of the answer.

On the issue of finding prior knowledge before teaching, the teacher expressed the view that it was important for a teacher to establish intersubjectivity before teaching. She said Grade Ones have to be assisted in organising their school knowledge. When I urged the teacher to be more specific about the importance of prior knowledge in her teaching, she said, "pupils come with the known and I have to provide the unknown". The last response the teacher gave made me conclude that she did not understand the full implications of the question. That is why she resorted to what I call the rhetoric "moving from the known to the unknown'. This is a popular saying amongst teachers, which has never been coupled with meaning.

What the pupils have learned at home or during their everyday interaction with peers in or outside the school doesn't count as being of consequence at school. The teacher unintentionally gives the message what matters is not what pupils come to school with but what she teaches them. In her interview she said that pupils pre knowledge was important but in practise she drilled pupils an the word 'ball' an object that pupils are familiar with in the township. Does this mean that the teacher in question does not value the pupils? At one level the teacher is operating **as herself** a person who is sensitive to things and experiences around her. At another level she as an **agent of the theoretical knowledge** she was trained in. There seem to be a line separating these two roles and these roles do not join or cross. They do not impact on each other. Her experiences about pupils during her years are of no consequence to her practice. The teacher undermines her experiences and gives more priority to what was predetermined for her by the theoretical background she learned. I do not think the teacher does not value the pupils. What she does in the classroom reflects her theoretical background not what she embodies as a person.

The trend in the past and even as I speak has been that what happens at home is irrelevant to what happens at school. Compounded to that, there is a wedge drawn between what happens in the classroom situation and what happens outside the classroom situation but at school. A teacher would send a pupil to buy things for her or him, she would insist that the child should check the change. She would have confidence in that child. When it came to interacting with the same pupil in a classroom her attitude towards the pupil would be different, she would take the pupil as being incapable. What I want to allude to is the classroom situation has its own distinctiveness that tend to isolate aspects from those that are outside it. During the classroom time the mediated action becomes different from the mediated action during break or after school. This difference can also be seen in pupils, during break and after school it is like they say 'this is our time, we can now behave as ourselves not learners'.

Wertsch (1998: p 7) says that "the external properties of cultural tools have important implications for understanding how internal processes come into existence and operate". In simpler terms this means : the way the teacher mediates has an impact in the type of skills that pupils develop. The skills that the pupils will develop will make it easier for them

(pupils) to interact with the material. Memorisation in Teacher 2 becomes the most obvious skill that the teacher is working to develop. Her insistence on drilling bears testimony to that. Her assessment during the end of the lesson required that pupils should reproduce what they had memorised.

While we understand the skills that are being developed, mediational means also has important implications in understanding why certain skills **had not developed**. What we observe in the classroom is not all that is happening. While the teacher is teaching the goal of her teaching may look obvious, but I would to argue that it is not that obvious. While she is teaching there are a number of goals that she promotes that she is not aware of. Wertsch (1998) says that mediated action has multiple simultaneous goals. Her mediational means carries with it explicit and implicit purposes that the teacher sometimes may not have control of. To discuss briefly these simultaneous goals; through mediating memorisation the teacher may not be aware that what she indirectly develops the pupils' dependency. By imposing knowledge, the teacher may not be aware that she undermines her pupils. She subconsciously sends a message that she does not value the pupils' experiences. Her act of not acknowledging its existence gives a message that it is not important.

It often occurs that the goals that are developed are in conflict to each other or they conflict the genuine purpose of learning. The teacher did not impose messages that are contradictory to the pupils. There was coherence in her presentation. Her teaching was consistent with the expectations she had on pupils, it was also consistent with her assessment at the end of the lesson. I want to argue that the style the teacher was using to teach promoted certain goals which were contradictory to the goals of schooling. I believe school has to prepare pupils for the challenges that they are going to face in the world. One aspect that is important is that the pupils should be independent in terms of both the physical material and the cognitive material.

This teacher is working against that goal. I do not think the she is aware of it. The teacher has directly or indirectly taken away the pupils' opportunities to be critical and independent thinkers. They do not have either the pressure or the incentives to be original and creative.

Both the teacher and the pupils are victims of the theoretical knowledge that the teacher has been exposed to. Mediated action is not static, it is always in the process of developing. We have a tendency of focusing on activities that are fossilised and try to interpret them as if they are static. Every mediated action that we see has a history. If we remove the historical context we can run the danger of ignoring the process. Wertsch (1998) cautions us about the danger of looking at a situation and analysing it as if it is an end to itself. If we can analyse and reach a conclusion about Teacher 2 without taking cognisance of her historical background we shall be committing an injustice. The teacher is a result of her historical context, she is also responsible for shaping the historical context of the pupils.

I would like to give more insight into the teacher by looking at what Elbaz in Pedro da Ponte (1992) refers to as professional knowledge. Professional knowledge is 'knowing in action'. It is based on both theoretical knowledge on experience and on reflection on experience. Elbaz draws a distinction between academic knowledge and professional knowledge. With academic knowledge there is more reliance to rational argument than on experience. Professional knowledge according to Elbaz is structured around three levels. **Images, practical principles**, and **practical rules.**

Images refer to a teacher's picture of how her teaching should be like in the classroom. Pedro da Pont (1992) argues that **images** are the less explicit and the most general level of the teacher's practical knowledge. The teacher's images capture within themselves the teacher's personal beliefs and perceptions about the classroom discourse. The teacher's images are the results of a boiling pot of the teachers' experiences about the pupils, subject matter, her perceptions. The images are organised in a way that help to organise the teacher's knowledge and practice. They influence the teacher's practice the classroom, how she relates to the mathematical content, her relationship with the pupils etc. They become a vision towards which the teacher aspires. It can occur that a teacher can have a repertoire of images about different aspects in her practice. These may be based on different teaching experiences that the teacher has been confronted with. The teacher can also have different images for different situations.

The second level of professional knowledge is **practical principles**. Principles are concerned with the purpose. They attempt to answer why thing are done in a certain way. The principles are shaped by the teacher's theoretical knowledge and her experiences. One of the aspects that Pedro da Ponte (1992) mentions is that practical principles function to portray that every practice is principled, it does not happen on its own. The arena of practical principles is where things are being thought out and crystallised. This level has some strength in that it is at this level that a mixture of theoretical knowledge, beliefs, perceptions and experiences are put together . At the end of putting these together principles which are end products emerge. These principles have implicit within themselves some thoughts about rules that determine practice and they are directly responsible for the formation of images. It should not be forgotten that these principles are part of the system that functions together. Even though the principles underpin practice they do not necessarily determine similar practice.

Practical principles are strongly linked by their nature to practical rules, the third level of practical knowledge. The practical rules are concerned with what one does during a practical situation. They are the standing practices that outline what to do in certain situations. The practical rules are the implementation phase. Their aim is to conserve time by eliminating deliberate thoughts during the lesson. It is difficult to form a trichotomy between images, practical principles and practical rules. The three levels of professional knowledge are not separate and independent, each level has an impact and is dependent on the other ones. If we try to isolate one from the others we run the danger of making an individual aspect lose its meaning.

The images that the teacher has about the classroom are shaped by the practical principles that she has formulated throughout her teaching experiences. If we look at the practical principles of Teacher 2 one can observe the limited premises from which they have been compiled. They put more emphasis on the debates that are put forth by authoritarian teaching . They put less emphasis on the daily experiences that happen in or outside the learning atmosphere. When you listen to the teacher's interview she has views that she expresses about pupils that are not constrained by the classroom environment. In her own personal capacity there are

issues that she has access to, but it looks like those issues do not carry through to practice. Her internal and external practices do not coincide.

When you compare Teacher 1 and 2 it would be easier to work with Teacher 2 because of her openness. It would be easy to isolate issues in her practice that require change. With Teacher 1 there is a veil of uncertainty covering her. In my experience with working with such teacher she is a hard teacher to be pinned down. There are fluctuations in her practice. Her practical principles are not well articulated.

During the process of working with Teacher 2 I had questions that were of some concern to me. Why have a number of teachers stuck to an authoritarian teaching style when there have been talks circulating about its inadequacy? Is it because of the power it gives to teachers? Is it because it can hide the teacher's inadequacy? There are some positive aspects that I managed to observe in this approach that people may not want to acknowledge. It maintains order and the pupil's attention. It is time economic and it works on the notion that practice means perfect and, it is focused. When we talk about effective learning we must be careful not to dismiss certain approaches because we have prematurely concluded that they are bad. We need to have objective views about different pedagogies and see how we can benefit from the advantages they provide.

5. 2. 3. Summary

Teacher 2 is what we could call a classical authoritarian teacher, she drills, she tightly controls the classroom interaction. Despite her style of teaching, she has a good relationship with her pupils. She is a teacher who, I think managed to keep her teaching free from the new approaches not because she is resistant but because she does not want to implement something she does not understand. She is proud of how she works. Amongst the other teachers I found that she has integrity and her teaching was coherent.

5. 3. TEACHER 3

5. 3. 1 Making the teacher real.

5.3. 1 (a) Who is the teacher

Teacher 3 is 53 years old. She has 30 years teaching experience. She has taught all the Grades in Junior Primary but has specifically taught Grade 1 for 11 years. The highest standard she has passed is what was then called Junior Certificate (JC) which is today's Grade 10. She also did Mathematics up to Grade 10. She studied for a Primary Teacher's Certificate (PTC) and qualified in 1967 after which she immediately started to teach. Unlike other teachers she hasn't had an opportunity of upgrading her qualification. She told me that she enjoyed learning Maths while she was at school. She enjoys teaching Grade 1 now that she is in it, but it was not her choice to teach Grade1; the school allocated the standard to her.

5. 3. 1.(b) Inside the classroom

Teacher 3's classroom had an uneasy atmosphere. There was a sense of coldness in her interaction with the pupils and in the classroom in general. During the start of the lesson it was as if there were two camps in the class, the one for pupils and the other for herself. The oneness that I saw in Teacher 2 was missing with them. The pupils were seated in groups and were facing each other they had books some open, some closed in front of them. They were making noise and the teacher did not seem to take notice. During the lesson I did not get the sense that they pupils were grouped in any specific way, they were mixed. In some of the groups there were a few wooden blocks on the table but most pupils did not take any notice of them which made me conclude the they had always been there.

The teacher's lesson was two fold in aspect, firstly it was about addition and then it turned to focus on number word objects e.g. 3 **Three** 000. The teacher started the lesson asking the

whole class to count, she then continued by asking individual groups to count. While pupils were counting she insisted that they should use their hands. For every number that they were saying they clapped their hands. I thought by allowing the pupils to count in groups was the measure to observe that all the members were able to count. At the end of each counting she congratulated the group. She progressed by placing a foam plastic plate which had a plus sign, a minus sign and an equals to sign on the table in front of the pupils. She asked the pupils what those signs meant. After a pupil had answered she would drill the answer. It was obvious to me by the look at the pupils' faces that the lesson was not challenging at all. The reason might have been that the teacher had done the lesson before or that the lesson was too elementary; it was a waste of time for the pupils. While the teacher was teaching there were a lot of things happening simultaneously, some pupils were paging through their books, some were playing and some were having conversations. The teacher did not spend time in calling for the pupil's attention to be involved in the lesson. She reprimanded pupils in a 'by the way' style. Her voice stayed the same and there wasn't a difference in tone between a compliment and a reprimand. This is what the teacher said after she had noticed that some of the pupils had opened their books.

Teacher: By the way what is this sign? (She points at the sign)

Pupil: Plus.

Class: Plus x3 (The teacher is pointing at a plus sign to indicate that pupils should repeat)

Teacher: Very good, **close your books**. What is this?

The calls of the teacher went unheeded it was as if she hadn't said a thing. I became curious because from my observation the chaotic situation that was prevalent was not conducive to any learning. Why was it that the pupils disregarded the teacher, was this the way the teacher reacts to pupils every day? During our interview session the pupils' behaviour was not different from that of the video. In the interview session the teacher used a lot of corporal

punishment. What was strange is that pupils were quiet for a short time after being punished and they would be rowdy and chaotic again. The hose pipe the teacher was using to point at things during the lesson is the same pipe she used to punish the pupils. The teacher's control of the classroom was a classical case of what Willower, Eidel, and Hoy (1967) refer to as custodial authority. This type of authority is characterised by the quest to maintain order, a lack of respect and or punishment. The pupils together with pupils place emphasis on external control that self or intrinsic control. Henderson (1982) says pupils who have more custodial orientation tend to be more external in their locus of control. Here we observe a situation in which I think there was tension within the teacher while she was teaching, she did not have an alternative plan of dealing with pupils. The strategy she was used to, was not going to be a good public relations face for the purpose of the research.

The pupils did not have problems in identifying the signs and also translating the signs into their first language. After drilling the signs the teacher went on to write an addition problem on the board '2+1=' and asked the pupils to interpret the problem. It was easy for the pupils "two plus one is equals to" she drilled that statement. She selected groups which should solve the problem. The pupils in the groups did not work as groups rather they worked as individuals. In one table there was a boy who had two blocks and he refused to share them with the group. At the same table there was a girl who had a block which she also refused to share. There are teachers who misinterpret group work to mean that pupils are sitting in a group even though they work as individuals. For grou work to be real there are a number of important factors to be considered but amongst them is that pupils have to work together to generate ideas.

The pupils were able to able to come up with the correct answers even though most of them did not use the objects. There was a girl who came with 5 as the answer. The teacher literally ignored her and focused on the one who said 3.The whole class had to repeat the answer. There was a technical lapse due to the video camera was using that I made the teacher aware of. After about two minutes she con son. I was taken aback to discover that she has abandoned what she had b that she was now handling a different topic. However, the same strategies seem il in the new topic, therefore

my description of her practice should be valid.

There is a tendency amongst teachers, after they've worked with pupils for some time to take it for granted that pupils understand what they are looking for even without asking them. The pupils in this class showed a strength of individuality and interpretation. It wasn't clear to me as an observer what she was looking for. The pupils' emphasis was removed from attending to the task, the focus shifted to reading the mind of the teacher. Different pupils read her mind differently, at the point were the teacher wanted to agree with a pupil, the whole class disagreed with the teacher. It is at this point that I think she (teacher) did not know how to handle the situation, she allowed them to give an answer that they (pupils) agreed with. I made a hypothesis that the historical interaction with the cardboard finally won the day; pupils remembered how the teacher previously used the cardboard.

This time she showed pupil a paper which had the number **2** and the word **Two** written. She said **'hands up'**. There was a confusion in the eyes of the pupils as they were not sure what to respond to. This is how the conversation went.

Pupil: Cardbox

Pupil: One

Teacher: All of you

Class: That is not one

Teacher: Hands up

Pupil: Two

Teacher : All of you.

Class: Two.

I was not able to figure out what the teacher was looking for. The first answer that the pupil provided was in my opinion correct because the teacher was indeed holding a cardboard, the second answer was also correct because she was holding one cardboard. Here I realised that the teacher was not sure of what she was looking for. After the response of the second pupil she wanted the whole class to repeat what the pupil had said. The whole class resisted and argued that what they saw was a 2. The pupils at this point determined the direction of the lesson. When the teacher produced another cardboard box (she also did not give instructions) the pupils knew how to interact with it.

When people talk about pupil driven lessons I do not think they refer to a situation like this. In a pupil driven lesson the teacher still plans her lesson and has an idea of when she can say the lesson has been successful and pupils have a clearer understanding of the direction of the lesson. The teacher further has a mechanism to deal with issues that she did not expect and she would know how facilitate them and curb them. What happened with Teacher 3 is that the pupils appropriated her control and direction because she did not have a direction. She did not have a plan for her lesson thus we saw her attempting to integrate issues in a way that was not understandable. The purpose of the lesson became muddled as the lesson progressed; maybe this explains why the pupils were not cooperative and attentive.

This teacher is one of many teachers that I have seen in my experience with working with teachers. Teachers' experience has several aspects to it. One of the advantages of teachers' experience is that one has a trial and tested wealth of knowledge that one can call for when in need, people say 'experience is the best teacher'. One of its down sides is that it can lead to a situation of complacency. It can lead to a situation of routine and a feeling of knowing it all. The danger comes when one operates in a automatic mode and thereby creates a comfort zone in it. It is a fact that some teacher do not take pain to plan and prepare for their lessons, because they have done this so many times that it seems to them that this has become unnecessary. This can lead to uncoordinated, unchallenging and meaningless lessons which are a waste of their pupils' time.

5. 3. 2 Theoretical interpretation

Reflecting on how the teacher conducted her lesson and her interview Teacher 3 fitted within the stereotype of an authoritarian teacher. Unlike with Teacher 2 who had a good atmosphere in her classroom hers fitted the one that was discussed in Breen (1991), a teacher who was not only authoritarian but who was also a terror. Like Teacher 1 and 2 she operated in a mode where she was the only one who initiated conversation in the classroom, she determined what the pupils should learn. The pupils' interaction with her were based on responding to her questions and then wait for another question. This is one of the ground rules that these pupils had learned to embrace. Her portrayal of Mathematics was that it was uninteresting and boring and this resulted in the pupils not showing any enthusiasm. The teacher's understanding of Mathematics was that it is a subject that concerns numbers and the four basic operations. Her reference to mathematics was confined to the counting of numbers and operations. When she talked about the importance of mathematics, she saw its significance as limited to equipping pupils to be functional in counting. The teacher's view of Mathematics was problematic because it immediately limited the richness and the values that the pupils can could from the subject. This perception also constrains the teacher from benefiting from the subject. She did not see Mathematics as a subject that is beyond numbers and operations. She did not see it as a tool that could be used to develop cognitive skills in pupils. In my perception pupils need not learn numbers and operations for their own sake but what they do with the numbers is very important.

What is unfortunate about this teacher's view is that it has the potential to filter down to pupils. If we reflect at her classroom practice we saw that it had consistency with the views she expressed about Mathematics. The pupils' perceptions and understanding about Mathematics may end up being consonant with that of the teacher. The pupils can also grow up thinking that if they know how to count and can perform operation well then they know Mathematics. Recently at a certain school a teacher asked the pupils to mention the difference between how a scientific calculator and a non-scientific calculator functions.

During moderation the departmental head asked the teacher to change the question as it was not mathematical. He requested the teacher to put in a problem that is expressed in numbers. What I want to allude to is that this perception of seeing Mathematics as only numbers is endemic. If senior people also portray this belief what chances do teachers have to hold different views?

When one observes Teacher 3 and listens to what she says about learning and about pupils we could conclude that she is a bad teacher. Part of the reality of the situation in South Africa is that the teacher is as much the victim as her pupils are. Wertsch (1998) says that agents and cultural tools and the relationship that exist between them have " a particular past" (p 9) and they are in the process of further changing. One of the aspects that we observers tend to do is to look at the present and make a conclusion about a situation based on it. We forget that what we see has been influenced by a past history.

Although it might be tempting to blame the Teacher 3 for ineffectiveness she like other teachers is a victim of the education system that she has gone through. To be just we may have to evaluate the teacher in the context of her historical background. I mentioned at the beginning of the paper that teachers were trained in situations where the only view that was emphasised was that 'they know' and that pupils 'do not know'. They were not exposed to diverse theories about learning to choose from.

When Vygotsky talks about novelty in people he argues that we cannot only focus on the biological structure to explain it, we also have to look outside the person. The process of learning is not an individual process, it is a process of interaction with cultural tools and sharing of ideas and knowledge (Mercer 1995). A human through interaction with other fellow humans has access to different types of knowledge and actions which he or she later internalises and puts into practice. The teacher's experiences at college not only enabled her to accumulate new knowledge but her cognition should have been transformed and reorganised. If one looks at the time the teacher has been schooled; it is fair to make an assumption that this teacher teaches in the same way that she was taught at the college. The only difference is that at the college, the pedagogy that was used was made more explicit, the

intention was to deliberately mediate that pedagogy. At a school level it is a tool to mediate content, the pupils access it by default. The image the teacher had about teaching was influenced by her experience during her school days and her training at the college.

The focus of the training in African schools was to absorb as true what was being taught and not be analytic and critical about anything. I say this because this was a trend during my years at the colleges of Education (which is much later than this teacher's experience). We were taught by mediators who never placed any value on critical thinking but only emphasised memorisation. Their mentors that is, the advisory services, the principals etc. that the teachers were put under were unfortunately initiated under the same system. Instead of breaking the conception they reinforced it. Most teachers including Teacher 3 had to operate within that framework. To be effective they had to acquire mastery in what they have learned. They had to know how to teach in the way in which they were taught. Mastery does not require any intensive interaction with an activity. Mastery requires knowing the rules and following them even without understanding them. A good example of mastery is knowing how to drive. If you follow the rules about driving you will know how to drive even though you do not understand how a car functions. Some teachers do exactly that, they think they know what to do, they do not have to think about it. Like cars, they get into the classroom and just drive through the lesson. While driving, they only focus on where they are going. What they leave behind is hardly their concern.

Whether teachers progressed to a stage of appropriation is another debate. The question of appropriation is a complicated issue in that it requires deeper understanding of the concept. Appropriation requires much more than following the rules and implementing what the rules say. To own something implies that you can account for it. The level of consciousness concerning what one owns should be high. I want to argue that Teacher 3 had partial appropriation of the method. She was not able to give a rationale for the things she was doing in her class.

Wertsch (1998) talks about mediational means as having a constraining as well as an enabling effect. While the mediational means can allow you to perform certain actions at the same time

they rob you of others. The teacher's beliefs and perceptions about Mathematics enables the teacher to be able to implement practices that are consistent with those beliefs eg the teacher knows the tools that will allow her lesson to be successful eg drill. I have acknowledged that the teacher's views have defects. Her beliefs and perceptions about Mathematics constrain her from exploring other ways of thinking about Mathematics. The teacher can not transcend the limits that have been set by her views even though (I think) she has the potential to do so. She misses the opportunity to learn and be developed by Mathematics. In the same light the teacher constrains the pupils from enjoying the cognitive development that they could enjoy from Mathematics. Mathematics is not only about numbers, it is more exciting and challenging than that. It is about thinking about objects and numbers in a different way. It is about analysing data and learning from it. From my experience as a facilitator I know that Grade Ones are capable of showing these skills etc. As she is responsible for the process of shaping her pupils, the pupils will suffer as the direct consequence of the teacher. This may be a hard thing to say about the teacher but if we acknowledge the central part the teacher implicitly or explicitly plays in the classroom then we can see the fact in the statement.

Do we say then that the teacher is doomed because of her views ? If we see the teacher as being imprisoned by her views and as having no potential to embrace new ideas then that could be the case. As we know, this is not the case, people and cultural tools are constantly in a developmental stage they are not necessarily fossilised. Wertsch (1998: p 15) talks about the impact of new mediational means to mediated action. He says that

"the introduction of new mediational creates a kind of imbalance in the systemic organisation of mediated action, an imbalance that sets off changes in other elements such as agent and changes in mediated action in general. In some cases an entirely new form of mediated action appears".

When Wertsch talks about newness he refers to it as something that was not existing before like fibre glass pole for pole vaulting. When I talk about new, I'll be talking about some things that have been existing but that are new to the teacher. It is possible for the agent (teacher) to change if she is exposed to new mediational means. I want to make it explicit that

change is more complex than only changing the mediational means. Changes in mediated action requires a reduction in the tensions between the agent and the mediational means. For change to occur there has to be a collaboration between these two aspects. The agent can be introduced to a new mediational means but, if she does not see the need to buy into it the process becomes futile and there may be no change. Sometimes the tensions between the means and the agent become so great that this can stand on the way of change. To illustrate this; an agent can wish to adopt new mediational means but may experience difficulties in appropriating it due to for example its complexity or its inaccessible language. Thirdly an agent may aspire to change but feel locked into a practice because of lack of alternatives.

The new mediational means provides the teacher with an alternative to change to. If you create an imbalance or shake the foundation of the teacher's present belief you need to provide her with an alternatives. The teacher has to be an active participant in her change. She (herself) has not only to see the need to change her present practice but she has to want to change it. Teacher 3 will have make her normal practice unfamiliar so that she can reflect on it. During her reflection she should be able to see aspects in her practice that are undesirable and those that are working. She should be able to see the shortcomings in her present practice and be willing to change them. One of the pitfalls of the teachers engaging new mediational means without seeing the need to do so is that, there is a tendency for teachers not to abandon the old mediational means. A variety of possibilities emerge:

1.They can use both the **old and new mediational means concurrently** This is common to teachers who work with non governmental organisations (NGOs). When a facilitator is in the class the teacher would teach using the new mediational means. As soon as the facilitator leaves the classroom the teacher would go back to her or his old ways. This creates tensions in pupils as they never know what to expect from the teacher. This also creates tensions within teachers who might view the new mediational means as belonging to the facilitator and the old one as belonging to her. This attitude has resulted in teachers creating a dichotomy in Mathematics. They talk in terms of 'their Mathematics' and 'our Mathematics'. This reflects the different mediational means.

2. They **use the new in an old way**. This was typical of Teacher 1 who tried to implement the problem solving method within the framework of authoritarian teaching. She wanted pupils to be creative but at the same time imposed restrictions on their creativity. That could result in tensions within the teacher. These tensions can lead to an absence of change in the mediated action.

3. They simply **refuse to use the new one.** The total rejection may be a result of a number of factors. Amongst the reasons is that some teachers feel that their present methods work because "they have produced doctors and lawyers out of them". Some may reject the new mediational means because changing would create stress in their lives. Some may simply reject the new mediational means not because it is bad, but because it was brought about by an 'inappropriate' agent.

I would like us to look at the aims of this lesson. What were the intentions of the teacher in conducting this lesson?. In the introduction I mentioned the teacher's explicit aims from my perspective was to teach addition and in the second half she taught numbers quantity and the numbers' written form. The first part of the lesson and the second part were disjointed. During the assessment at the end of the lesson the teacher was not sure about what she wanted, she wrote things on the board and later erased them. She finally drew a circle and wrote 2 underneath it and asked pupils to fill in the objects. It is not easy to assess the goals of the teacher but I think we can get some ideas from reflecting on her practice. In this lesson I do not think the purpose of the lesson was to teach some new content to the pupils. From observing the classroom it looked as if the pupils knew what the teacher was teaching they were not challenged by the lesson. There wasn't any excitement in the lesson so I ruled out the possibility that she wanted to impress me. I had asked the teacher beforehand that I was going to come and video tape her teaching Mathematics, she agreed. The goal of this lesson was to present that lesson for the video. The teacher knew what I was going to observe. From my perspective this was a typical 'space filler' lesson. A space filler lesson is that lesson that the teachers present to keep the pupils occupied. I call them space fillers because their aim is to occupy time. These lessons are teacher centred and they undermine genuine learning. These lessons do not take into consideration that the pupils have to learn their focus is that the

teacher has to teach. The teacher has to fulfil her obligation to teach. I have a good relationship with this teacher, so she would not be looking for an opportunity to spite me.

In work situations in general the terms of employment can be based on the **time** the person spends at work e.g. a clerk has to work 8 hours a day the work she /he does during that period is of little concern. In other instances people are employed according to **how many** good wares do they produce in an hour. In the first scenario it is not that quantity and quality are not important, it is that much emphasis is put on **being there**. This is unfortunately what happens in many schools. The emphasis is put on the teacher being present in the classroom and teaching. The quality of his or her work while she is present is largely ignored. If there is any control being put into place by the senior management it is the one that emphasises quantity. Some principals and heads of department are concerned with how much work has been covered. This type of functioning could result in a situation where quality accountability is compromised for quantity accountability. A situation where teaching has more priority than learning. Teacher 3's lesson was based on **being there**, it did not consider the quality and the quantity of the lesson.

I have seen teachers on several occasions teaching lessons for the sake of keeping pupils busy. These lessons are characterised by lack of planning and preparation, lack of clear intentions and focus, lack of coherence etc. In more instances than one they are retrieved from the teacher's previous repertoire. These are lessons that are thought of at a spur of the moment. Such lessons violate the purpose of teaching irrespective of what method the teacher uses. They form partitions between teaching and learning. The focus of such lessons is moved from developing a pupil to managing pupils. In the video we saw that pupils knew that there were no incentives to be attentive; so they disregarded the teacher.

In the previous paragraphs I discussed how the teachers' historical context helped shape and direct the beliefs and perceptions of the teacher. What I would like to elaborate on now is how the mediated action in the classroom impacts on the pupils. Teachers are in situations where they are part of the pupils' history. There are things that pupils learn from teachers that teachers intend to teach. They are other things that pupils learn that the teachers never

intended to teach. Sometimes teachers do not have much control over what pupils can learn from a situation. Teacher 3 through her mediation exposes new knowledge to the pupils and also transforms and reorganises their knowledge. Lets look at what the pupils might learn without the teacher intending it.

Firstly, daily exposure to counting and doing operations during Mathematics may result in pupil thinking that, that was Mathematics.

Secondly, the teacher is the only one that initiates talk and she further sanctions what counts as knowledge. This can result in pupils accepting that what they know independent of the teacher does not count. This may further develop into dependency of the pupils on the teacher.

Thirdly, the teacher's use of corporal punishment to maintain order: this has resulted in pupils relying on the teacher to maintain control. When the teacher used her voice while they were making noise and disrupting the class they ignored her. When she went to give them a hiding they would pretend to be asleep. After punishing them they would be quiet for a few seconds and then they will start making noise again. The advantages of playing and talking outweighed the minor inconvenience of corporal punishment.

Fourthly, lack of proper preparation in Mathematics could lead to the pupils' losing confidence in what the teacher teaches. This could result in the pupils losing interest in the subject.

What I have mentioned are a few negative aspects that the pupils can internalise which the teacher did not mean to facilitate. The spin off of these negative aspect could have disastrous consequences in the pupils' future interaction with the subject.

Mediational means are associated with power and authority. There are some mediational means that do depend on absolute power to sustain them. In child centredness power is distributed between the pupils and the teacher. Authoritarianism is sustained by the notion of

power and authority. The role of the teacher embodies authority and embodied in that authority there is power. She is the manager of her class. The teacher's authority is not only in terms of managing the class but it transcends to issues of, who makes what decisions in the classroom. The teacher decides what is it that pupils have to learn, and she decides how the pupils are supposed to learn it. In this case she chose the tell and drill method. In her teaching she is the only one who initiates talk. Pupils interact with her in terms of responding to her questions or instructions. She is the one who decides whether the pupils' answers are appropriate. In terms of, maintaining order in her class she relies on corporal punishment. These instances indicate the imbalance of power that exists in the classroom. The teacher holds more power and has appropriated power from the pupils power. She enjoys privileges at the expense of the pupils. I believe that the power the teacher enjoy depend on the methods she uses to mediate. In certain cases, lesson are so engaging that the teacher doesn't find it necessary to exercise control on pupils. There are instances that, because of the nature of the lesson maybe it is uninteresting, or it lacks focus the teacher will use a stringent measure to control her pupils. In Teacher 3 the weight was neither in the content nor in her control. As I mentioned earlier this created a tension within the teacher. It was difficult to teach a rowdy class but I think she felt that her way of maintaining order would be unacceptable.

I want to argue that the images of teaching that the teacher has are strongly representative of the authoritarian theory. Her practical principles were enshrined in the authoritarian principles and something else which was less important. That in my opinion enabled her to close herself to experiences which might have challenged was she was believing in even though, during the interview she acknowledges those experiences. Her practical principles which shape her images does not take into account her experiences with pupils. I think if there was an integration of her experience about pupils into her practical principles, then she would interact differently with pupils. I want to emphasise that the practical principles that are based on superficial understanding of the theory cannot stand the test. Teacher 3 knew about the prior knowledge but she did not know when or where she could use it. She further could not articulate why she was doing certain things. Her practical rules reflected more the authoritarian ways.

5.3. 3. Summary

My analysis of Teacher 3 is that of the teacher who has been there teaching for a long time. She simply does things in the way she has been doing things. She does not take pains or effort in bringing life into the classroom situation, note that what she was is what we called a space-filler. The teacher has become **part of a denuded school establishment**. It looks like she has seen it all, and can never be excited by anything.

5. 4. TEACHER 4

5. 4 .1 Making the teacher real

5. 4.1 (a) Who is the teacher

Teacher 4 is the youngest of all the teachers I have interviewed for the research . She is 31 years. She studied Junior Primary Teacher's Diploma (JPTD) which takes three years at the college and completed in 1989. She is at this moment studying for a higher diploma in Remedial work at a local university through distance education. She has taught all the grades in Junior Primary school. This was her second year in Grade One. Teacher 4 is the only teacher amongst all the teachers who confessed that she hated learning Mathematics during her school days but she does not put the blame on the teachers. She opted out of the then Science stream and went into the General stream in Grade 9. Mathematics became an even bigger struggle for her at the college, and she blames her lecturers for the problems she experienced. In conclusion; she does not like Mathematics.

It was not her choice to teach Grade 1. She was forced to teach Grade 1 by her principal. If she had had a choice she would have wanted to teach Grade 2. Now that she is teaching Grade 1 she has learned to enjoy working with the pupils. Teacher 4 feels that teaching Mathematics in Grade 1 is different than teaching it in the higher grades. She alleges that the difference is that in Grade One; Mathematics is fun and it is about playing. She does not have complex Mathematical problems to deal with. In the higher grades when pupils are supposed to solve problems "they have to be taught steps" to follow. As Mathematics progresses it loses its pleasantry and become rule bound.

5. 4. 1 (b) Inside the classroom

Inside this classroom the pupils are sitting in groups of between five and six. They are facing each other. They were talking to each in a easygoing controlled way before the beginning of

the lesson, and the teacher did not seem to mind. There is a good teacher- pupil relationship in the classroom. The atmosphere in this classroom looks relaxed.

The teacher started her lesson by asking the pupils to count from 1 to 10. She then asked them to use the counters while they were counting. This has been the trend in all the teachers. While the pupils were counting the teacher walked around observing and listening to pupils. The teacher's explicit purpose of the lesson was teach comparisons; *greater than, less than* and *equals to*. She had objects of different sizes and had the *bigger than*; *smaller than*; and *equals to*; signs with her. The teacher called a pupil to come to the front and asked the pupils to compare her with that pupil. The pupils responded by saying the teacher "**mkhulu**" than the pupil and the pupil "**mncane**" than the teacher. These are problematic terms in this context because "khulu" can mean "bigger in stature" or "older than", "ncane" can mean "smaller in stature" or "younger than". I do not know what the pupils meant when they said those terms. The teacher could have used more accurate words of mother tongue.

The teacher called another pupil to the front and asked the class to compare the two pupils. There was silence in the classroom. The teacher wanted the pupils to say that those pupils were equal but, it was hard for the pupils to see that. One pupil was slightly taller than the other one. After a long pause of reading the teacher's mind, a pupil responded by saying 'bayalingana' this can mean the "same age" or "the same stature". It was not explicit to me what exactly did they mean and the teacher did not enquire more. It was clear by the look at the pupils' faces that the answer was not convincing. The teacher sensed that and then quickly intervened and told the pupils that the pupil **are supposed to be equal** therefore they must assume that they are equal. This is what she said

"Uthi bayalingana noma ke bangeke balingane ncimishi" (touching their heads)

They are the same size even though they can not be accurately equal

She said this in a way that said "I acknowledge why you are confused, these pupils are not equal but for the sake of progress let us assume that they are". This reminded me of the

teacher in one school who had different colours on the board, except red. She took an orange card and told the pupils that they should assume that it is red. The pupils indeed said that the card was red.

Teacher 4 then took balls of different sizes and asked pupils to compare them. The pupils were able to see that the ball were of different sizes, one ball was bigger than the other one. In reverse one ball was smaller than the other one. The pupils also gave rationales for their answers. The bigger ball was big because the was holding it with her two hands. The smaller ball was small because the teacher was holding it with one hand. It happened during the lesson that the teacher subconsciously held the big ball with one hand.

These above incidents indicate the authority that teachers have in the classrooms. It shows that the authority of the teacher is not limited to managerial aspect but it also goes the access to knowledge. When Bhaktin in Wertsch (1997) talks about mediational means as being associated with power and authority he makes a distinction between authoritative power and persuasive power. In authoritative power one can either accept something or reject it, the art of persuasion is not explored. The 'appeal' of Teacher 4 to pupils to believe that the pupils were of equal size was in my opinion accompanied by her recognition of the power she possesses on the pupils. She knew that pupils would not argue with her, they would take whatever she said. Her usage of this power blinded her from seeing that she was developing misconceptions in some pupils. She forgot that there are those pupils who depend entirely on her for new knowledge.

After working with the balls and using the board the teacher gave pupils tasks to do. She said pupils should take the comparison signs and, using objects, the signs make examples indicating *smaller than; greater than; and equals to.* The pupils were given objects to do that. What I observed with the objects is that they were of the same size. That eliminated within the pupils an opportunity to compare sizes. I think there was an unintentional confusion within the teacher in terms of comparing size and quantity. The example she worked on with the pupils were on comparing sizes like: this ball is smaller than that one. When it came to giving the pupils tasks to do she gave them objects that were of the same size which limited

them to mostly comparing quantities. Pupils started to compare quantities like: three objects are greater than two. The teacher did not oppose the examples that the pupils gave, she incorporated them into her lesson. I think the teacher became aware of this other aspect of comparison (quantities). She did not make an issue out of it, she incorporated it into her lesson. From an example of comparing size the tasks involved the comparison of numbers.

While pupils were working on their tables the teacher walked around observing what they were doing. She asked them to indicate with the show of hands if they wanted her to see their work. She stopped randomly at the desks and asked pupils what they had been doing. I observed that pupils were working as individuals, pupils in the same group had different individual examples. I noticed that pupils talked to each other about what they were doing. Some pupils would do one example and wait for a go ahead from the teacher. When the teacher asked them to give account of what they had been doing, she addressed them as individuals, not as groups. She would ask the pupils to take her through all the examples, and she would ask questions like for example, "if you start from the opposite side what would your sentence be like?". She asked other member of the group to verify whether an individual was correct or not. If an individual experienced problems she would ask other pupils from the same table to intervene. Some pupils had problems which the teacher and the group were not able to resolve; the teacher left them to attend to other pupils. This process took a long time and the teacher was not able to talk to other pupils. That resulted in other pupils starting to do other things but, the situation did not degenerate into chaos.

After working with object she asked the pupils to draw in their books what they had been doing. She kept on reminding them about what the signs mean and she encouraged them (pupils) to ask their peers if they experience problems. In the pupils' books there was a mixture of both comparing the sizes and the quantity. The teacher went around looking at the pupil work.

5. 4. 2 Theoretical Interpretation

The expressions from the pupils indicated that there was nothing strange in the way the teacher was working. There was coherence in the way both the teacher and the pupils were responding to each other. My impression was that the teacher is used to working in that way with the pupils. Teacher 4 had similarities and differences with other teachers. Her views about what Mathematics is and its importance to pupils was similar to that of the other three teachers. Her perception about Grade One Mathematics is that it is about numbers and operations. She saw the importance of Mathematics as being able to equip the pupils with the counting skills.

"Abantwana if, bazi i number concept bazokwazi ukuthi izitulo ziyi..... nasekhaya uzokwazi ukuthi mabekhuluma ukuthi uthenge ibhodlela eli one bathini".
If pupils have a number concept they will know the number of chairs (that are in the classroom). At home they will understand what a person means if they are sent to buy one bottle.

When the teacher talks about the Mathematical pre-knowledge that pupils come with to school she only makes reference to counting.

"Though abazi u two uma ungambuza ukuthi unawo amehlo ayingaki ? Ayi two,..."
Even though they can not write 'two' if you can ask them how many eyes they have, they will tell you 'two'.

The practice of Teacher 4 stood in contrast to her views about what mathematics is. She was teaching comparisons *many, few, bigger than, smaller than* in her lesson but I also noted that she dealt with positions e.g. *first, middle, and last*, she dealt with direction: *left to right*. My impression was that even though the teacher was teaching other skills in mathematics she was not conscious of them. This is an example of the tensions that can exist between an agent

and the mediational means. The agent can operate with a mediational means without actually being aware of its merits and demerits. The relationship of the agent and the mediational means could not have transcended the state of subconsciousness, it may have remained superficial.

The above discussion raises the question of the relationship between consciousness and effectiveness in teachers. Are there teachers who are providing good service without being aware of it? Teacher 4 is teaching more than counting in her class, but she is not aware of it. Could the service be better if the teachers were more aware of their practices? The answers to both questions is yes. I have seen teachers who produce competent pupils without knowing how that happens. Their pupils are just as good as the pupils who come from 'reflective' teachers. They cannot isolate aspects or provide reasons that make them successful. It could be difficult for these teachers to be of assistance to other teachers.

The above situations brings to the surface the differences between the concepts of appropriation and mastery and the relationship they have with good practice in the classroom. There are teachers who are good teachers but who cannot tell you why they do a lot of what they do. These teachers can teach effectively in their class without having insight in their practice. Mastery on its own can play a significant part the classroom even though we must acknowledge that it is not enough. Most teachers are operating within a grapevine of different information, when they sit together they have discussions about matters that affect them. A teacher may like what she or he hears from other teachers because that may sound fashionable and constructive. She could implement it in her or his class without having a deeper understanding it. Her or his level of mastery could be advanced even though the level of appropriation may be low.

"High levels of mastery are positively correlated with appropriation of the concept". Wertsch (1998 p 24). This is true but it is not always the case. Sometimes mastery exists in the absence of appropriation. There are teachers who have mastered what I call 'good practice' without having any ownership of it. Some teachers have always been having positive support, in terms of exposure to demonstrations of effective practice. They trust what they hear and

want to put it into practice. (There are a lot of people who do things not because they understand them but because they sound good). By following the guidelines even without understanding them, they can perform well. They have automated good practice without understanding it. The danger of high level of mastery and the absence of appropriation is that one could be insensitive to changes in classroom interaction as community practices change. There may be difficulties in adapting to new situations if they arise.

Wertsch (1998) talks about mediated action as having an enabling and constraining effect. Mediated action enables you to perform certain activities but it can restrain you from benefiting from the means that you are not familiar with. I want also to discuss the enabling and the constraining effect of internalisation as mastery and internalising as appropriation. As I said earlier that mastery can enable good practice and it can produce good results. If mastery is as a result of appropriation the practice may even be better. If a teacher remains or stays with mastery, her practice loses the benefits that he or she could have enjoyed from appropriation. Implementation without ownership denies an individual the opportunity of manipulating whatever he or she has. Appropriation on the other hand has the benefit of good practice and better understanding of why things work and why they don't. These in return can lead to self reliance and independence, and broad implementation of what you have appropriated. What has been appropriated can have an effect of enriching and transforming the knowledge that an agent already possesses.

Appropriation involves understanding not only the how but also having insight in the 'why' and the 'when'. It is also accompanied by flexibility and confidence in oneself. When you own something you become flexible and innovative in how you use it. You can also optimise its usage, you know and know when it is not going to work. Sometimes the teacher's mastery can be deceiving because on the surface it can be confused with appropriation. It is only when one gets questioned about what one does that sometimes one can pick the difference. It can occur that the questions can lead to a certain level of awakening in ones' practice. Even though mastery can lead to good practice but appropriation gives good practice an extra edge. If we can increase awareness on the already present good practice then there can be increased chances of appropriation.

Teacher 4 like other teachers made a distinction between what she termed pre mathematics and mathematics. In pre mathematics (which is done during the school readiness program) skills like similarities and differences are explored by both the teacher and the pupils. That unfortunately does not go beyond that. When they start with real mathematics they concentrate on counting and operations. I got a sense that the readiness programme was not seen as having a spin off effect for 'real mathematics'. The issue of **creating dichotomies** in how teachers operate is a problem. What Grade One teachers do between January and March is different and has no relationship from what they do between April and the rest of the year. This has come up out with all the teachers. Here are some examples of the dichotomies that exist in school: Grade One work is not related to Grade Two work. This is why some Grade Two teachers repeat what the teachers in the previous Grade did. Division is not related to multiplication. Issues and concepts are not seen as progressive. This is one of the negative aspects that teachers have appropriated from the education system and that they are continuing to use. Seeing issues in small separate packages instead of viewing them as interconnected is detrimental to the pupils' learning. Mastery does not assist in solving this problem of dichotomies but, with appropriation, the teacher can begin to engage with some of these dilemmas.

Teacher 4's lesson was divided into 3 parts. Her first was where she did most of the talking, her second part was when pupils worked in groups, and the third part was when she allowed them to work as individuals in their books. The first part of the lesson was a light version of authoritarianism. The first part took a short time when compared to the second and third part. This part was characterised by the teacher initiating the talk and asking questions, the pupils responding to the teacher and the teacher evaluating their response. In the first part the teacher articulated explicitly the direction of the lesson. She started her lesson by letting pupils respond to the questions she had. At this moment she **strictly controlled** the direction of the lesson, she eliminated any opportunity for deviation from what she wanted. She drilled the pupils on the language of the comparison. She also drilled the pupils on the meaning of the signs (the teacher told me that this was her second lesson on these signs). Some pupils were still struggling in understanding, whereas others were comfortable. She gave them cues on

how to remember what the signs meant like: an open mouth will eat more than a closed mouth. During this first part the teacher did most talking and doing and the pupil's role was limited to listening and responding to the teacher's questions.

My immediate response to the teacher was that of disapproval at how she held a tight reign on the lesson, but as I sat down to reflect on her lesson I started to have questions. If lessons are started in an open democratic way how much authority does a teacher have in creating focus and direction in his or her lessons? Is it a negative thing for the teacher to determine the direction of the lesson? Is the teacher's authority always a violation of child centredness? I am asking these questions because the present trend in education is towards child centredness. There is a taken for granted assumption that child centredness is a concept that runs throughout the lesson. Teachers have to start their lessons in child centred way and finish them in that fashion. At what level and time do we implement that concept in our teaching?. Is there a place for a structure in child centredness, if there is, who is responsible for creating it? I think these are areas of tension in teachers. From talking to Teacher 4 and observing her teaching, she is a person who wants pupils to play an active role in their learning but she acknowledges that she still has a role to play in their learning. It may be easy for her to integrate but this could be a dilemma for many teachers especially if this is not clarified.

Teachers are functioning within constrains that they do not have control over. The scene (school or classroom) and the purpose have an impact on the relationship of the teacher and her approach. Teacher 4 and all other teachers operates within a school which has time constraints and expectations. Her purpose is not only to allow pupils to be good debaters but they have to have mathematical skills to learn. In her hands she has to juggle the pins of: time constraints, mathematical skill, good communicators, expectations, active pupils and more. These are some of the realities that teachers are faced with. Without being judgemental, one of my concern is that a number of educationists (myself included) often talk to teachers about the theory of constructivism as a thing to strive for. We sometimes become blind to some of the constraints that teachers are working within that constructivism would little effect in. What we need to do is to talk about **effective learning.** I do not think constructivism as a pedagogy is synonymous with effective learning. Constructivism has a number of good

aspects that contribute to effective learning e.g. active pupil participation. It also has aspects that are restricted by the constraints that teachers operate within. If we talk about effective learning we should be broad in our definition of what counts as effective learning. We can also be more sympathetic to demands of the teachers' different contexts.

In the teacher's presentation during the first part I noticed that the teacher took a lot for granted in her content. My suspicion was that it was clear to her that she wanted to teach sizes, but she did not consider how her pupils were going to assimilate it. Her first illustration opened itself to different interpretation. What did the pupils mean when they said 'the teacher is *mkhulu* to the pupil'? Did they mean she was "older in age" than the pupil or did they mean that she was "bigger in size?" That also applies to the other example she used. This illustration highlights the complexities of language that are at play in a classroom discourse. What you put in does not always guarantee what will come out. The teacher's might have had a clear picture of what she wanted to teach, but she might have overlooked some of the tensions that can exist within languages. "Khulu" does not have a single meaning in the context she used it. She might have assumed that the pupils will have the same interpretation of *khulu* and *ncane* that she has. I do not know what the pupil's interpretation was but I would not be shocked if most pupils meant the teacher is older than the pupil. The rol. of creating intersubjectivity was overlooked in this regard that is: making sure that both parties are talking about the same thing. This is also a situation where one can see multiple of goals at play during mediated action. The goals of the agent can be sabotaged by her mediational means. The teacher can experience problems in using appropriate mediational means to fulfil her goal. This can lead to a situation where a flood of unintended conflicting goals are being unleashed without the teacher being aware of it. This can further lead to the development of misconceptions in the pupils.

The second part of the teacher's lesson was characterised by active pupil participation but that participation was limited to certain boundaries which were set by the teacher. She (teacher) spent time talking to pupils as individuals and not as a whole class. She gave pupils instructions and asked them to work in groups. When pupils started working with their objects she (teacher) realised a problem in her presentation in the first part of the lesson. The

equipment that were made available to the pupils contradicted the initial purpose of the teacher, which was in this case to compare size. The situation did not generate into confusion because of the relationship both parties have. The teacher handled the situation well, instead of being hostile towards pupils demanding that they do what she had shown them, she acknowledged their contributions and started to incorporate their framework in the lesson.

The teacher was fortunate in this instance because the manipulatives that she provided could be manipulated by pupils. If resources are not properly built into a lesson they can create confusion in the pupils, instead of assisting them in their learning. Inappropriate resources can cause imbalances in the minds of the pupils. They can send messages that you as the teacher do not intend to send. The perception that resources always guarantee success is in most cases not true, only properly planned ones have a chance. Resources are not a separate entity to a lesson, as planning goes to the lesson it has to accommodate resources. Resources should complement the teacher's intentions.

The teacher's goal for the first part was "this is what I want you to learn and this is how it can be learned". She had objects and she asked to comment on them. The goal of the second part was "to show that you understand, take the lead by demonstrating to me that you do understand". In the first part the teacher demonstrated her mastery of the topic to pupils. She then took a back seat and wanted pupils to demonstrate that mastery to her. Pupils were given an opportunity to also feel important. When the pupils came with the aspect that the teacher probably overlooked, the teacher did not become negative, instead she incorporated what the pupils brought into the lesson. There is an implicit message that the teacher can also make mistakes (I do not know whether that was deliberate) and that she appreciated and had confidence in the pupils' contributions. They are also important in the learning situation.

The goals of group work were in my opinion not achieved. There was a conflict of goals within the teacher. There was a discrepancy between what she aspire to do and what she did in group work. The teacher wanted pupils to work co-operatively, to discuss with each other and help each other. Pupils had their individual resources and they were working as individuals doing their own things without recognising their peers and the teacher was

comfortable with that. Sitting in a group does not automatically mean group work. Pupils can sit in groups and work independently without acknowledging their peers. For group work to be effective pupils have to bring together their heads, discuss with each other, and share ideas. This applies to both collaborative group work and co-operative group work. This process does not occur automatically when pupils are sitting in groups. Teachers have to work on it. They have to use different means to encourage pupils to work together. Teachers also have to teach pupils the skills that are necessary for making group work successful like respecting each other, listening to each other etc. Teacher 4 did not encourage that aspect of working together. Her approach encouraged individual accountability instead of group accountability. Immediately that happens, pupils could start to read that as a message that encourages individuality. Pupils in this class started to focus on themselves and downplayed the importance of the collective.

The teacher took a long time in evaluating individuals in such a way that she did not manage to talk to each and every child. It was obviously impossible for her concentrate on each and every child. Teacher 4 encouraged those who had better understanding to assist those who did not understand. If pupils worked together this would have been unnecessary because generic in the group interaction is the issue of helping each other. In my observation I did not get the sense that those who did not understand came forward for assistance. It was only when the teacher discovered a pupil who did not understand that the other pupils came in 'to correct him'. Pupils kept to themselves and in some cases, waited for the teacher's approval before progressing.

There are more positive aspects to group work than sharing ideas. Pupils can develop skills that they can use later in their lives. For the teacher group work can mean creating pupils who are independent. It also means saving time in evaluating pupils because the group members have an obligation to assist each other. The teacher can also improve the quality and the quantity of work in the class. She can refocus her resources more to pupils who are needy while not neglecting the other pupils.

The third part of the lesson consisted of pupils of pupils working as individuals in their

books. I observed that in their books pupils drew a variety of pictures , some compared sizes whereas others compared quantities. The teacher went around their desks and looked at their work she talked to them about their work.

In the first part Teacher 4 had a tight control on what she wanted pupils to learn. She focused them on the topic and dominated the talk. She talked to them as a class. In the second part she loosened up and gave over some power and control to the groups. In the third part of the lesson she devolved the control further to individuals. The three parts of the lesson complemented each other. The approaches may have looked different but I think the teacher had aspects of continuous assessment built into the lesson. During the lesson it was important for pupils to work together in groups but, at the end of the lesson she knew that individual pupils' understanding remain of utmost importance. She had a tool to measure that impact. Teacher 4 followed the pattern of class- groups -individuals.

I think this was worthwhile effort to observe and talk to the Teacher 4. If one takes into account the fact that she has had no intervention from outside Mathematics NGOs or has had no input from the Education department one must commend her effort. I do not want to say this is a good teacher but she raises a number of questions for us. The impression that exists about teachers who have had no intervention is that of incoherence and lack of will. Teacher 4 even though she has problems she shows organisation and coherence in her approach. She also shows willingness in trying out things.

5.4. 3. Summary

Teacher 4 manages to falsify the perception that is prevalent about Grade One teachers that they are not coherent and organised. Her lesson had a particular flow within it, she was very coherent in her practice. If one considers that this teacher has had no formal outside mathematics intervention one can commend her for her trying out things. I want to state categorically that I don't mean that she does not have constraints, but she has managed to raise issues that are of importance. We see her integrating, not without problems, approaches

that were thought to be conflicting in her practice, she knows when to use what. It is also clear that she has managed to integrate her role with that of the pupils.



CHAPTER SIX

6. 1 CONCLUSIONS AND IMPLICATIONS.

In my findings I realised that all these teachers had differences in their practices, their approaches were different. In some of them (Teacher 1 and 4) one could sense when looking at their practice that, they are influenced by the contemporary thinking in education. Teachers 1 and 4 are trying to integrate what they have been doing in the past with the new child-centred approaches, but, their approaches are also different. In analysing the teachers I found that they have common constraints and concerns that need to considered and addressed. In this section I shall provide a summary of their status in the schools.

6.1. 1 Who is the typical Grade One teacher?

My discussion in this section will be based on my experiences of many years in working with Grade One teachers and also on the four teachers I have observed and interviewed. What I discovered from the teachers that I have worked with is that a Grade One teacher is not different from other teachers. She is not a demotivated, incapacitated, and lowly-qualified teacher. Grade One is not a dumping site as most people perceive it to be. I found that these teachers have aspirations, disappointments, and they have beliefs like other teachers. They view their work as 'work', not as a place where they should relax and wait for retirement. They see themselves as being important in the development of their pupils.

Grade One is unfortunately still a female terrain. In the past in black African junior primary schools there was a perception that females (being mothers) could look well after the pupils, male teachers were not allowed to teach in the elementary phase. This also had something to do with status, junior primary teachers used to earn less than other teachers. Three of the four teachers that I worked with were above fifty years old, only one was in her early thirties. There is a gradual emergence of young Grade One teachers in schools. In the recent past this class was mainly taught by older female teachers. Of the three older teachers two had enthusiasm. They loved teaching Grade One and they indicated that they wanted to improve their teaching. All the teachers except Teacher 1 indicated that they did not have a choice in

choosing their classes, but if they had had a choice, the three elderly teachers said they would choose Grade One. Only the teacher who is in her thirties indicated that she did not like Grade One, that if given a choice, she would have chosen another grade. I think the three older teachers are comfortable with Grade One because of the experiences they have accumulated in teaching it. Three of the teachers had passed Grade 12 and the same three have done upgrading courses or are in the process of completing an academic qualification. All the teachers did mathematics up to the college level, but as said [illegible]e colleges merely repeated the syllabi of the primary school level.

6. 1. 2 The teachers' beliefs about Mathematics.

Having talked to the teacher and observed how they teach I can claim that I had some access to their beliefs about Mathematics. In discussing these beliefs I am conscious that belief systems like others are not static. They undergo changes from time to time depending on the individual's new experiences. The picture that I hope to give in this discussion will illustrate the beliefs of the teachers at the moment I was working with them. Beliefs according to Thompson (1984) and Cooney (1985) play an important role in shaping and guiding the practices of the teacher in the classroom. It does happen at certain occasions that teachers can fail to translate their beliefs into practice. In such situations there can be some dissonance in the teaching and consequent learning.

'**For it to be Mathematics it has to have number**'. This statement captures the beliefs of all the teachers about Mathematics. When the teachers described what Mathematics was, they all said it was **numbers and operations**. They saw Mathematics as a vehicle to teach pupils how to count and how to apply four basic operations. During the observations, three teachers mediated other skills but I noticed that they felt pressurised to reduce whatever they were teaching to 'number' to make the lesson mathematical.

The beliefs do not exist alone. they are supported by other beliefs. There is a belief in all the teachers that Mathematics is **fixed,** I cannot say rule bound, they themselves did not teach any rules. Though the teachers varied in portraying this belief and if one looked at the what

the teachers taught and how they responded to the pupils' answers it is easy to pick up that they were looking for **specific answers,** not at the **pupils' answer**. Teacher 4 who is comparatively more liberal than other teachers insisted that the pupils should see unequal things as equal. This was more explicit in other teachers, Teacher 2 even told the pupils exactly what to see and say. If the pupils' answer did not fit with the teachers' idea of a correct answer that answer was thrown out or ignored. The teachers had the power to define what Mathematics was and what counts as Mathematical knowledge in the class. Any input that did not fit with their definition was viewed with suspicion and the message was transmitted that it unacceptable.

Coupled with the belief that Mathematics is fixed the question is then asked, what are the mechanisms that will ensure that pupils learn the correct Mathematics? I have mentioned before that some beliefs do not exist alone and they bring into existence other beliefs. Because the **teacher knows** what counts as Mathematics and the **pupils do not**, it becomes the function of the teacher to impose what counts as the correct Mathematical knowledge. Teachers were the only resources not the pupils. This act immediately created a **division in the class**. There was a teacher who knows and the pupils who do not know. In all the classes the teachers initiated the talk and they asked questions. There isn't any occasion where the pupils asked the teachers questions. In all the classes except in that isolated incident in Teacher 3 the teacher was the only person who had a final say in the pupils' answers. If she disagrees with the answer then that is not questioned. If she agrees, that answer has to be taken in. I do not know whether the teacher were conscious that they were encouraging instrumental understanding.

The beliefs that the teachers held, helped shape their images of what a good mathematics lesson has to look like. There is always a reciprocal relationship between the images, the practical experience and the practical rules, one cannot look at one in isolation of another. The practical experiences of the teachers which can be traced back to their school and college helped shape the teachers' images about Mathematics. The three elderly teachers were educated in colleges where the same kind of thinking was promoted. Teacher 4 also came from the Mathematics background similar to the other teachers even though it was at a different time. The practical principles together with the image influenced how the teachers conducted themselves in the classroom. In lessons the teachers conducted there was an

inclination to make them consistent with this image.

There are certain beliefs that the teachers held and expressed that they did not know how to translate into practice. There were tensions between what the teachers did and what they believed to be desirable. Teacher 1 for example acknowledged that pupils come with mathematical knowledge to school and she claimed that she used it in her teaching. She further accepted that pupils are important in the success of the lesson. At no time in her lesson did she utilise that knowledge. She simply went through the lesson as if pupils knew nothing. She had problems in making pupils constructive participants in her lesson. Teacher 2 said pupils are different and in their learning they are at different levels. In her practice she treated her pupils as a homogenous unit, pupils answered in a chorus, during drill they repeated the same things. Teacher 3 said pupils' understanding was important, in her lesson but she never enquired whether they understood things. All the teachers operated as closed books which pupils had to struggle to read. Pupils spent most of their time reading the teachers' mind instead of focussing at the task at hand.

Why did these teachers fail to translate their beliefs into practice? The reasons may range from partial appropriation to inappropriate understanding of the issues. Teachers even though they have not had any direct facilitation have been exposed to information about new ways of doing things. They are receptive to that information to an extent that it becomes part of their beliefs. In most instances the tension begins when there are conflicting beliefs in a person existing at the same time. At one extreme there are old beliefs that have been reinforced by time, on the other hand there are those that are new and lack sufficient support. With both these situations present, the teacher is expected to do something. If she employs the new she does not have enough back up. If she calls for the old there is sufficient back up. The tendency like with Teachers 1 is to utilise the new belief with the support of the old beliefs. What then happens is that there are conflicts emerging in the practice. The teacher wants pupils to come with their answers but she is the one who knows 'the correct answer'. There was always that tension with Teacher 4.

When you reflect on this situation you get to understand better the tensions that exists between the mediational means and the agent. There is a break up in relationship between

the agent's image and the practical rules. I want to argue that in these instances the images were formed out practical principles which are not solid. The agent finds it hard to use the mediational means to project the image that she wants. This is why Teacher 1 and Teacher 4 had problems in ensuring a flow in their lessons. Some actions to a certain extent sabotaged others, their actions conflicted with their intentions. In the quest to encourage group co-operation Teacher 4 encouraged individuality. This is what is likely to happen when teachers have a superficial appropriation of issues.

Teacher 3 on the other hand might be speaking in the new fashionable language but that language remains in the language level, it does not carry much meaning in it being translated into practice. In this instance the agent operates with the mediational means that is not tainted by the new information. The new information is at a level where it is isolated, is has not had any engagement with practical principles. There is no tension in Teacher 3 in that her practice continues in a way in which it has. Teacher 2 on the other hand is the teacher who has integrity, she only implements things that she has confidence in, she has to have full appropriation. She is aware of the new information, she appreciates it but until understands she won't implement it. The teacher is particular about the mediational means she uses. Instead of tensions being created at the practical level, she sees the necessity for resolving them at a prior stage, on a personal level.

6. 1. 3 Content knowledge and teaching

I discovered that all the teachers lacked some specific **content knowledge**. They were not able to translate the content to the pupils in a way that pupils could understand. There were some misconceptions that the teachers unintentionally mediated to the pupils. Two of the teachers did not know how to deal with the pupils' concerns because, I think, they did not know much about the topics they were dealing with. That put the teachers in a vulnerable position, they were not able to take their lessons forward. If a persons' internalisation of the concept is in terms of mastery not appropriation, it is difficult for that person to have flexibility when working with that concept. With appropriation a person is able integrate or assimilate the new knowledge into the already existing knowledge. When that knowledge is being used, it utilises the benefit of the other experiences, a person can have more flexibility

in the application of that knowledge. Mastery without appropriation on the other hand does not integrate the new knowledge into the already existing knowledge. What is new, remains as a separate entity from the other knowledge, it does not engage with the other knowledge and experiences. In the absence of appropriation one may be content with the dealing with the material that would not arouse any debate, or any cognitive engagement on the part of the pupils. Understanding the Mathematics content also gives you authority and confidence in teaching. One of the aspects that might explain the strong inclination that teachers have towards authoritarian approaches may be that they are not confident with what they teach. To avoid any discussions or pupil involvement, they resort to a tell and test method. Lastly, the knowledge of the content helps the teachers to organise the learning material better. If you had observed the classes the teachers dealt with what they were teaching in a horizontal fashion. Their lessons were flat, they started and ended at the same tempo, the only difference was that, the pupils from talking progressed to writing; but the pupils who excelled at making novel contributions were ignored and, they were trapped where the other pupils were. Teachers 1,2, and 3 all used inappropriate resources for their lessons.

All the teachers knew that Mathematics is important, some even saw it as being more important than other subjects. They provided reasons that were externally and instrumentally orientated. They saw Mathematics as a tool to equip pupils to be able to use their number knowledge better in future, and also a tool that could help place the pupils in different jobs. The teachers were not conscious of the internal orientated effect of mathematics, that mathematics has transforming abilities in a person and that it can help a person think in a different way.

6. 1. 4 How the teacher perceives Grade One pupils.

There is always tension between the teachers' definition of their role and their definition of the pupils' role. There is also a distinct line separating these roles. The three teachers saw themselves as people who are responsible for plotting the direction of the pupils. Unfortunately the routes that pupils plot should be closely aligned with the teacher's route. The consequences of such behaviour is that the pupils as subordinate partners cannot set themselves free from the mother body. They cannot decide to explore and set their own

routes. What I find fascinating with the teacher-pupils relationship is that it is **sensitive to the scene**, it changes according to the location. Inside the classroom the teachers portray **no** confidence or **little** confidence in the pupils' ability to explore. Three of the teachers said they do not think pupils are capable of developing their own strategies when they solve problems. Teacher 1 added that throughout her experience she has never seen a pupil developing a strategy. It was only Teacher 4 who believed that pupils can develop their own strategies, she added that she has seen some. Outside the classroom pupils acquire a different role in the minds of the teachers. They are capable and independent little people. These teachers talked about pupils as if they are capable and able. Pupils cannot be capable and at the same time be incapable. If these teachers realise that they are dealing with the same pupils and that what changes is the environment they can start thinking differently about pupils. It is unfortunate that the teachers do not realise that there is a relationship between their **perception about pupils** and their **practice**. They relate to pupils in the classroom as if they are incapable and dependent, pupils appropriate the teachers' perceptions and they enter into an 'incapable mode'. When pupils act as if they are incapable, they reinforce the teachers' perception. This is a circle that teachers have to break.

6. 1. 5 The teachers' perception of how Grade One pupils learn Mathematics.

This section is informed by how the teachers perceive Mathematics and how they perceive the pupils. What we saw in three of the teachers is that they dominated the interaction in their classroom. This is consistent with their perceptions about pupils. Since the teachers perceive the pupils as being incapable of doing things for themselves, they bridge that gap by doing things for the pupils. The teachers come with what I would call a **'ready prepared** Mathematics meal' and **feed** it to the pupils. These teachers believed that their duty entails giving pupils access to knowledge. There is also something that they do, they closely monitor the quality and the quantity of the knowledge that pupils construct in Mathematics. Teachers set limits in what pupils can learn, and these limits are based on what appear to be arbitrary reasons.

6. 1. 6 The teachers' perception of how to teach Mathematics in Grade One.

The teachers' perception of how they believe pupils learn Mathematics is consistent with their perception of how they should teach the subject. In teaching Mathematics there is an unspoken consensus amongst teachers that pupils' involvement is important. I observed that the notion of child-centredness is problematic. This word has been turned into a cliché. In all the classes the pupils had opportunities to be involved at one point or another, whether they talked in a chorus or as individuals, some stood up to point at pictures or at the teacher, but it was the teachers who gave them a chance. A number of teachers might interpret that as genuinely involving the child. What I believe contrary to the teacher, is in the **quality** of that interaction or involvement, and also the **outcomes**. I would like to believe that the teachers do not know that. The teachers are struggling with how and when do you involve pupils in a Mathematics classroom. There are also problems in what do you involve yourself in. They could have tensions in how they **reconcile** their roles and the notion of child-centredness.

All the teachers acknowledge that it is important to use resources when you teach Mathematics. All the teachers used some form of resource in their teaching. What was problematic is **how** the teachers used their resources and also the **appropriateness** of those resources. Some teachers used the resources to strengthen to their positions, some like Teacher 3 used them as a matter of course. There were certain instances where I believed that the presence of resources brought dissonance rather than understanding. I would like to argue that it is not in every situation in a Grade One Mathematics classroom that the teacher has to bring and use concrete resources. Sometimes the nature of an activity can be a resource, for example, pattern series on the chalkboard.

The teachers used tell, question and confirm method. In certain cases (refer in particular to Teacher 2) there was drill as an important aspect. This to me is a "fool proof" method to ensure that pupils take home something from school. Even if it is not through understanding, it can be through memorisation.

From analysing the information I have about teachers, I discovered that teachers have **real problems** in Mathematics that have to be tackled in **real ways**. By 'real ways' I mean that we

have to avoid to be bound into a 'world of clichés' that has no meaning to teachers. Teachers need to be given access to the types of alternatives that are there and be made aware of the advantages and the disadvantages that they can get. If we wait and hope that teachers will discover for themselves the alternatives because we think, if they discover for themselves they would understand better, we would wait for a long time in some teachers. The trend amongst most facilitators is that they have an aversion for telling teachers anything. The thinking is that teachers and pupils have to discover things for themselves. I prefer to think that this process is not as simple as currently conceived. We need to use a variety of methods to give teachers access to the contemporary thinking. Another tendency amongst teacher educators has been that their approaches to teachers have been tainted. They implicitly market one view as opposed to others. Teachers are exposed to one way of thinking and are not given a fair choice. Sometimes the situation becomes **'mine and your method'**, mine being portrayed as good; yours being portrayed as bad. We must avoid polarisation in our perception of such critical issues.

The concepts of consciousness and reflection are important in the effective functioning of a teacher. But these concepts on their own cannot address the problems that teachers have. Consciousness is not a cure-all medicine for teachers. For it to be effective the teacher shall need to have insight and information of the knowledge upon which their consciousness can be grounded. Application, too, is required for effective action.

What we are concerned with is that, at the end of a period, the pupils must demonstrate that they have learned. To evaluate effectiveness in the learning environment the teachers have to work from backwards to front. The indicator of the teachers' success has to be the calibre of pupils they produce at the end. For pupils to learn we must realise that there is no single way to follow but there are many ways that we can use. Sometimes it becomes necessary to integrate different methods to maximise the chances of success. We should not confuse **constructivism** with **effective learning**. Constructivism as a philosophy has a number of positive aspects within it. One of the aspects is that "knowledge is not passively received, but it is actively built by the cognising subject" (Wheatley 1991), secondly is that knowledge is there to make meaning of the world, it is not there to discover the truths. This is a philosophy which has to be translated to practice. If we translate constructivism as a philosophy to a

pedagogy there are factors that immediately create conflicts. Schools operate within specific constraints. There are time constraints, there are parental and departmental expectations. The world expects certain knowledge for pupils to have access to the world market. It is unfortunate that constructivism alone cannot solve the problems posed by these constraints. That is then where I talk about effective learning. Effective learning is not about exclusion, it is about inclusion. **Effective learning is not about a specific pedagogy but it about a pupil learning**, it is about looking at the context and being able to take the best out of every pedagogy and help develop a competent child. We have teachers who allege because they are constructivist that it is wrong to give pupils information, this has resulted in pupils being frustrated in certain lessons because they cannot move either forward or backwards and the teacher is not prepared to help. A teacher has to know what to do when. She should be in touch with the context and the pupils' needs at all times. Constructivism as a pedagogy even though having different interpretations has aspects that contribute to effective learning, but so has authoritarianism and other pedagogies. Effective learning entails producing quality pupils at the end, having obviously taken the best out of a variety of methods.

We should be careful that we do not replace one dogmatic pedagogy with another, authoritarianism with constructivism and in the process forget our priority. I suggest that our aim should be about effective learning, which implies taking what contributes to effective learning from different philosophies and merging them in the classroom contexts.

6.2 Conclusion.

In this project I have looked at who a Grade One teacher is. I found that the perception that exists in the society that alleges that Grade One teachers are teachers who do not have aspirations and who are waiting for their pensions does not exist. I found that they have aspirations and visions like other teachers. There is nothing that tells them apart from other teachers. We also see the emergence of young teachers in Grade One, in the past this was initially an elderly lady terrain. The project further looked and analysed the beliefs that Grade One teachers hold in Mathematics and their content knowledge. I discovered that teachers hold many beliefs, with some, conflicting. I got the sense that they were not conscious of this. The challenges that they were facing were; how do they merge these beliefs and utilise them

successfully? Their responses to the challenges were different. Some experienced difficulties whereas some decided to ignore the challenge and carried on as normal. What I identified as being part of the problem is that teachers had partial appropriation of concepts. This led them to situations of powerlessness and tensions.

We found that teachers lacked in their content knowledge. Partly, I see this as one of the reasons why teachers found it difficult to appropriate the pupils' answers and to develop their lessons further. The lack of content knowledge had the unfortunate consequence of making the teachers restrict pupils' innovations because they could not deal with them. This project also looked at how Grade One teacher perceived Grade One pupils. I found that there was a relationship between how the teachers perceive children in their classes and how they teach them. There was polarisation in the classrooms. At one end there were pupils who do not know, at the other end there were teachers who know. During these processes teachers, though not deliberate, appropriated more power for themselves from the pupils. In all those situations the pupils played along with the teachers.

There are issues that people take for granted when assisting teachers. The issue of using terminology which has no meaning or little meaning for the teachers further exacerbates tensions in the teachers. Elementary statements like 'when I do I understand' open up doors for great misinterpretations by the teachers.

When we use these terms with the teachers we have to ensure that they do not remain at terminology level but that teachers should be encouraged to fully appropriate them. Facilitators should also be careful not to replace one indoctrination with another, authoritaniarism with constructivism. The priority has to be that at the end the pupils should learn. There isn't one pedagogy that can do that, but with looking at the contexts that teachers work in and being sensitised to the pupils' needs we can move towards that outcome. In conclusion, this project has attempted to highlight the situation of Grade One teachers in black schools at ground level and it makes a strong case for a consistent teacher support programmes.

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Appendix 1.

OBSERVATIONS

- How the teacher presents the lesson
  - does she tell most of the time?
  - does she allow pupils to discover for themselves?
- How the teacher facilitates learning
  - when does he or she intervene
  - how does he or she intervene
  - how does he or she provoke learning
- The role of pupils as determined by the teacher pupil relationship

do they sit and listen?

do they initiate questions?

do they discuss with peers?

- Resources
  - are they used?
  - how are they used?
- The nature and status of pupils' written work

the format

formulation of teachers' questions

method of marking

corrections

overrehearsal

consistency across books

[As soon as teachers start with formal teaching of Mathematics, pupils start to write. They write numbers, draw pictures different shapes at the initial stages. Later they go to different operations like addition and subtraction.]

Appendix 2

INTERVIEW QUESTIONS

1. The Teacher's Profile.

Sex

Age

Highest standard passed

Highest standard that they passed Mathematics

Professional Qualification

When were they professionally trained

Academic Qualification

Years spent teaching Grade One

Other classes taught and duration e.g. Std 1-2 years

Did they enjoy learning mathematics at the college/university?

Is it their own choice to teach Grade One?

If yes, why did they choose it?

If no, why are they teaching it?

I shall proceed to the following questions:

2.What Grade One teachers think about Grade One Mathematics.

Do they enjoy teaching Mathematics in Grade One?

Is Mathematics important for Grade One? Why?

Do pupils come to school with Mathematical knowledge?

Give an illustration of your answer

Is it important to find out what pupils know before you teach them?

If yes why?

If no, give reasons

What Mathematical concepts do you teach at the beginning of the year?

Why?

Do you have an upper limit in numbers when you teach pupils?

If yes, What is it?

If no, why don't you have it?

Can you outline how you can teach addition to the Grade Ones.

Explain how you handle corrections in your class?

Do you use resources in your classroom?

If yes, why do you use them?

If no, why don't you?

3. Comment on the following statements.

Boys in Grade One perform better in Mathematics than girls.

There are pupils in Grade One who are not meant to do Mathematics.

Memorisation rather than understanding is important in Mathematics.

When giving pupils problems to solve I first have to show them how to solve the problems.

When pupils are able to write numbers then they understand them.

Grade One pupils cannot develop their own strategies to solve problems.

Pupils who rely on Mathematics resources are not good in Mathematics.

Appendix 3

Teacher 1: Classroom Observation

Time	Teacher - pupil talk.	Comments
05: 32	Class: "Good morning teacher".	
	Teacher: "Sit straight Now lets count from 1 to..., everybody."	
	Class: "0, 1, 2, 3...."	
06:00	Class and Teacher: "32, 33..38, 39, 40."	
	Teacher: "Sukubaka ngomnwe sebenzisa isandla 65, 72, 75, 76."	**Some pupils are not counting.**
07:32	"Namhlanje sizokufunda ngezi shapes siyabona he.., ke!"	**The teacher introduces the topic of the day "shapes"**
	Class: "Yes teacher."	
	T & C: "Sizofunda ngezi shapes, ngezi shapes namhlanje."	
07:39	Teacher: "Okokuqala ngaphambi kokuba siqhubeke, umntu makabheke ucango."	**The teacher is pointing at the door and she want pupils to look at it.**
	"Look at the door!'	

	"Look at the door everybody".	
	"Masilubhekile ucango sibona linamacala amangaki, Hands Up! Mangaki amacala ocango. Arthur, mangaki amacala ocango mangaki?" Arthur: "Four Teacher and class : "Four."	**She wants to know how many sides does a door have The class repeats Arthur's answer**
	Teacher: "Thank you , good."	
08:16	Teacher: "Njengoba siwabhekile , wabheke askaqedi ukuwabheka, sizoqhubeka ngalolo cango. Niyeva."	**The teacher wants to know whether all the sides are equ**
	Class: "Yes"	
	Teacher: "Okay, njengoba eyi four ingabe ayalingana lawo macala." (cough)	
	Class: " No, teacher"	**The teacher wants individuals to answer not the whole class.**
	Teacher: "No, Lift up your hands don't just say no teacher".	
	Teacher : "Nomthandazo! Ayalingana na?"	**The teacher continues to ask the question even after the class has given the answer. It looks like**

	Nomthandazo: "No"	she wants to give most pupils a chance to answer the question.
	Teacher: "Awalingani , ubani othi awalingani, ngubani othi hay mna ndithi ndiyawabona mistress awalingani?"	
08:35	Teacher: "Nonceba wena, Nomlindelo ngathi awuphakamisanga nje, anjani"	Notice that the pupils' answers are the same. They are repeating the first pupil's answer.
	P: "Awalingani"	
08:40	Teacher: "Phakamisa ke ntombazana yam nokho ke utsho njalo. Lindiwe anjani. Andiva ntombazana andiva."	The pupil mumbles something.
	Pupil: "Awalingani"	There is tight control of the pupils.
	Teacher: "Uthini awalingani, ndibona ungaphakamisanga bhuti wam. Awatheni?"	
	Pupil: "Awalingani"	
	Teacher: "Bathini"	
	Teacher and class: "Awalingani"	
	Teacher: "Ubani ongasixelela ukuthi	The teacher is asking for

	njengoba angalingani nje ame kanjani?"	**a reason why the pupils say the side of the door are not equal.**
	"Amekanjani?" x2	**The pupils look amazed.**
	"Nkosinathi ubona enjani mntanami?"	
	Pupil: "awalingani"	**The pupils seem not to understand what pupils wants, they still repeat the first pupil's answer.**
	Teacher: "Awalingani njani ke Nkosinathi,uwabona enjani? Sukuma baba sukuma. Anjani Nkosinathi?"	
	Mzwakhe awalingani. Andiva sukuma man! uwabona enjani ubona enjani mfanam?"	
09:10	"Uyabona uyasibonisa"	**The pupil demonstrates vertical and horizontal using his hands.**
		The teacher misses the opportunity to use this pupils' answer.
09:40	Teacher: "Khawutsho uwabona enjani wena Zinhle?	**The teacher looks strained because the pupils are not coming with the answer that she wants.**
	Zinhle: "Mm…."	
	Teacher: "Anjengantoni?"	**The pupils are also frustrated.**

	"Anjenge rectangle?"	**This pupil say the sides are like a rectangle and the teacher immediately gets excited.**
	Pupil: "yes"	
09:48	Teacher: "Ubona ngantoni ukuthi ayi rectangle ubona ngantoni Busisiwe?"	**The pupils think the teacher is looking for the names of shapes.**
	"stand up!"	
	Busisiwe: "Njenge ah ngetriangle	**Note their responses**
	Teacher: "Ubona nge triangle he	**laughing.**
	" Iya, ubani omnye ofuna ukuphakamisa sive uk[illegible]i ubona ngetriangle Nkosana andiva ndibona abanye basaphakamisile"	**The teacher is getting frustated.**
	Pupil: "nge circle"	
10:17	Teacher: "Hel Uthi ubona nge triangle ngubani omnye ongazama"	**Even if the answer is incorrect, the pupils still repeat it.**
	"Ubona ngantoni?"	
	Pupil: "Ngibona nge triangle"	**The teacher is continuing to laugh out of frustration, but she keeping a tight control over the pupils.**
	Teacher: "Ubani omnye ongazama, bathi abazi njani kanjani".	

	Teacher: "Magret."	
10:36	Pupils: "Ngapha nangapha kuncane"	**This using her hands indicate that the sides have different sizes.**
	Teacher: "Ngapha kuncane nangapha kuncane inkulu kuphi?	
	Pupil: "Ngapha" showing using hands."	**The teacher misses that too.**
	Teacher: "Nangapha kukhulu ufuna ukuthini, ufuna ukuthini?"	
10:49	Teacher: "Khawume ulungise sisi khawuzame"	**The pupils are now struggling to read the teacher's mind.**
	Pupil: "Ayisquare"	
	Teacher: "He, anjani linjani."	**The lesson is falling apart.**
	Pupil: "Ayisisquare"	
	Teacher: "Anjani ?"	
	Pupil: "Yinkulu ngapha yincane ngapha".	
11:05	Teacher: "Ngaphambi kokuthi siqhubeke masike sibheke apha niyeva"	**The teacher now, want to lead the pupils to the answer that she wants.**

Class: "Yes teacher?"

The response means we are listening.

Teacher: "Make sijonge ngapha niyabona, okay siphinde sijonge nalapha siphinde sijonge nalapha. Zingaphi lezinto endiziphethe"

Class: "Ziyi three"

Teacher: "Ziyi three masizibaleni"

Teacher and class: "1,2,3"

11:35 Teacher: "Kungaba zime ngokufana, are they the same?"

Class: "No teacher."

Teacher: "He!?"

Class: "No teacher"

11:42 Teacher: "Njengoba ndiziphethe nje ingaba ikhona efana nocango."

Class: "No teacher"

Teacher: "He andizwisisi siyayibona le."

Pupil: "yes"

Teacher: "Injani iyafana nocango

Pupil: "No teacher."

Teacher: "okay le injani iyafana nocango?

Class: "yes, No! teacher".

Pupils are *not* sure.

Teacher: "hayi, hayi"

Class: "Yes teacher"

Mind reading. Look at how quick the pupils change their answers when they realise the teacher does not want it.

Teacher: "Masibheke kwelicala, masibhekisane, kwelicala.

"Injani le , ayifani nayo?"

Class; "Ifana nayo?"

She focuses pupils to what she wants.

12:15 Teacher: "Ngobani abathi ifana nalo? Uvume njengoba nawe uyibona, nxa ungayiboni undixelele ukuthi hayi andiyiboni nna teachernoma nnamanga, hayi ayifani kakuhle

The pupils are utterly confused.
The teacher seems trapped into this method.

	nocango. Niyabona bantwana bam.	
	Class: "Yes teacher"	**"Yes" not meaning we agree, but meaning "we are listening"**
12:31	Teacher: "Okay, ngokuke ndizobhala ezishapes ebhodini niyeva	**Drawing different shapes on the board.**
	Class: "Yes teacher	
12:37	Teacher: "Asizijongeni, sithe sifunde ngantoni kanenenge.....	
	Teacher and class: "Ngezishapes	
	Teacher: "Very good". Ndizakuyilinganisa ndibone ukuba ndizokwazi ukwenza leya efana nocango andithi na? andithi sithe inkulu kusho u Ntokozo iphende ibeyincane, ibencane ngokuba iyefana nocango? Class: "Yes teacher	
13:03	Teacher: "Kodwa siqaphela ntoni apha kuyo, amacala mane andithi sithe mane? Anjani? Niwabona enjani? Nontlantla anjani mhlekazi	

	Teacher: "Makhulu, makhulu! ubani omnye othi makhulu. Okay okay Anjani ntombazana yam."	
	Teacher and class: "Made."	
13:31	Teacher: "Ubani omnye othi made, nonke nithi made	**There is lack of progress in this lesson and the teacher doesn't realise that. She is sticking to an approach that is obviously failing.**
	Class: "Yes teacher"	
	Teacher: "Hee..usaphakamisile u Sylvia anjani?"	
	Class: "Makhulu?"	
	Teacher: "Onke?"	
	Class: "No, teacher."	
	Teacher: "Kodwa ndifuna nindicacisele ningathi nje No teacher,asithi no teacher sichaze ukuthi siwabona kanjani. Niwabna enjani Machiya sungathi awumamelanga sithandwa ngathi ungavala incwadi nanayivale yivale ntombi yaminiwabona enjani khawutsho ntombi yami ."	**There is a deafening silence**
	Pupil: "Made"	

	Teacher: 'Kungabe uwabona emade wonke."	
	Pupil: "No teacher"	
14:12	Teacher: "Andifuni abantwana abazovela bathi 'no teacher' uzabakhomba emva noba umntu zobaxolelaandifuni bavele bathethe niyeva. Anjani mntwana,	
	Pupil: "amanye makhulu amanye mancane."	
14:23	Teacher: "Mangaphi la amade because ndiyabona anivisisi?"	
	Class: 'One" "five..."	**Pupils are not certain**
	Teacher: "Hayi! Umntu izovela athethe angakhonjwanga."	**In an aggressive manner. The teacher is starting to lose her temper.**
	Pupil: "Five.."	
14:39	Teacher: "Ndiqed'ukuthini ngomntu othetha angakhonjwangauzokhonjwa ngizakukhomba muva nje. Mawunda. Chaza phela uwuvanga ukuthi ndithini Xolani?"	**A reminder for pupils to raise their hands when they want to answer. The teacher is displacing he. frustration to the pupils.**
	Pupil: "Two".	
14:45	Teacher: "Atheni mfana? Why uthi	

	ayitwo amacala ubani, Yes, ntombazana yami."	
	Pupil: "Ayi two"	
	Teacher: "Ayi two, ntoni ? Ayi two amade good, nawe yitsho"	
	Pupil: "Ayitwo amade	It is clear to me that the teacher is working in a way that is strange. There is no flow in this lesson.
	Teacher: "Good Mm...Abanye bathini phela, abanye bathini phela uthini uVuyo ngoba ngathi uyakrokra nje"	
	Pupil: "Ayi two amade	The pattern of repeating answers is emerging again
	Teacher: "Okay wena"	
	Pupil: "Ayi two amancane"	
15:35	Teacher: "Ayi two amade kaloku khona into esithi yi big and small Kunokuthi big and small ke ngoku asisebenzisi ubig apha abantu bazothi mancane. Sthi made amanye anjani kanene?"	The teacher introduces the terms 'big' and 'small'
	Class: "Makhulu"	
	Teacher: "eh... made, abanye, anjani?"	

Class: "Mancane"

16:01	Teacher: "Ah...ayi mancane niyafuna ndinixelele igama endilifunayo, (pause) mabini anade mabini anjani?...amafutshane. Sithole ungarasi mntwanam, Inde, imfutshane."	**The teacher bring in other shapes, a cicle.**
		Note: subtle control language
	"Ndizanibonisa enye i circle, iyafana nocango? Ifana nantoni? Noma ubheke phezulu ifana nantoni."	
	Pupil: "Nelanga"	
	Teacher: "Ulibele manje ukuthi ndithe niphakamise izandla, inje ngantoni ntombazana yami."	
	Pupil: "inje ngelanga"	
	Teacher: "omnye x2 ngifuna ukuba khomba bonke aba...u	
17:14	Pupil: Injengebhola	
	Teacher: Omnye	
	Pupil: "Ifana ne half moon le yasebusuku e round."	**The teacher is sarcastic to the child's response. She undermines the child's creativity. Observe what happens**
	Teacher: "Yeyiphi kanene ihalf,moon I halfmoon yasebusuku round yeyiphi	

	le halfmoon, uthi ihalfmoon".	**next.**
17:56	Pupil: "Ifana nelanga."	
	Teacher: "Busisiwe uthini wena?"	
18:10	Abantu bathetha nge halfmoon! ifana nantoni	
18:17	Pupil: "Inkanyezi".	
	Teacher: "Inkanyezi ! yintoni ngesiXhosa sithini. Ngaba sithi inkanyezi. Ufuna ukutsho yena athi Inya....."	
	"Injani? Bethunana masingathethi futhi masinga..... Siyibonile lendawo eround ifana nantoni? Nendingiliza. Nantoni?"	
	Class: "Nendingiliza"	
	Teacher: "Sinayo nenye kanti	**Showing a triangle.**
19:00	bantwana bam."	
	"Ifana nantoni yona Andifuni umntu atsho igama layo."	
19:25	Teacher: "Ifana nantoni?"	**This to me was a good answer, it was a pity that the teacher did not realise it.**
	Pupil: "Nesitina"	

	Teacher: "Ifana nantoni? Itsho mntwanami ifana nantoni ntombazana yami?" (softly)	
	Pupil: "Nesitina"	**Getting very irritated, she then corrects her tone.**
19:59	Teacher: "Abantu bayaqashela Yebantu x2 !Kuthethi mna ndingayiboni into efana nesitina. Ifana nantoni? yebantu! ndifana abantu bazondibonisa lesisitina. Wena uthi ifana nantoni, mntwanami?"	**Getting frustrated**
20:00	Pupil "Ifana nesitina esi half".	**The teacher is creating more confusion. She wants pupils to look at a wall outside, but they do not know what to look for.**
	Teacher: "Abantu sebephakamile"	
20:19	Yebethuna masikhangeleni (pointing) niyabona le e room 7	
	Pupil, "Yes mem'	
	Teacher: "Niyabona lecala elisecaleni lime kanjani linganisa ngezandla. Nomthandazo sit down! Lime kanjani lelicala apha linganisa ngezandla."	
20:42	Teacher: "Ime kanjani x2 Kanti abantu ababheki?	**Pupils are looking at each other and making circles with their hands, there's one pupil making an angle, but the teacher**
21:12	Ubani oke wabona isikolo esimekanje. Uke wasibona?"	

		ignores her.
		The teacher cannot understand why pupils can not see what she is seeing.
21:38	Teacher: "U Xolani uthi yena uthi sime kanje. Nibosibheka isikolo senu kanti anisazi. Ok masihliseni bantwana bami"	**The teacher's attempt has failed again. She puts the blame of failure on the pupils.**
	Teacher: "Nansi enye. Sijongile na. Nijongile into endiyenzayo.Sijongile ! masijongeni bantwana bam.	**Introducing a rectangle.**
22:17	Nijongile kaloku uMistress uzathi nenzeni. Nani kufanele ibonakale into eniyenzayo. Nantso ke enye." "Niyazibona izinto esizenzayo zininzi. Uvela ngale uphinde uvele ngale."	**Talking to herself.**
22:37	Teacher: "Le masiyibhekile inamacala amangaphi?"	
	Class: "Four"	
22:49	Teacher " Grade One niyalibala ne? Khawutsho inamacala amangaphi?"	**control language.**
	Pupils: "Four"	

22:58	Teacher: "Anjani lamacala ayi 4, Ntombizodwa anjani, Sixa uwabona enjani?" Pupil: "Ayi 4" Teacher: "Wena". Pupil: "Ayi 4". Teacher: "Anjani Nomthandazo? Pupil: "Ayi 4". Teacher: "Wena uwabona enjani Ntokozo?" Pupil: "Afana ne box". Teacher: "Wena" Pupil: "Afana ne box." Teacher: "Wena uwabona enjani?"	**Look at the pupils' responses.**
24:40	Teacher: "Sanukulinganisana. Lamacala njengoba nthi ayi 4 ayalingana? Atheni! Ayalingana.. Close your books nabani ovule inc.vadi yakhe, close your books."	**The teacher is frustrated. The pupils are bored they are staring to open their books. There is no response from the pupils.**
24:40	Teacher: "Masijongeni bantwana bam. Ikhona enye ebodini".	**Lifting a picture with a triangle.**
	Class: "Yes teacher."	**Pointing at another picture.**
	Teacher: "Ikhona le!"	
	Class: "Yes teacher".	
25:06	Teacher: "Ok, U Nonceba aze apha	**The teacher wants the**

	ayibeke kule eyiyo. Masijongeni u Nonceba sibone sibone ukuthi uzayibeka phi". Ngaba u right?" . Class: "Yes, teacher" Teacher: "Let's clap izandla."	**pupil to take a shape and put it ontop of a similar shape on the chalkboard.**
25:34	"Sizawucela u Gift ukuthi athethe le abone ukuthi ifana neyiphi. Clap hands. Thank you Gift, thank you my boy." "Lena. Sit down" x3	**Gift does the matching correctly.** **Pupils rush to the board. Emphatically**
26:24	"Ubani ongaphakamisanga, make kuze u Ntombizodwa. Ubona ukuthi ifana neyiphi?"	**This pupil comes from the neglected group.**
26:57	Teacher: "Andithi njengoba nathi singabantwana umntwana xa evela uphiwa igama.' Class: "Yes teacher." Teacher: "Masiziphe amagama ezo. Lena sithi yi circle, sithi yintoni?" T&C: "Circle" Teacher: "Circle" Teacher: "Siyayibona le, this is a triangle." T&C: "Triangle"	**The teacher gives the shapes their names. Pupils know these terms, they have been using them since the beginning of the lesson. Was this part necessary?**
28:35	Teacher: "Ikhona le enye enamacala alinganayo. Nonhlanhla bheka phambili. Lena sithi sisi....." T&C: "Square"	

	Teacher: "Namhlanje sifunde nge shapes ezingaphi?"	
	T&C: "Eziyi 4." X2	
28:44	Teacher: "Ezi shape sithi zinjani?" Amacala ajani?"	**Unclear question. Reformulation of the question. Pupils can still not understand then the teacher volunteers the answer.**
	T&C: "Awalingani."	
	Teacher: "Nazo zinjani."	
	T&C: "Azifani"	
28:56	Teacher: "Masifunde, 'Rectangle'	**Pointing at a rectangle. Pupils repeat after the teacher.**
	Class: "Rectangle"	
	Teacher: "Triangle"	
	Class: "Triangle"	
	Teacher: "Circle"	
	Class: "Circle	
	Teacher: "Square"	
	Class: "Square"	
29:29	Teacher: "Ukuze singalibazisani, sizilahla phansi ayikho engekhoyo."	**The teacher different plastic shapes and throws them on the floor.**
	"Sit down."	
29:29	Teacher: "Nkolongwana pick up a triangle and stand there. Come Nkosinathi pick up a circle and come. Come Sixa pick up a square, take a square. Try. Lillian ,come pick up a rectangle. Come Xola, come Nonceba	**The pupils come forward to pick up the shapes. Sixa is struggling**

pick up a triangle. Thank you thanks darling."

31:10 Teacher: "Come! Pick up a square and stand there. Lift them up. What is this?"

Pupil: "This is a circle."

Teacher: "What is the colour of the circle"

Pupil: "Green."

Teacher: "The colour of the circle is.." green . The colour.....

The teacher wants the pupil to repeat the whole sentence.

Pupil: "The colour of my circle is green."

Teacher: "What is this?"

Pupil: "This is a rectangle"

Teacher: "What is the colour of the rectangle?"

Pupil: "Blue, the colour of the rectangle is blue"

32:37 Teacher: "What is this?"

Pupil: "This is a circle"

Teacher: "What is the colour come, Sixam"

Pupil: "This is a square".

He is holding a blue circle.

Teacher: "What! What is this

Pupil: "That is a blue"

Teacher: "That is a blue! What is it x2 Hands up .Tell"

The teacher gives an answer that the teacher least expected.

Pupil: "Circle"

Teacher: "That is a circle, come on tell them, what is it Nomvula?"

	Pupil: "This is a square."	**The teacher is holding a**
	Teacher: "Lets clap hands for them.	**circle, she wants other**
	"Lillian says this is a rectangle."	**pupils to correct Lillian.**
	Class: "No teacher"	
	Teacher: "Xoliswa what is it?"	**While this is happening**
	Pupil: "Circle"	**the other pupils are**
	Teacher: "Very good, don't be shy,	**playing at the back of**
	What is this".	**the class.**
	Pupil: "Circle	
35:24	Teacher: "What is this."	**Holding a triangle.**
	Class "This is a triangle."	
	Teacher: "What is this?"	**Rectangle.**
	Class: "This is a rectangle."	
	Teacher: "Can you draw these	
	Shapes?"	
	Class: "Yes, teacher."	**Pupils prepare**
	Teacher: "Open your books and take	**themselves for writing.**
	your pens."	
35:58	Teacher: "Draw me a circle."	

Appendix 4

Teacher 1 : Interview.

Did you enjoy learning Mathematics at college or at the university?
Ewe
Yes

Was it your own choice to teach Grade One?
Ewe
Yes

After so many years of teaching why did you decide to teach Grade One?
Ndiyathanda ukubeka I-foundation. Ndiya preferisha ukuqala abantwana besebancane. Rather than ufumane sebegqibile esikolweni.
I like laying a foundation. I prefer to deal with pupils when they are small rather than dealing with grown-ups.

Do you enjoy teaching Mathematics in Grade One?
Ewe, ndiya enjoya.
Yes, I do

Is Mathematics important for Grade One?
Yes, very important (emphatic)

Why?
Kwenzele ukuthi bakwazi ukucounter, abanye bazoya nasesibhedlela or baye ezikholejini.
So that pupils may be able to count some are going to work in hospitals, and some will go to colleges.

Do pupils come to school with mathematical knowledge?
Ikhona.
Yes

Give an illustration of your answer.
Noma ungabeka I-chalk bayazibona ukuthi ziyi 2. Ngoba baqhelile nasekhaya ukuphiwa ama sweet, even ke asazi noma baza esikolweni bavela e pre-school okanye be.....Kodwa abafiki be blank as such. Into abablank kuyo ukubhala. Noma uyambuza ukuthi amehlo akho mangaki, uyakutshela ukuthi ayi-two.
If you can put two chalks infront of them, they will tell you that they are two. At home they are given sweets, well we don't know whether they come from pre-school, but they are not blank. They know '2' even though they cannot write it.

How do you use that knowledge?
Mna ndi adder from what they know. Ukuthi ngibone ukuthi bazi kanjani. I move from the known to the unknown. Ndithola le knowledge abaza ngayoekhaya iyandinceda ndithatha..... Most of them know how to count. Kodwa xa befika apha they can't write ukuthi 1+1 ubani kodwa bona into abangayazi ,into efana ne addition ne signs.
When they come to school they can't write 1+1. They do not know addition and signs

What Mathematical content do you teach at the beginning of the year?
Ndithanda I-colours,kodwa ngoba ndiyazi ukuthi iconcept ekufana ndibatitshe yona zi shapes. Ezi shapes ndifuan bazazi zizicolours. So if ndifuna ukutisha I shape e blue bayakwazi ukuthi, this is a blue shape.
I like colours but I know I am supposed to teach shapes. I want them to know the colours of shapes. If I want to teach a blue shape ,the pupils will know that it is a blue shape.

Why do you teach shapes?
Ndithanda I-colours x2 and to teach from 0 to kanjalo, ngoba xa sesingene kwi.... xa sibatisha u 2,3,no 4, fanele sazi ukuthi baphi kanye.
I love colours (the teacher is incoherent)

Ngoku ama colours uwasebenzisa phi throughout the year?
Where do you use colours throughout the year?
No! No! Mandithi apha kwa A kukho lento abathi yi bridging . Thina apha kwa A from January to March khona into abathi yi-brdging. Ukuqala nje ukutisha siqala ngo April . From January to March banencwadi zabo andazi ukuba ndingakubonisa.
In Grade 1 we do a bridging course from January to March. We start teaching as from April . From January March they use certain books. Do you want to see them.

Ndiyayazi lencwadi othetha ngayo.
I know th book you are talking about.

Do you have an upper limit in numbers when you teach pupils?
Nokwaka Grade 1 bona ubatisha up to 9. U 10 asimtishi, its from 0-9.
According to Grade 1 you teach up to 9.

Ndibone abantwana bakho becounter up to 100.
I have seen your pupils counting up to 100.
Ngoku counter bayafika ku 100, kodwa ezibalweni kabanakwenza 10+1; or 11+1. Ngokwe syllabus esiyinikwayo ngokwe addition or subtractionit only 1-9.
According to our syllabus you add and subtract numbers below 9.

Can you outline how you teach addition in your class?
I use sticks and bottle tops. If ndiza wutisha into eziyi 2 ndiyazuthatha izinto ndibabonise zona. Ngenye ioveki ndiyazithatha ndimana ndisusa, ndenze I addition ngenye iveki ndenze isubtraction.
If I want to teach 2 things I take the 2 apparatus and show them to pupils. In one week I do

addition in another week I do subtraction.

Uphawu

Sign

Ndiqala kanjalo nophawu sebenalo bayalwazi nasebhodini . Uyababekela uphawu nokuthi u 3 ungakanani . I sign nazo bayazazi.

From the onset I introduce a sign, while they work they already know the sign.

How do you deal with corrections?

Siyaya ebhodini. Eh..... Abanye bayakwazi ukwenza ezincwadini, kodwa most of them siyaya ebhodini sisiphinde isibalo. then abasibhali ezincwadini. Uyabona ezinye izinto sizenza from July. From January to April balibali yilencwadi. Kusukela ngo June . Its only April, May nje ngoba kuwu June. Izinto ezifana singena kuzo deep as from May, ngoba ngoku sisangcambazisana nale addition. Sivule late ngo April.

We do corrections on the chalkboard. Some pupils do them in their books, but most of them do them on the board to redo the problem. Don't allow them to do corrections in their books. We start doing most of the work after July. From January to April we do the bridging course. As from May we start with the corrections. As for now I am taking them slowly through addition.

Do you use resources in your classroom?

Ndiwasebenzisa kakhulu , ngoba futhi lencwadi esiyisebenzisayo fro January to March iza nazo ezizinto zonke.

I use resources a lot . The bridging course that we implement encourages the use of resources.

Comment on the following statements.

1. Boys in grade One perform better in Mathematics than girls.

Ngamantombazane aperformer bhetele.

Girls perform better.

Why?

Ndibona kunjalo. Amantombazana akhuthele kunamakhwenkwe oko ndibona kunjalo.

Girls are more active than girls.

Anjani amakhwenkwe.

How are boys.

Inkwenkwe noma uyibona I bright izakancane nje. Intombazana if I bright ihamba kwenkwenkwe.

Even if a boy is intelligent he is usually out performed by girls.

2. There are pupils in Grade One who are not meant to do Mathematics.

Andikaze ndidibane nalo problem unless umntwana ndibone ukuthi fanele aye kwi special school.

I haven't met that problem unless a child needs special care.

Umbona kanjani umntwana ofanele aye kwi special school.
How do you determine a pupil who needs special education.
Uyabonakala nje nezinye I subjects uperformer badly.
That child performs badly in all the subject.

3. Memorisation rather than understanding is important in Mathematics.
Ndibona ku important uku understander. Ndipreferisha I understanding.
Its important to understand.

4.When giving pupils problems to solve I first show them how to solve them and let them solve similar problems.
Yes.

5.Grade One pupils can not develop their own strategies to solve problems.
Ngokwabo!
On their own!
Andikaze ndibone. Bongbantu okufanele ubanike into then babuze ukuthi yenziwa kanjani. Abanakuza nge problem bayi solve ngokwabo. Kodwa abantwana abafani, khon'abazamayo.
I have not seen any. Pupils always need assistance. They cannot solve problems on their own, they need a teacher. Anyway, pupils are different, maybe some can do that.

6. When pupils are able to write numbers then they understand them.
Yes

7. Pupils who rely on Mathematics resources are not good in Mathematics.
Naba good bayaziphatha. Bonke baba better xa ubanika izinto eziphathwayo.
Every pupil even the good one like to handle resources.

Appendix 5

Teacher 2: Classroom Observation

Time	Teacher -pupil interaction	Comments
39: 26	Teacher: 'Good morning." x3 Class: "Good morning teacher and good morning classmates."	The crosses 'x' indicate the number of time the teacher repeats the sentence.
	Teacher: "How are you today."	
	Class : "We are fine and how are you teacher."	
	Teacher: "Be quiet. x2. Look at me. x2. Now we are going to learn about shapes."	
40: 00	Teacher: "About what?" x5 Class: "Shapes." x5	Drilling
	Teacher: "Now these are shapes. What are these?"	The teacher introduces the sentence and repeats the same sentence with the pupils.
	Teacher and class: "These are shapes." x2.	The teacher is pointing at the objects on the table.
40:52	Teacher: "Right, here I brought a shape. This is a circle. "	Holding a circle. The teacher alternates the

	"What is this?" X6 Class: "Circle."	**talking with the pupils. The pupils and the teacher are getting excited.**
	Teacher: "Now listen at me." This circle is round like a ball. x4 This circle is round like a	**Pinning the circle to the wall. The teacher will say the whole sentence and repeat the same sentence but leave out the last word for the pupils to say.**
42: 50	Class: Circle. x8	
	Teacher: "A circle is round like a ball." x4 Class: "Ball."	**Pupils are pointing at a ball and they repeat the name ball.**
	Teacher: "This is a rectangle. What is this?" "That is a rectangle." x4	**holding a rectangle**
	Teacher and Class: "Rectangle" x4 each	**Pasting the rectangle on the board.**
	Teacher: "A rectangle has 2 long sides." "A rectangle also has 2 long, short sides.." "Listen." x2. "What is this?" Class: "That is a rectangle."	**2x each sentence** **Pupils mimic the teacher.**

46:00	Teacher: "What has a rectangle."	**The teacher poses the question**
	"A rectangle has 2 long sides."	**and answers it herself.**
	"A rectangle has 2 short sides." x2	
	"A rectangle has short long sides."	**This is an interesting statement.**
	"A rectangle has short side." x2	
	Teacher: "How many short sides has a rectangle."	
	Class: "Four."	**The pupils show signs of**
	"Two." x2.	**confusion. They say the answer**
	"Two short sides." x2.	**and look for the teacher's approval.**
	Teacher: "How many long sides has a rectangle."	
	Class: "Two, four, three?"	**Pupils are not sure.**
46:18:	"Ha! How many!?"	**The teacher is amazed.**
	Teacher and class: What is this	
	"That is a box." x5.	**Teacher speaking together with**
	Teacher and class: "A box is like a rectangle." x4	**the pupils.**
46: 00	Teacher: "A box has 2 long sides. x3 and 2 short sides." x3	**'Thank you' indicates the end of teaching a shape and the beginning of another**
	"Thank you."	
	Teacher: "That is a square." x3.	**Drilling.**
	"That is a ....."x4.	
47: 00	Class: Square. x4	

	Teacher: Listen. A square has 4 equal sides. x3	
47: 44	"This is a square." x4	**The teacher repeats the patterns of the other shapes.**
	"Again."	
	"A square has 4 equal sides." x3	
	"How many sides has a square."	
	"Hands Up?" x8	
	Pupil: "Four sides." x4	**The teacher uses the ruler to determine the space. Rote-rhythm.**
	Teacher : "Four sides." x4	
49:10	Teacher: "What is this?" x2	
	Class: "That is a box."	
	"Again, all of us." x6	
	Teacher: That is a box, right.	
49: 30	Teacher: "A box is like a x6	
	hands up." X5	
	Class : "Square."	
49: 47	Teacher: "A box is like a square."	
	"A square." x4	
	"A box is like a	**The pupils should finish the sentence.**
	"Again."	
50: 00	Teacher: "A box has 4 equal sides."	**Pupils are alternating talk with the teacher.**
	"Again." x7	

Class: "A box has 4 equal sides."

51: 11 Teacher: "Very good, right."

51: 19 Teacher: "This is a triangle.

"Triangle." x4

"What is this?"

Class: "That is a triangle." x7

Teacher: "Again."

"Triangle."

51:53 Teacher: "That is a triangle." x5.

"A triangle has 3 sides." x4

Teacher and Class: "A triangle has 3 sides."

52: 54 "Again."

Class: "3 sides."

"Right."

52: 54 Teacher: "What is this?"

Class: "That is a triangle"

"Again." x8

53: 13 Teacher: "What is this Zwane?"

"How many sides has a triangle."

Class: "Three sides."

53:27 Teacher: "A triangle has 3 corners." x3

"Let us count the corners, 1, 2, 3...."

	"Again." "How many sides has the triangle?"	
	Class: "3 corners."	
	Teacher: "Again." x3. "Very good."	
54: 58	Teacher: "Now tell me, what is in the classroom like a rectangle." x5 "Hands up." x6 Right. Pupil: "I'm see the cupboard."	**Pupils are pointing at a cupboard.**
55: 41	Teacher and Class: "Cupboard is like a rectangle." x3 "Again." x3 "Very good."	
55:58	Teacher: "What else do you see in your classroom like a rectangle?" x4 "Mpucuko!"	**A pupil is pointing at a circle**
56: 14	Teacher: "Where is a circle, show us." "This is a circle, but I want a rectangle, I want anything like a rectangle." x5 "What is in the classroom that is like a rectangle." "Is this one like a rectangle?"	**The pupils cannot find anything that looks like a rectangle, they are struggling.**

"Go and point and touch it."

57:12 "A cupboard!"
"This cupboard is like a rectangle." x4
(using a ruler)
"What else do you see in your classroom like a rectangle." x3

"No! We have seen a cupboard."

57: 50 Pupils: "Tafula." **Pointing at the table. The teacher is happy.**

58:13 Teacher: "This is a rectangle." x4
"Again."

58:41 Teacher: "I want you to show us a circle." X2 **Pupil points at a picture of a circle**

"Very good."

59:10 Teacher: "A circle is round like a ball." x3.
"A rectangle is like a table, cupboard door is like this table."

"A circle is round like a ball and a what?" **A pupil points at a watch.**
Watch! What! What!

	"This watch is round like a circle." x3	
		The teacher is pointing at the watch.
00:15	Teacher: "Show me a thing like a circle." x3.	
	"Show me a thing like a square."	
		Pupils pointing a circle.
	Class: "Square. That is a square. x3	
	Teacher: "Again."	
00:39	Teacher: What else do you see in your classroom that is like a square.	
	"Is that a square?"	
	"No, No! I want a square."	
	"Four equal sides?."	**A pupil points at a picture.**
	"Very good!"	**Mind reading exercise.**
	"The picture has 4 equal side." x6	**Pupils are looking around to see whether they can't find anything that looks like a square.**
	"This is a square. Is there anything you see."	
02.12	Teacher: "A box is like a square." x3	**Pupils point at a book.**
	"A book is like a what?"	
	"A book is like a square. Ha!"	**Mind reading the teacher.**
	Class: "Rectangle."	

		Excited.
	Teacher: "A book is like a rectangle." x2	
02:40	Teacher: "Two sides are long and two sides are short."	
	"Two sides are....." x4	**For the pupils to complete.**
	"Thank you". x2	
	"Very good."	**pointing at a circle.**
	"Now lets read from the board."	
03: 13	Teacher : "What is this?"	**The teacher is holding a cardboard circle.**
	"That is a circle."	
	"Again." x3	
03: 29	Teacher: Now what is this	**She is now holding a square.**
	"That is a square"	
	"Again Zwane." x3	
03: 40	Teacher: "Now what is this."	**She is now holding a triangle.**
	Class: "That is a triangle."	
	"Again." x3	
	Teacher : "What is this?"	
	"That is a circle."	
	"Again." x3	
	"Very good."	
04: 49:	Teacher: "Now what is this..."	**The teacher is asking a question.**
	Class: "That is a triangle."	**Note the way she phrases her**
	"Again." x3	**questions.**
	Teacher: "Now what is this."	
	"That is a ....."	

"Again." x3

"Lets clap our hands." x3.

4:30 Teacher: "Open your books and write your name.'

"Do you like your names?'

Class: "Yes teacher I like my name." X2

Teacher : "Write your names you say you like your names."

Teacher: "Have you finished?' X2

Pupils write their names and wait for the teacher's instructions.

6: 29 Teacher: 'The date is 09. 06. 97, underline."

"Now jump a line and next to a line write a beautiful square."

"Have you finished a square?"

Class: "Yes teacher."

Pupils copy the date into their books

The pupils are going to write what they have been doing in their books.

10: 27 Teacher: "Jump a box and write a beautiful triangle."

Appendix 6

Teacher 2: Interview

A. Did you enjoy learning Mathematics at school?

Bengingaku enjoyi as much, bengi medium nje. Okondingamzondi umntu oyitishayo but not ukuthi ndingaspecialiser kuyo. Angiyizondi but hayi ukuthi ndingambulala umntu xa engathi ndinga tish' Maths.

I neither liked it nor hated it. I did not hate the person who was teaching it, but I would not specialise in it. If I wasn't given Mathematics to teach at a school I would not necessarily kill a person.

Was it your own choice to teach Grade One?

Adizikhetheli ndifike nje kukhona le post. Asithi wena utisha le class. Wahamba ndiske ndifike mna ndicele lomsebebenzi kuthiwe umntu uhambile. I vacancy esinayo kuthiwe sifuna umntu ongtisha u..... Uhambe wazi ukuthi uzongena endaweni kabani. Hayi awuzikhetheli.

You don't have a choice of a standard you teach. When you come to the school you just occupy the vacancy that is open.

Xa bebengathi uzikhethele ubuzokhetha u Grade One na?

If you were given a choice which Grade would you choose?

Mangifika esikolweni bengingakhetha u Grade One because ndimtrainele, ndikendamtisha. Ndingamtisha x2. Nam ndingazikhethela nje.

I would choose Grade One, I have an experience in teaching Grade One.

Xa bengathi nanka amaclass...

Ndingazikhethela u Grade One. Ayikho into engiyithandayo, okumnandi apha kuyadlalwa. Abantu abangaqumbi noma ubabethile abanandaba nalonto. uthi , uthi ubabone bephinda sebahleka.

In Grade One Pupils do not hold grudges, they are forgiving that is why I like Grade One.

Uya enjoya ukutisha iMathematics ku Grade One?

Do you enjoy teaching Mathematics in Grade One?

Ndiyaku enjoya.

I do.

Is Mathematics important for Grade One?

Ewe.

Yes.

Why?

Into yokuqala kufuneka ukucounter. Okwesibini bazi o plus no minus. I Maths yiyona into esiyisebenzisa all the year round. Noma use shop yi maths, noma usesikolweni yi Maths. noma use taxini yi maths, itshintsh'imali uyabala.

Its important idlula amanye ama subjects. Uyabona ingena kuwo wonke amasubjects.

It is important that pupils should know how to add or subtract. You use Maths all the year round and for purposes of shopping, changing money etc.

Do pupils come to school with mathematical knowledge?

Ewe.

Yes.

Give an illustration of your answer.

Some, some they come, but some angezi ayazi. Mhlambe nazi ichalk ziyi 2, omnye xa ubuza ukuthi zingaphi lezichalk, athi 3. Ubone ukuthi kuyanange age. Kuye ngengqondo nangesiphiwo sakhe apha ngaphakathi ukuthi unjani. Ngoba omnye ubona ukuthi akekho normal kahle for the class. Kukhona iclass okufanelele labantwana babe kulona, iremedial. Enye into ebalulekile angezi emncinci e under age. I Grade One is from 6-7 years. Kufanele uthi zingaphi ezi chalk, ndizele nechalk ayi 1.

Pupils are different some come to knowing how to count they can tell you how many chalks you have. Some people do not have that knowledge because they are under-age. There are

those who need remedial attention.

How do you use the knowledge that people come with to school?

Ku important. Kufanele bazi ngoku ukuthi ndibatishi maths. Mawuvela nje usukeleke omnye akazi nokuthi uthini. Uthi niyabona ke bantwana bam, ngoku sizakwenza izibalo. Asifunzi into enye apha eclassini. Baqonde ukuthi benza maths. Uyazi ukuthi maths into ethetha ngama figures.

Pupils have to know that I am now teaching them mathematics. There are a lot of subject that Grade Ones do, you need to help them to differentiate between them.

Its important ukufumana I knowledge yabo ufumana iknown le ndizazisa mna I unknown. Kufuneka uqale ufumane iknowledge yabo ubabuze buze imibuzwana ukuthi right apha eclasini ekuseni kukhona abantwana abayi 2, kwahamba oyi 1, bangakhi abasalayo.

Its important to find out what pupils know. They come with the known I bring the unknown. You have to ask them questions.

What Mathematical concepts do you teach at the beginning of the year?

Ama objects: stones, ice cream sticks etc.

Why?

Mabefunda ngento ephathekayo bayakhawulezisa uku understander phezu kwe memorisation.

When pupils have object they understand better.

Ubafundisani ngama objects?

What do you teach with those objects?

Maybe sifunda I numbers ukuthi how many? How many tins are there? '2'. How many sticks are there? '5', okanye take 1 stick akwazi, take 2 sticks, akwazi. I numbers kakhulu azi and then makube kuhamba ixesha nayo I addition siyayenza okanye ne subtraction: 2 tins utata wazithatha how many are left?.

Do you have an upper limits in numbers when you teach pupils?

Ewe ikhona inumber ongagqithi kuyo. Uphela ku 9 ngokwe syllabus. Ikhona inumber onga gqithi kuyo at a later stage. Njengoku uyabona yi fourth quarter. Nako ungadlula uthi 10, 11, 12. Kodwa apha kwi Maths simana sithi 2+2; 2+3=. Decomposition up to 9.

The syllabus stipulates that you have do not have to exceed 9, but during the fourth term you can do 11, 12....(The teacher looks uncertain)

Why uphelela ku 9?

Indaba yokuphelela ku 9. Ngathi nje yi standard. Istandard sethu.(unsure)

It is because of our standard.

Uyitisha njani I-addition?

How do you teach addition?

Lets say maybe ndifuna ukutisha u '5', I addition ka '5'. Ndithatha ke ngoku u 1+4=5. Utisha ke ngoku ngama objects kanye nge tins, amapaniki. Uyatsho ke , thatha zibe yi 5. Uno 5 wakhe unento ezininzi bese uthi thatha 2, uphinde ndithathele 3, zingaphi mazidibene? Abale 5. A week utreater lento ka 5. 2+3; 5+0=5.

If I want to teach 5, I take 1 and 4 to make 5. You use objects such as tins and counters. You instruct the pupils to take 5 counters and from that 5 they should take 3 and 2 to make 5. You have to do this the whole week.

How do you handle corrections in your class.

Siyawaphindaphinda kwakhona, sisukume sime around. Mna ngoku ndithathe ama objects ndi demonstrate kuqala. Ndi demonstrate kwathi... X3 (demonstrating for me) masiphindeni. Masenzeni nani ndibone ukuthi niyakwazi. thatha zibe kangaka ubeke x2. Zidibanise zingaphi xa zihlangene, kuphume inani elinga. Maybe nalowo ebengacacelwanga a understander.

We repeat the problems all over again until the pupils understand. We stand and do the problem again. I then tell or instruct pupils exactly what to do.

B. Comment on the following statements

1. Boys in Grade One perform better in mathematics than girls.

Yazi ukuba mem.... (siience). Ok mna ndingathi.... Mna ndiyavuma ukuthi amakhwenkwe a performer bhetele kunamantombazana. Isizathu ukuthi amakhwenkwe abantu okungathi bathanda ukudlala ubukhulu, abekho inside. Bathanda ukuba outside bayadlala nge sticks, everything outside. Bazidlalela bodwa so, lento iyabenza bakhawuleze ukucounter bakwazi, unlike... especially be blacks asinazo nezi toys ezikuthi umtwana aye kwi toy room. Thina abantwana bethu (amntombazana) if uhleli apha endlini uhleli nje. Uzamane ethunywa kuthiwe yiza nalento yiza nalonto x2. Mna ndithi iboys zi pherformer bhetele, why/ bayadlala kakhulu phandle badlala nge objects bona bengaunderstandi ukuthi bakwi Maths. Kanti lonto izabanceda eclassini.

Boys are brought up to be adventurous they play outside the house whereas girls stay inside the house and perform manual jobs. Boys tend to perform better in Mathematics than girls.

2. There are pupils in Grade One who are not meant to do Mathematics.

Ubabone ukuthi abayazi? Mna anditsho! Ukuthi yinyani mna ndike ndiyithathe otherwise, okanye yi slow learner,abafuna ukuqhutywa. Kukhona aba fast abantwana ubone ukuthi lo uslow kufuneka u understander . Mna ndiyithatha ukuthi akanabe akazi yi slow learner. Yabona lomntwana noma emncinci xa umnika i-5cents wazi kakuhle xa umrobhile. Awumnikanga icent kodwa xa uthi makubhalwe ubona ukuthi, hayi.

I disagree with that statement, pupils are different, some pupils are slow learners whereas some are fast. When you cheat a small child especially with money they usually notice.

3. Memorisation rather than understanding is important in Mathematics.

Hayi iwrong imemorisation kune understanding.

Memorisation is wrong.

4. When giving pupils problems to solve I first show them how the problems should be solved and then let them solve similar problems.

Ama problems kuya depender, hay mna manditsho ukuthi ndiyababonisa mandibona ukuthi

bayahiluleka. Ndibabonisa ukuthi kufanele siyenze so! so!so!

It depends,(not certain) I just show the pupils how to solve the problems.

5.When pupils are able to write numbers then they can understand them.

Ama numbers before abhale uthatha iobject athi 1, 2, 3, 4 azi ukuthi 4 uminishani. Kukhona abantwana abakwazi ukubhala u 4 bengazi ukuthi uminishani. Kukhona abanjalo bakhona.

There are pupils who can write 4 without understanding the meaning.

6. Grade One pupils cannot develop their own strategies to solve problems.

Andazi andiboni kusengathi bafuna ukugayidwa.

I have never seen a pupil developing her strategy they always need guidance.

7. Pupils who rely on Mathematics resources are not good in Mathematics.

No. Kufuneka u use iconcrete for I understanding.

Every pupil need concrete material to understand.

Appendix 7

Teacher 3 : Classroom Observation.

Time	Teacher- Pupil discourse	Comments
1:11:42	Teacher: "Masibe sibhala logama, esayilungisa sibala one, zero."	Pupils start counting as a group, then they progress to counting as groups.
	Class: "0, 1, 2, 3, 4. ..."	
1:12:19	Teacher: "Ngathi angivanga makube leya group."	
	Class: "1, 0, ..., 20."	
1:12:36	Teacher: "Very good, very good, masive leya."	Pupils count in their groups and the teacher is
	Group: "0, 1, ..., 20."	walking around their
	Teacher: "Very good, makubale le." 2x	desks.
	Class: "0, 1, ..., 20."	
	Teacher: "Makubale zonke igroups."	All the pupils count
	Class: "0, 1, ..., 20."	simultaneously.
	Teacher: "Very good."	
	Teacher: "Masijonge apho kweliphepha lam?"	The teacher is holding a hard board with
	"Kanene, ngubani lo ? Hands up!"	operations written on it.
	Class: "Plus" (+)	The teacher does not ask
	Teacher: "All of you."	questions, she just looks
	Class: "Plus." 3x	at the pupils and they

	Teacher: "Very good, masivale incwadi."	**know they have to**
	"'Le, yintoni le, Ntombi?"	**answer.**
	Pupil: "Susa!"	**Some pupils are not even**
	Teacher: "All you, again."	**looking at the teacher,**
	Pupils: "Susa." 5x	**they are reading their**
		books and some are
		playing.
1:14:30	Teacher: "Wena!"	**Pupils are identifying the**
	Pupil: "Susa!"	**operations.**
	Teacher: "Le isho ukuthini!"	
	Teacher: 'Siyabonga."	
	Pupil: "Is equal to."	
	Teacher: "All of you!"	
	Pupils: "Is equal to."	
	Teacher: "Again."	
	Pupils: "Is equal to."	
1:14:51	Teacher: "Very good children,	**The teacher writes a sum**
	ndizokubhala ke isibalo sam?"	**on the board.**
	Pupil: "2 + 1 =" (two plus one is equal to)	**Pupils read the problem**
	Teacher: "Masike sifundeni sonke."	**which is written on the**
	Pupils: "Two plus one is equal to."	**board.**
	Teacher: "Sifunda sonke."	
	Pupils: "Two plus one is equal to,"	
	Teacher: "Ndifuna ke la group ike	**The teacher instructs a**
	indenzele esisibalo sibone ukuba ingaba	**specific group to solve the**
	ngubani na. Nale group isenze	**problem.**
	ngamakhulu ethu." 2x.	**Th other pupils are not**
	"Umuntu abe yi one." 3x	**concentrating, they are**

		playing.
1:16:30	Teacher: "Singabhali." 2x "Usenze ngoba senzeka two plus one." "Senzabani? hands up." 2x	The teacher doesn't want pupils to write the problem down, she also does not want them to deviate from the way she has written it on the board.
1:17:13	Pupil 1: "Zenza five." Pupil 2: "Zenza three." Teacher: "All of you." Class: "Zenza three."	The teacher ignores the first pupil's answer because it is wrong and jumps to take the second pupil's answer.
1:17:44	Teacher: "two + one. zingaphi zizonke." 2x Teacher: "Celisiwe." Pupil: "Zenza three." Teacher: "All of you." Pupil: "Senzo three, again." 2x	The teacher does not show any excitement in her lesson and the pupils do not look interested.
	Pause	There was a pause of a few seconds due to some technical problems. After the problem was sorted out we continued.
1:18:52	Teacher: "Make sibaleni sonke, sibhaleebhodini singa longi, phaya, vala incwadi makhe sibaleni zero, one khawulezisani." Pupils: "0, 1, ...20." 2x Again.	The teacher wants the pupils to start with counting again. The teacher has written '2' on the board. When she says "hands up" she is asking

	Teacher: "Very good." "Hands up."	**a question. The pupils seem to understand the question.**
	Pupil: "One." Teacher: "All of you." Class: "That is a not one."	The teacher looked happy with the answer but the pupils are not happy. They disagree with the answer.
1:19:55	Teacher: "Hands up!" Pupil: "Two." Teacher: "All of you." Class: "Two miss."	The teacher senses the dissatisfaction from the pupils and changes her mind.
1:20:28	Teacher: "Ngubani lowaya, hands up, Lerato." Pupil: "One." Teacher: "All of you." Pupils: "One." Teacher: "Sizom'bhala ngokwamagama."	The teacher has completely changed her lesson, instead of continuing with addition, she starts with something new. Pupils have to write the numbers in words.
1:21:04	Teacher: "One." 2x Class: "One." 2x Teacher: "One triangle, All of you." Class: "One triangle." 2x Teacher: "Again. Very good." Class: "One triangle." 2x	The teacher has written '1'and drawn 1 triangle on the board.
1:21:34	Teacher: "Siyadlula, ndiyavala, ndimbhale naye, futhi ngamagama." Teacher and Class: "Two, two and two triangles." Class: "Two, two and two triangles."	She has written 2 and drawn 2 triangles on the board.

	Teacher: "Again."	
	Pupils: "Two, two and two triangles." 2x	
	Teacher: "Very good."	
1:22:25	Teacher: "Ngubani endimbhalayo."	Number 3- three-3
	Class: "Ngu three."	triangles are drawn.
	Teacher: "All of you."	The pupils are not
	Class: "Ngu three."	interested in what the
	Teacher: "Sonke sijonge ebhodini."	teacher is doing.
	"Sifunde, ... Again."	
	Pupils: "Three, three, three triangles." 3x	
1:22:32	Teacher: "Siphinde ke sifunde." (again)	They do number four.
	Class: "Four, four, four triangles." 2x	
	Teacher: "Ubani ke lo endimbhalayo."	
	Class: "Ngu four."	
1:24:03	Teacher: "Sibale."	5 triangle are drawn on
	Pupils: "One, two, three, four, five."	the board. Pupils have to
	Pupils: "Five, five, five triangles."	count them.
	Teacher: "Very good."	
1:24:23	Teacher: "Kanye kanye sithe ngubani lo."	The teacher goes back to
	Class: "Ngu plus."	addition and subtraction.
	Teacher: "Hands up, lo ngubani?"	She has plus and minus
	Class: "Ususa."	written on the board.
	Teacher: "Okanye ngelinye igama sithi ngubani?"	It looks like she is going back to her original
	Class: "Minus."	lesson.
1:24:38	Teacher: 'Hands up, ngubani lo."	The teacher has written
	Class: "Is equal to."	an 'equals to' sign on the
	Teacher: "All of you." (again)	board.
	Class: "Is equal to." 2x	

	Teacher: "Very good."	
1:25:42	Teacher: "Nguko ndifuna nindivulele izincwani zenu . Open your books." Teacher: "Nindenzele ezizibalo nindenzele izinto enizithandayo bhala eziyi two."	**Out of what the teacher has done, the pupils have to develop 2 problems of their own.**

Appendix 8

Teacher 3: Interview

A. Khawutsho e college njengoba ufunda wawuyi enjoy iMaths?

Too much, ndandiyi enjoya kakhulu.

I used to enjoy Maths

Kwakuyi choice yakho ukuthi utitshe u Grade One.

It was my own choice.

Mm

Akukho ichoice, uyaxelelwa nje ukuthi hamba uyotitsha iclass engubani. Mna ke noba bengathi ndiyotish eyiphi iclass ndingahamba ndiyotisha kuyo because ndiyitrainele.

There isn't any choice, you are instructed to teach that particular class. I don't mind teaching any class.

If bengathi khetha iclass oyithandayo kuwo wonke ama class, eyiphi iclass obungayikhetha?

Ndingamkhetha uGrade One (tentative)

I can choose Grade One.

Uyamthanda

Any class eh... ndiyamthanda.

I like teaching any class.

Oh! any class.

Any class kodwa ke ndiyamthanda u Grade One.

Sewuyiphendelile aminye imibuzo asoze ndisakubuza yona.Uya enjoya ukutisha

uGrade One?

Very much.

Iimportant na iMathematics kuGrade One?

It is very very important iMaths ku Grade One.

Ngoba?

Ngoba iba..... iyenza ukuba babe ne memory abantwana. Ngoba siyababalisa nje. nale counting o 1, 2, 3, njalo (x3) and nje ibavulela kuwo wonke ama subjects. bawa understande.

Mathematics enables the pupils to develop memory because we allow them to count. It also opens the pupils' minds

Ivula kanjani ke ngoku.

How does it do that

Ivula ngokuthi yona, apha kukho kuba (2x)... Ingqondo apha iyasebenza nalapha iyavuleleka kwezinye isubjects.

The mind function here more than it does in other subjects.

Ngoku mem abantwana mabeza esikolweni esikolweni ikhona imathematical knowledge abaza nayo.

Do pupils come to school with Mathematics pre knowledge

Ikhona kakhulu.

Yes.

Khawuchaze kemem.

Can you explain further

Abantwana beza benayo kwasemakhaya. aba xa umbuza uthi nibangakhi kokwenu, uyatsho umntwana athi ngiyi-one kuphela. Ngobani abanye abakhona ekhaya bangaphi, uyaphendula ke umntwana bathathu, babini. Umama notata nam sibathathu,siyi three. Uza nje une knowledge.

Pupils will know how many there are in a family. If you ask them they will tell you.

Ngoku leyo knowledge uyisebenzisa kanjani?

How do you use that knowledge

I knowledge yomntwana?

The pupils' knowledge?

Ewe, andithi uthi baza nayo, uyisebenzisa kanjani?

You say pupils come with some pre knowledge, how do you use it ?

Ndiyisebenzisa ngokuthi ndiyababuza.

I ask them questions.

Makesekuxelele

When they have answered you what do you do.

Andixelele kebese ndithatha khonapho ndiyatisha.

I use what they have told me to teach.

Uthisha kanjani

How do you then teach.

Ndithisha nje o plus no minus ngoba uyatsho andithi ndiphiwe ilekere okanye nje zibe yi three okanye zabe two. Omnye umntwana wasekhaya, uyewaphiwa yayi one njalo njalo. Zingaphi ezo.

I teach addition and subtraction. I use example of sweets. (the teacher is experiencing some difficulties)

Yintoni into oyitisha ekuqaleni konyaka.

What concept do you teach at the beginning of the year

Ekuqaleni konyaka, ndithisha....

At the beginning of the year I teach.....

Ewe

Nditisha isigns ndibafundisa isigns ndisebenzise ne apparatus, ezinjenge bottle tops,

ndibathishe nemithetho yendlela.

I teach them signs, I use apparatus such as bottle tops.

Why uqala ngesigns.

Why do you start with signs?

Ndenzela ukuba siza eh...kuzibalo igama lawo.

(incoherent)

Njengoko ku Grade One ikhona inamba okumele baphelele kuyo xa ubatisha?

Do you have an upper limit in numbers when you work with teachers?

Abayibhalayo.

Do you mean when they write.

Eh.

Yes.

Ewe phofu kufanele baphele ku 9. Ukubala kwe counters baphelela kuyo.

They have to stop at 9.

Why ikubhala uphelela ku 9, kodwa ikubala baphelela baphelela ku 20.

Why do they have to stop at 9 when they write and yet they count up to 20.

Intoba kaloku ingqonjane. kuyasuka kuye ku addition.

Its because they have small minds.

Khawundixelele I addition xa uyitisha uyitisha kanjani?

How do you teach addition in your class?

I addition?

Ewe

Ndiza nezi apparatus.

I use apparatus.

Uyitishe kanjani?

How do you teach it?

I addition xa ndiyitisha ndiza ne apparatus ndifike ndizibeke phambi kwabantwana. Ndibabonise kuqala isign engu plus ndibaxelele ngu plus, ufike yongeza, dibanisa ndibaxelele onke lawomagama. Emva koko ndithi kubo masibaleni icounter siphelele ku20. Emva koko ndithathe.....(silence)

When I teach addition I give apparatus to the pupils. I start by showing them an "plus sign" and tell them what it stands for. I then let them count counters up to 20.

Sigcine kuphi mem?

Where were we?

Ku addition. Emva koko ndithi ke ndithi masibaleni babale baphelele ku20. I addition izawuba ngu 3+2 which is equal to 5. Ndithatha I bottle tops eziyi 3 ndizibeke. Sizibale kunye nabo. Sendibhalile ukuthi isibalo sethu ngu 3+2 kodwa u equal to abhalwe abe yedwa . I answer ingabhalwa. Emva koko ndibeke I bottle tops zibe yi 3 ndiphinde ndithathe zibe yi 2 ndizi plüse. Babaleke abantwana zizonke batsho ukuthi zingaphi na? Sibe sesiyabhala lo number I answer. Ndiyazitshintsha tshintsha iinumder kodwa I answer izenza u 5, ibe ngabantwana abangonokwabo abazenzenzelayo. Mhlawumbe 1+4 direct noba yithina abayibeke. Omnye athathe eziyi 4 . zibalwe zonke, kubhalwe sebezenzela ke ngoku I combination of 5.

When dealing with 5, I take 3 and 3 counters and put them in front of the pupils, by that time I have already written the sum on the board. Throughout I use bottle tops. While I am doing this , I encourage the pupils to count. I change the numbers but the sum will remain 5 when pupils have observed what I have done I let them do their own sums but still working with 5.

Niwenza kanjani ama correction eklasini yakho.

How do you deal with corrections in your classroom

Ama corrections ndibakorekisha ngoku bebhalayo, ndiyajikeleza , bayabala bayabhala. Ofumene I wrong ndimenza wrong, Kwenziwe I corrections after. Bazenza bona ebhodini. Kuthi ezinzima ndizenze ebhodini.

I correct them while they are writing. After that they go to the board to do their corrections.

In cases where the problems are difficult, I do correction on the board for them.

Do you use resources in your teaching?

Ewe. Kukhona izinto abazisebenzisayo ama bottle tops. Zezona zinto ezi common

Why do you use them?

Ndinzela ukuthi bayenze I practical ukuze izongena kubo.

I want what they do to penetrate into their minds

B. Comment on the following statements

1. Boys perform better in Mathematics than girls.

Andizuthetha ndingase ndithi bayafana okanye bayagqithwa amakhwenkwe ngamntombazana. Kuyafiwa. Nawo amntombazana awazibeki phansi. Apha ku Grade one kuyabanjwana. Amakhwenkwe namantombazana.

What I can say is that they are the same ....but no, they are not the same. (The teacher is not sure.)

2. There are pupils in Grade One who are not meant to do Mathematics.

Bakhona abntwana abanjalo. Kunjalo nje ukubakho kwam ndifundisa ngalendlela yayi ..... Kuyacaca ukuba kubelula ukukopa. Ukuba yena angabala hayi akakwazi noma sibeka I apparatus. Umana akakwazi akaboniswa.

Yes, I think there are pupils who just can not cope. It doesn't matter how much you help them they just cannot cope.

3. I memorisation ibalulekile na ukogqitha I understanding kwi Mathematics.

Ewe. I important ukuba ivele automatically kanje ngokuba kudala kwakwenziwa I time table njenge 2x1=2; 2x2=4. Lonto umntwana noma ubuthi 2x7 athi 14, izizele nje lento ngokuba uyimemorisile.

I think memorisation is more important. In the olden days pupils used to memorise tables, they became sharp, answers came up automatically.

4. Xa unika abantwana isibalo uqala ubabonise ukuba senziwa kanjani, wandula ubanike isibalo esifana neso ububabonise sona.

Ewe uyabonisa abantwana xa ubatisha ukuthi I problem isolviwa kanjani. Lena ke xa ngabe bayoyisakala ndim lo ndiyababonisa.

Yes you have the show the pupils how to solve problems.

5. Xa umntwana ebhala inamba yinto exela ukuba uyaqonda lonamba na.

Bayayazi I numbers abantwana bangekazibhali. Mabe counter ba counter bengakwazi ukuzibhala. Okwazi ukuzibhala uyazazi.

Pupils know numbers before they can write them, but those for those who can write them, it means they understand them.

6. Can pupils develop their own strategies to solve problems.

Bakhona abantwana abanengqondo. ke bayakwazi uku solver amaproblems Bayazenzela indlela yabo.

There are pupils who are intelligent. they can develop their strategies.

7. Pupils who rely on Mathematics resources are not good in Mathematics.

Pupils who rely on mathematics resources are good. Ndibabona apha eklasini batsho ngawo ama resources. Bagood kwaphaya. Ndibabona bebhalela abanye abantwana. Baba ngompetha. Baba good abo bantwana.

Pupils who use resources become even better.

Appendix 9

Teacher 4: Classroom Observation.

Time	Teacher -Pupil Talk	Comments
33:30	Teacher: "Niphethe ama counters ezandleni zenu, masiwabekeni sibale ngeminwe from 1-10."	The teacher is asking the pupils to use their fingers to count. The pupils should now use counters. All the pupils have 10 counters each.
	"Right akesibaleni ngamacounters ethu."	
33:25	Teacher: "Konje mina ngingubani?" Class: "Uwu Mrs Mzwazwa." Teacher: "Woza la Tisetso. Lona ubani?" Class: "U Tisetso."	She is calling a pupil to come forward.
33:05	Teacher: "Mina ngiyalingana no Tisetso." Class: "No teacher." Teacher: "Ngingakanani mina?" Pupil: "Umkhulu." Teacher: "U Tisetso ungakanani?" Pupil: "Umncane."	The teacher wants the pupils to compare her with Tisetso. It is not clear whether the criteria is age or height, lingana could mean both those two. The terms that the teacher uses are problematic.
32:20	Teacher: "Woza la Skhumbuzo. Ubani lo". Class: "U Skhumbuzo no Tisetso." Teacher: "Ubani ongangitshela ukuthi bayalingana."	The teacher has called two more pupils to use as examples. Silence. It seems the pupils do not know what to say. The only sign they had not talked about

	Pupil: "Bayalingana."	**was the equals to sign.** **A mind reading exercise started.**
31:47	Teacher: "Uthi bayalingana noma ke bangeke balingane ncimishi. Hlalani phansi."	The teacher is using the pupils to illustrate the sign "is equals to'. The problem is that these pupils differ in their height. The teacher can see that . She tells the pupils that they must assume that these pupils are equal.
31:25	Teacher: "Lingakakani?" *What is the size of the ball* Class: "Likhulu?" x2. *Its big*	
	Teacher: "Why nithi likhulu? x3 Nonhlanhla. Yini lithi likhulu? Nelly!" *Why do you say the ball is big*	The teacher is asking for the reason why they say the ball is big.
	Pupil: "Ngoba ubambe nge zandla eziyi 2". *Because you are holding it with two hands* Teacher: "Good."	There is silence. The reason the pupils give is that 'the ball is big because the teacher is holding it with two hands.
31:12	Teacher: "Linjani, yini lokhu." Pupil: "Yibholo." Teacher: "Lingakanani?" *What is the size of the ball* Class: "Lincane." *Its small*	The teacher is showing the pupils a small ball.

	Teacher: "Why?"	
	Pupil: "Umbamba nge sandla esiyi one."	
	"Lingakanani lele."	She is showing the pupils both balls.
	Class: "Likhulu."	
	Teacher: "Leli."	At this time the teacher is holding the big ball with one hand.(The big ball fit into the reason given for the small ball.)
	Pupil: "Lincane."	
30:27	Teacher: "Kunophawo esilisebenzisayo masifunda izibalo masibonisa izto enkulu nencane. Linganisa ngathi u phethe I bhola. elikhulu nelincane . Kwizibalo sinophawu esilisebenzisa masibonisa into enkulu nencane. Lophawo lusho ukuthi…… Konje masifunda siqala ukufunda ngokwesiphi isandla?"	The teacher has "smaller than"; "bigger than"; and "equals to" card board signs.
	"Siqala ka left siye ka right" x2	
28:29	Teacher: "Nasesibalweni siqala ngakuphi?"	She emphasises the importance of the correct reading and writing direction. They should always start reading from left to right.
	Class: "Ka right."	
	Teacher: "La akukho e China x2 la baqala eright ubani le sondla engisiphakamisile u right lesi. Masiphinde, siqala kuphi nakwizibalo. siqala ka right siye ka left. Loluphawu lusho ukuthi kuncane kuna… mawubheka lusho kuthini? Kuncane kuna, kucifile."	

25:40	Teacher: "Lolu luthi kuncani ku no..... Lolu silufunda kanjani. Lolu luthini?" Sbusiso.	**The teacher talks about the meaning of the signs.** silence
	Pupil: "Kuncane kuno..."	
	Teacher: "Uqinisile?"	
	Class: "No."	
	Teacher: "Bayaphika Sbusiso."	
	Pupil: "Kukhulu ku no.."	
	Teacher: "U Tisetso no Noxolo sitineni?"	She is using the 'equals to' sign.
	Class: "Bayalingana."	
	Teacher: "Ezibalweni sinalo uphawu elusho nkuthi bayalingana."	
24:00	Teacher: "Xola awusifundele lophawu oluphezu."	The teacher wants the pupils to read the sign from the board.
	"Ubani ozosefundele oluphakathi."	
	"Peggy!"	
	"Ubani ozosifundela olusekugcineni. Sbongile!"	
	Pupil: "Kuyalinga."	
	Teacher: "Nge group yakho sebenzisa thatha ama counters akho. E groupini siyasizana ngifuna ukunibona nisizana."	It is the end of the first part. The pupils have to work in their groups. The teacher encourages pupils to help each other.
	Pupils are busy working with their counters. Even though sitting in groups, the pupils are working as individuals.	Pupils are working while the teacher is talking to them. Some pupils are talking to each other, discussing what they have been doing.

16:50	Teacher: "Very good, very good Bala 1, 2, …. Ncedisani phela ncedisani. Nibasize nabanye. Ubani?" "Kodwa bekumele ukuthi kuyalingana angithi?"	**The teacher is walking around the classroom and looking at what the different groups are doing and facilitating individual pupils. She is encouraging the members of the group to help each other. The pupils are not working in groups, they are working as individuals.**
	"Right, ake asibalele lona. Uqinisile? Ya. Kunjani lokhu. kunjani?"	
15:23	Teacher: "Wokuphi okuyi 5 Dimakatso, niyakh[illegible]pho?" "Qhubekani Puri[illegible]anifuni uku drawer?" "Awuthi ngibone." "Thathake nansi uphawu." "Okay!"	The teacher while facilitating is asking individual pupils questions. She is walking around their tables.
13:23	Teacher: "Qoqa, qoqa into ama counters uwabeke la. Nawe uqt[illegible]e okwalapho." "Thola amagama" "Aphi amaphepha nephandle!" Pupil: "Aphelile." Teacher: "Awesekho amanye? Qoqa. Right, kuleliphepha engikunika lona , ngifuna ungindwebele izinto eziyi three ne!"	This is the start of the third part of the lesson, the pupils are going to write down what they have been doing. Its important to note that even though the pupils do not talk, in actual fact they are busy working.
	Teacher: "Okuyi one okulinganayo, okuyi one okukhulu kunokunye, okuyi one okuncani kunokunye ne." Noma ngabe kuningi, Noma ngabe	**The teacher wants pupils to make drawings illustrating smaller than objects, bigger than objects and lastly objects**

	kuyi one more kungalingani siyezwana?"	**that are equal.**
	Class: "Yes."	
	Teacher: "Phendula wena."	**This means 'are you listening'?**
10:48	Teacher: "Mase ukhohliwe ubuze abanye bakusize siyezwana."	Pupils are starting to draw pictures in their books. The teacher insists that the pupils should be able to read what they have written.
	"Ngizophinda ngizibeke lezimpawu uzungakhohlwa."	
	"Dweba phela ngifuna ungifundele."	
	"Ngifuna ubhale noma yini ozokwazi uungifundela yona siyezwana."	
09:00	Teacher: "Oqedile aka phakamise isandla isandla."	Those who have finished should indicate with the show of hands. The teacher is looking at the pupils' work and making comments. The pupils are busy working.
	"Why ungasho ukuthi uqedile?"	
	"Uqinisile makebhale ama apula ayi ten bese abhale uphawu lolu, olukhulu noma oluncane, nolulinganayo. Kusho ukuthi uqinisile? Very good."	
06:29	Teacher: "Lolu right loluphawu alubhalile. Lalelani nina."	The teacher wants other members of the group to confirm whether the pupil's answer is correct. The teacher insists that the other pupils should listen when a pupil is talking.
	Group: (Nodding yes)	
	Teacher: "Ya."	
	Teacher: "Funda Sizwe. Lusho ukuthini loluphawu olubhalile lana. Lisho ukuthi	**The teacher wants the pupil to explain what he has written.**

ama apula akho anjani?"

Pupil: "Ayalingana."

Teacher: "Uqinisile u Nelly Uqinisile. makethi ayalingana? Right."

05:45 Teacher: "U..... Okwakho kuncane." To another pupil. The teacher is commenting about the size of the pupil's drawing.

"Futhi Sibusiso kukhulu, ubhale uphawu olu right he? Ukuthi nje udweba kancane, kuthi kukhulu loku, khona loku. Uqinisile, kodwa kuncane okubhalile."

Appendix 10

Teacher 4: Interview.

Did you enjoy learning Mathematics at the college.

Eh... ukukhuluma iqiniso. I never enjoyed it. I don't know mhlawumbe bekuyilecturer. Ka course One no course Two siyesathola i lecturer yebhulu u Davel. So at least uyewasifihisa at ease ngaqala ngabona ukuthi I can do it.

I suspect it was my course one lecturer who made me not to ejoy maths. We had a good lecturer in course two who made things easier for me.

So uthe ekuqaleni bekuyi lecturer so u blamer i lecturer or your past teachers.

I don't think esikolweni bekuyiproblem because ngesikhathi setha besi groupana kuthiwe umuntu makenza i home economics enze i functional Maths. So ka standard 8 yilapho ngayigcina khona i Maths and bengenza i functional maths. So if nakanjani eklasini le home economics ubungeke ukiyenze i maths. So ngithe mangihlangan nayo e-college.

Maths was not a problem at school, during our time we went into different streams. I did Maths up to standard 8.

Kwaba umzukuzuku.

Kwaba umzukuzuku.

It was difficult

Was it your own choice to teach Grade One.

No, it wasn't. x2 Usho manje, this year no it wasn't

So can you tell me why?

94 no 96 nga tisho u Grade One and then 95 ngatisha u Grade Two. Kusho ukuthi I was told ukuthi u tisha u remainer in a standard at least for three years. So mangitisha kusho ukuthi I had one year ku Grade 1 ne one year to ku Grade Two so bafuna ukungi tshintsha bathi ngizohlala ku Grade 2 for at least three years so ngithole ukuthi ukushintsha noma ngifune

ukuhlala some more years ka Grade 2. So mina bengisafuna ukuthola i experience ku Grade 2 base bengishintsha u principal, but anginankinga.

If you had your own way you would be teaching u Grade Two?

Ja

Now that you are teaching Mathematics, do you enjoy teaching it?

Ja

Why do you enjoy it?

Kusho ukuthi ayina lamaproblem anzima and zonke izinto sizenza practically. Sometimes kuba playfulbut ngazi ukuthi bayafunda.

Grade One doesn't have difficult problem, problems are done practically.

Kwa Grade 4

I more serious, wenza isum yonke nama steps, unlike u Grade One. Ngathi ama problems a starter after second term. Ama operations yiyo iproblem enzima.

In Grade 4 you have to perform steps.

Is Mathematics important for Grade One

Yes. Abantwana if bazi inumber bazokwazi ukuthi izitulo ziyazi ukuthi siyi..... Nasemakhaya mabebathuma nasekhaya uzokwazi ukuthi mabekhuluma ukuthi uthenge ibhodlela eli 1.

If pupils know how to count he shall know how to perform house chores.

Is it important to find out what pupils know before you teach them?

Yes

Why?

Though bazi u 2 i number concept. Mawungababuza ukuthi unawo amehlo ayingaki, ayi 2. So angazi noma yi background ye pre-school, but kwa Grade One abantwana bayakwazi ukubala up to 5. Though mhlawumbe kuba ne problem yokuthi akakwazi ukubhala. Ukuthi kuqalaphi ukubala ngama fingers akhe, but bayakwazi.

Pupils know the number 2 even if they do not know how to write it.

What mathematical concepts do you teach at the beginning of the year.

Siqala nge reading programs i pre maths of which senza kakhulu i shapes, colours, quantity, long/ short, okugcwele nokuncane.

Why?

Ukuthi babe ne awareness i size ukuthi izinto azilingani. Senza ishapes and colours ukuthi azi ukuthi lets say: Masenza i square kufanele ukuthi even if amaside made kwenye awalingani kukhona nama corner ne shape.

Do you have an upper limit in numbers when you teach pupils?

I syllabus ithi senza 1-5 from January to March, 1-10 till November.

Do you stick to that limit?

No, I don't stick to the limit because abantwana bayabala up to 10 though kune problem yokubhala inumber bayaphambanisa but bayazi ukubala they can count up to to 50 abanye even 100.

Can you outline how you teach addition to Grade Ones.

Sidlala isitolo. Mawuthenga uthenga, u adder lokhu onakho or uthola lokhu ongenako. So esikhathini esiningi sithengisa amaswidi omunye abe yi shop keeper. Ubunayingaki, uthenge ayingake? Senza amacounters, wonke umuntu uyazenzela. After sesibekile ezi 3 ubeka uphawu ubeke 3 sihlanganise (laughing).

We role play a shop keeper scene. When a child buys something she knows that she is adding.

Explain how you handle corrections in your class?

Abantwana ababambi ngokufana, kuba khona i group esalayo 2 or 3. Labo sihlala nabo phansi e capertini siqalele phansi sibale. Ngiye ngishintshe ama methods. Mngikhulurna ngo + or - senza kanjani. Do you use resources in your classroom. Abakhohlwa abantwana if

benza. Abantwana baba ne interest kuma blocks ngoba e colourful. Sometimes bayadlala babuilder. If kukhona izinto abazithandayo, abazisebenzisayo abakhohlwa.

Comment on the following statements

1. Girls perform better than boys.

If ungabheka kahle amantombazana a maturer faster than boys. Amantombazana yes la avoluntarayo.

2. There are pupils in grade One who are not meant to do Mathematics.

Kuya ngomntwana, aba developi ngokufana esiyi one. Makufike isikhathi bayo super. Umntwana o normal ngeke ahlulwe yi Maths ka Grade One.

Pupils develop at different rates. A normal child is able to do grade One Mathematics.

3. When giving pupils problems to solve I first show them how to solve them.

Sometimes ngiyaye ngibakhombise. kodwa awumliniti umntwana ukuthi. this is the only method yokusolver. Sometimes uke uthole akho method, avela umntwana uze usho ukuthi uyenza kanjani.

I sometimes show them, but you don't limit children by prescribing methods. Sometimes pupils can come with innovative methods.

4. When pupils are able to write numbers then they can understand them.

I don't think abantwana bangabhala into abangayazi.

I don't think pupils can write what they don't understand.

5. Grade One pupils cannot develop their own strategies to solve problems

Abantwana can develop their strategies.

6. Pupils who rely on Mathematics resources are not good in Mathematics

No.

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