Explored Vygotsky's concept of mediation in a biliteracy project in the foundation phase of a township school.

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By

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Declaration

I, Nompumelelo Grace Frans, hereby declare that the work in this thesis is my own idea and where ideas from other writers were used, they were acknowledged in full using references according to the Rhodes University Education Guide to References. I further declare that the work in this thesis has not been submitted at any other university for degree purposes.

Signature

Date: 27/11/2019

Abstract

The research reported on in this thesis explored teacher mediation when a biliteracy approach through task-based teaching and learning is used in a Foundation Phase classroom in a township school in the Eastern Cape. It is an action research aimed at understanding and systematically investigating how and what it means to work with bilingual mediation to ensure cognition, with emphasis on task design, facilitation for cognition, mediation forms and language use.

This thesis was motivated by three issues that are still not being adequately addressed: the low level of cognitive work in South African schools, the failure to use the home languages of children throughout schooling as a medium of instruction and assessment (while providing excellent access to English as subject), and a top-down approach to both policy development and teacher professionalisation.

These three issues drove me to explore theories that can help address them, and that is how I came to rely mostly on mediation, biliteracy and a task-based approach to teaching.

For this research, on data handling I prepared and taught six lessons, but only three of the six lessons were recorded, transcribed and analysed for empirical data. I chose data handling, as in my previous experience I found it to include all the mathematical problem-solving skills which involve addition subtraction, analysing and comparing information. It also offered opportunities for language use, and meaningful interactive co-construction and acquiring of knowledge in the process of teaching and learning. This turned into a form of theory-driven action research, which was also developmental. I was critically reflective on my practices, and my facilitation for cognition and how I use language to make cognition possible. I also looked at the types of activities that I gave learners to help reach maximum development.

The data collected from the classroom interactions, shows how I, in some instances, would take decisions, implement them and then find them not to be effective. It also shows some of the challenges I came across, from myself and the learners. Learners challenges were, unfamiliarity with the systematic build-up of data handling, filling in tables, transferring information from one form into a different form, and constructing and analysing bar graphs. This was part of pedagogy

not the policy, which indicated inadequate teacher development. This could be because data handling is allocated minimal weighting from the CAPS document, and teachers do not go as in depth as they need to in dealing with data handling.

My challenge was to prepare the grade 3 class for more data handling encounters in the higher grades. I had to ensure they grasped data handling concepts in their mother tongue before the switch to English as LoLT, as prescribed by policy. Learners proved to have little or no knowledge with regards to data handling concepts, which meant I had to start from the basics, as I had nothing to build on, and then progress to grade 3 level in one year.

This study suggests that for any concept that has to be taught, cognition must be a priority, and strategies on how to facilitate that needs to be well thought out. Teachers need to be aware of theories that can positively impact on their practices. Teacher development is key to improvement of education, especially in the Eastern Cape. That cannot be done in isolation, but in partnership with relevant stakeholders.

Key words: *Mediation, task-based teaching, reasoning gap activities, zone of proximal development, data handling, information gap activities, theory-driven action research, biliteracy*

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Dedication

I dedicate this dissertation to my daughter, who despite going through a tough time was patient and supported me through the process of my studies. Without your reassurance that everything was okay, even though it was tough, motivated me to keep going.

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List of Acronyms

CAPS:	Curriculum Assessment Policy Statements
DBE:	Department of Basic Education
EC:	Everyday Concepts
FAL:	First additional Language
HL:	Home Language
LOLT:	Language of Learning and Teaching
MoI:	Medium of Instruction
MTBBE:	Mother Tongue Based Bilingual Education
NPRS:	National Poverty Ranking of Schools
OBE:	Outcomes Based Education
RASA:	Reading Association of Southern Africa
RNCS:	Revised National Curriculum Statements
SC:	Scientific Concepts
SGB:	School Governing Body
SNP:	School Nutrition Programme
TD:	Teacher Development
T/L:	Thought and Language
ZPD:	Zone of Proximal Development

CHAPTER ONE: INTRODUCTION

1.1 Introduction and background to the study

The research reported in this thesis sought to explore teacher mediation using a biliteracy approach in task-based teaching and learning curriculum in a Foundation Phase classroom in a township school in the Eastern Cape.

This study is located within the larger landscape of the crisis of schooling in South Africa, especially in the rural and township schools. The crisis has to do with the failure of South African children to reach grade-appropriate benchmarks in literacy, numeracy and science. This educational crisis has been much written about and I will not therefore repeat the issues that have been raised in the literature. It is well-known that despite many training initiatives by government, and many curriculum revisions since the onset of democracy, little has changed in rural and township schools. If anything, the situation has deteriorated (Ntuli & Pretorius, 2005; Fleisch 2008; Metcalfe, 2008; Ramphele, 2012; Taylor, van den Berg, & Mabogoane, 2013; Roodt, 2018). Many different and complex reasons have been put forward to explain South Africa's ailing schooling system. The legacy of apartheid, the poor infrastructure of schools, lack of resources, poorly- trained teachers, the absence of a culture of reading at home, and poor administration and management of schools have all been put forward as possible causes.

1.2 The historical context of this research

Historically, as is well-known, starting from 1652, with the first occupation of South Africa by the Dutch and through the successive periods of British colonialism and the establishment of the Republic of South Africa and the Apartheid regime, the diversity of South Africa's languages and cultures was not recognised. When the Afrikaners came to power, the Afrikaans language was developed to become a language of education and scholarship, to the exclusion of the indigenous languages of South Africa. Afrikaans-medium schools and universities were set up. Afrikaans flourished to the detriment of the local languages. It was only in 1994, with the end of Apartheid

and the onset of democracy, that constitutional provisions were made for the official recognition and development of South Africa's indigenous languages.

However, the political and socioeconomic realities of Apartheid continue to impact on South African schools, especially in the township and rural areas. In these places, many schools are badly resourced, teachers are poorly trained and failure rates are high. Many schools are dysfunctional, with severe social problems, such as teacher negligence and absenteeism. Government feeding schemes are poorly managed and there is lack of administrative accountability, drunkenness among staff and even sexual violence against learners.

Also as is well known, the history of Apartheid and post-Apartheid South Africa shows the continuation of policies driven from above. Fundamental pedagogics, Outcomes Based Education (OBE), Revised National Curriculum Statement (RNCS), and the current Curriculum and Assessment Policy Statement (CAPS) are all initiatives developed by experts. There has been little or no input from teachers. This seems to be the case even with the latest Framework for the Teaching of Reading in African Languages in the Foundation Phase, which came out only in July 2019. While policies and textbooks are necessary, they are ineffective if not coupled with effective teacher development initiatives. These initiatives need to be sensitive to teachers' contexts and constraints. Also, if teachers' own beliefs about teaching and learning are not surfaced, all teacher training initiatives are likely to fail. If teachers own beliefs are not either strengthened or revised, teachers are often likely to revert to familiar and entrenched practices. This may be why teachers are unable to implement change, at the end of a development workshop or programme of training.

In addition to ineffective training programmes, the largely monolingual approach to schooling is a serious deterrent to teaching and learning. Educational policy advocates the use of the mother tongue/home language in the first three years of schooling. However, many township and rural schools are prematurely shifting to English. The home languages of learners do not have the chance to develop as academic languages. At the same time, the English competence of learners is not developed adequately. Consequently, in grade 4, when the transition to English as medium of instruction and assessment takes place, learners cannot use English as an academic language for thinking, reading and writing. Teachers tend to continue with the MT instruction, as learners

cannot understand when English is the LoLT, and assessment is done in English. This approach does not solve the problem, but creates confusion, as learner's English competency is still inadequate.

Thus, while there has been powerful advocacy for bilingual and multilingual education as being the best context for the cognitive development of learners whose mother tongue is not a colonial/global language such as English (Cummins, 1996; Heugh, 2003, 2010; Alexander, 2005), in reality, learners continue to struggle with English. They also do not develop an adequate competence in their own language. Research shows that learners who develop a strong academic foundation in their mother tongue are able to deploy it in the acquisition of knowledge. They also then have the best chance of developing high levels of fluency and academic literacy in an additional language. But sadly, this is not the case in South African schools.

As was observed in our paper (Joseph, Frans, & Ramani, 2017, p. 194),

> While thousands of pre-service and in-service teachers upgrade their qualifications year after year, little is changing in many schools. In reality, Higher Education's efforts to increase the number of qualified teachers have had little or no impact on rural and township schools. One-off training workshops, though well-intentioned, still leave these learners at low levels of cognition and literacy, and locked into their everyday knowledges.

University academics do not have much contact with teachers and are often cut off from classrooms. Often due to their own preoccupations with lecturing and research, they are hardly ever able to follow up on their certificated teachers.

The failure of top-down training provokes us to point to the distinction between *teacher training* and *teacher development* models of professionalisation (Barnes, 1975; Allwright, 1983; Stern, 1983; Ramani, 1987; Gains, 2010). Teacher training tends to be top-down and is often a lock-step transmission of policy statements and pedagogic procedures (as in the current highly scripted CAPS directives which offer minute-by-minute guidelines). "Models of teacher development, on the other hand, perceive teachers as being autonomous professionals capable of integrating their own beliefs about teaching and learning with pedagogic practices and of engaging with policy in empowering ways" (Joseph et al., 2017, p. 194).

In this thesis, I will be focusing on three issues that have still not been adequately addressed: the low level of cognitive work in South African schools; the failure to use the home languages of children throughout schooling as a medium of instruction and assessment (while providing excellent access to English as subject); and a top-down approach to both policy development and teacher professionalisation.

1.3 My professional autobiography

Moving on now to my own professional autobiography, I am a full-time Foundation Phase teacher in a quintile 3 township school in Joza, on the outskirts of Grahamstown (now called Makhanda). As laid down by policy, the medium of instruction (MoI) or Language of Learning and Teaching and (LoLT) in the primary grades is the home language of the learners. In the Eastern Cape this is isiXhosa. The learners are being primed for grade 4, where the MoI shifts from the mother tongue to English. In grades 1 to 3, all subjects, namely, Numeracy, Life Skills and their Home Language (HL) are taught in isiXhosa. English is used only in the First Additional Language (FAL) lessons. The mother tongue in this context is therefore a bridge to English-medium instruction and assessment. There is much expectation that the learners will develop enough competence in their FAL, English, to be able to use it for learning and assessment from grade 4 onwards. In reality however, this is not the case.

My teaching experience spans across the entire school spectrum, namely, senior, intermediate and foundation phases of the current South African system as implemented by the Department of Basic Education (DBE). While following the Curriculum Assessment and Policy Statement (CAPS) syllabus set out by the DBE, I have had to modify it and change some of the materials in response to my learners' needs. This thesis will demonstrate some of the ways in which I have had to develop my own curriculum, while adhering to the overall specifications of CAPS.

After teaching at the intermediate and senior phases for over 23 years, I decided in 2014 to move to grade 3, as I discovered that my learners were unable to perform at the requisite academic level in their school subjects in the higher grades. I realised that there were severe gaps in their knowledge and competence and that they require effective interventions at earlier stages of

schooling. In 2015, I decided to move further down from grade 3 to grade 1 and to work with the same group of learners as they progressed through the system.

1.4 The Biliteracy Project

In 2014, I began a joint Community Engagement project with Professors Esther Ramani and Michael Joseph from Rhodes University. We collectively named it 'The Biliteracy Project'. This project is still ongoing and has played a big part in the research reported in this thesis. A fuller description of the Biliteracy Project will be provided later in this chapter. A poster on the project is presented in (Appendix H). Then in 2017, I decided to do my MA degree under Professors Ramani and Joseph, and so from being co-partners in the Biliteracy Project, they became my research supervisors together with Prof Kaschula.

I now give a brief account of my professional journey that will help to clarify how I arrived at the subject of this thesis, and my interest in investigating Vygotsky's concept of mediation in the ZPD. I break up my journey into three parts: my perceived role as a teacher before the Biliteracy Project, the Biliteracy Project, and insights from the Biliteracy Project which enabled me to embark on the present thesis.

1.4.1 The pre-Biliteracy Project phase

My shift from high school and middle school to primary school was motivated by my witnessing at first hand the poor performance of students in the higher grades. I have been formally trained as a primary school educator, as well as a senior phase and intermediate phase teacher, so I felt confident that I could teach the primary graders as well.

My shift was based on certain convictions I had, which I was fortunate to be allowed to implement in my school. The first of these was my belief that I wanted to understand the learners and the learning process as they developed from grade 1 up to 3. I also wanted to teach these learners continuously, that is over a sustained period of three years, so, I moved up, or in other words 'promoted' myself up with the same batch of learners. I thus taught them in grade 1 (in 2015), in grade 2 (in 2016), and in grade 3 (in 2017). These three years of teaching – called 'rotating' in our

school, and 'looping' in the professional literature – proved invaluable to me as a teacher as I could do a lot of 'integration' work: such as following the CAPS policy of integrating the content of subjects as much as possible; and of integrating languages: English and isiXhosa, and also designing materials, and mediating them. I also built very good relationships with my learners whom I respect, calling them 'little people' rather than 'kids'. I am a strict teacher, but I also believe I am kind and interested in challenging my learners. The children in turn respect me, and those who have moved on to grades 4, 5 and 6, return to be in my class during break-times.

Yet, I realised during the few years before the start of the Biliteracy Project, that I also had certain pedagogic beliefs about which I was passionate. These were: i) bilingual exposure to texts in isiXhosa and English; ii) a rejection of the phonics-based approach of CAPS in favour of more text-based, meaningful approaches to learning both the mother tongue and English; and iii) avoiding spoon-feeding the learners through repetition and other thoughtless ways of teaching in favour of making learners think, and getting them to make an effort to find meaning in texts and iv) training primary school learners to use the computer lab to type their own texts. When the Biliteracy Project began, I was already implementing these ideas in my practice.

1.4.2 The Biliteracy Project phase

The aims and experiences of the Biliteracy Project have been presented at three conferences and have also been published (Joseph et al., 2017, p. 194-207). Because of the Biliteracy Project, I presented at the Reading Association of Southern Africa's (RASA) annual conference in 2014 for the first time, and also became a co-author. I will highlight key aspects of this Project.

1.4.3 Equal partnership

The two university partners wanted an opportunity to link their theories with teaching practices of their own in my class. I, on the other hand, had a great desire to acquire educational theory through them to help me discern what was effective and what could be improved in my own teaching. During the biliteracy project, one of the partners regularly taught my class to understand how specialist theories looked like in practice, with the same learners, resources and under the same constraints. My discontent with universities had reached a high point of frustration because of the

abstract and irrelevant way in which they imparted theory to pre- and in-service teacher trainees. The Biliteracy Project, while focused on biliteracy as the curriculum, therefore also explored a model of teacher development (TD) where 'specialists' from the university and practising teachers in schools could learn from each other. This approach to TD resonated very well with the goals of the Community Engagement Office at Rhodes, and the Director (Di Hornby). She promotes an asset-based approach to community development. She believes in a model of sharing resources between university and community members (including schoolteachers), as equal partners in co-managing their projects.

1.4.4 Focus on bilingual education

In addition to my former practice (which continues till today) of translating texts from English into isiXhosa (and sometimes from isiXhosa to English), I concentrated on getting learners to think through their language, while being exposed to texts in both languages. I was keenly aware that a traumatic shift to English as MoI awaited them in grade 4. Consequently, from very early on, I tried to introduce English literacy learning (and not just oral work in English, which is the practice, especially in grade 1). I also found that getting the learners to use the computer (I taught computer literacy to them), encouraged them to write in both isiXhosa and English. They solved Numeracy problems on the computer and also created their own little stories which they were happy to type. Keyboard work released them from the painstaking task of writing by hand (which they still had to do) which they really enjoyed. In other words, using the computer facilitated a bilingual approach to learning.

1.4.5 Shift from oracy to literacy activities

My observation of what teachers tend to do in the name of the mother-tongue medium of education, compelled me to rethink my own approach. In the early years of schooling, teachers tend to do more oracy-based teaching with learners, such as singing, chanting activities and rote learning. When it comes to reading, they prefer to get learners to repeat sounds, letters and words after them. Learners' writing is limited to copying pieces of writing that the teacher does on the board. Learners are expected to read aloud and are not checked for meaning-making or comprehension

of what they read. Dictation is usually of single words, unrelated to the texts they are supposed to read. Literacy is usually phonics practice or 'back to the basics'. I used a teaching approach that connected the learners' oracy with their literacy, with a focus on understanding the meaning of texts. My unit of teaching was the sentence or the text. I sometimes also taught phonics because the CAPS materials insisted on it, and it was necessary for the exams.

1.4.6 Re-designing CAPS materials

In using CAPS workbooks, I discovered that CAPS materials were very uneven in the questions they asked, providing a mix of low-level and high-level challenge, without guidance on how to mediate the more difficult questions. As a result, teachers normally avoid these higher-level questions, or give the answers themselves before the learners attempt them. This practice has been referred to as 'safe talk' and is aimed at saving face for both teachers and learners (Hornberger & Chick, 2001). I therefore became more discerning about how to use CAPS materials, often re-designing the content, or transferring high-level concepts (such as data- handling) from the English FAL CAPS materials to the isiXhosa Numeracy class. This kind of transfer across the languages is usually not discussed in the one-off CAPS training workshops given to teachers from time to time.

I therefore focused either on choosing the cognitively-challenging questions from CAPS, or introducing them whenever they were absent. In other words, I was using an approach to CAPS that in ex-model C schools is colloquially termed 'CAPS PLUS'. Teachers in these schools can safely say they are following CAPS but also going beyond CAPS. I was also (forced to) follow CAPS for the learners' exams, and my own revised version of CAPS in my teaching. I will say more about this in Chapter Four when I discuss how I designed the unit on data-handling that I taught to the students.

These efforts were all within a professional model of teacher development. My partners in the Biliteracy Project and I observed each other's teaching practice of my class, held discussions, video recorded the classes and analysed these videotapes. The research focused on two aspects: task-based teaching which I was learning about from the Biliteracy Project, based on the work of

Prabhu (1987) in India. I continued the 'rotation' practice or 'looping' as it is called. I continued the reading of stories, but I taught them as advocated by the CAPS materials, that is using comprehension checks. I also used Big Books, and was influenced by PRAESA materials from Nal' ibali (see Bloch, 2014). In a way, task-based teaching was equated to the goal of 'reading to learn' (content) and the reading of books was related to 'learning to read'. I later challenged this concept of 'learning to read' in my own thinking and opted for experiments in dramatic story telling and story enactment in 2017, when I started my MA research.

Side-by-side with my mainstream teaching, I encouraged children to use their break time to engage in leisure reading in a reading corner that I had set up, where they had access to many books in isiXhosa and English, factual and fictive, which they were free to choose. Learners also had access to the blackboard, which they now freely use as a result of the task-based teaching, in which they were required to come up to the chalkboard to work out solutions to tasks. Learners read in groups, or pairs or by themselves. Sometimes they used pretend play in isiXhosa where one learner choses to be the teacher and others sat on the carpet and were being taught reading from their chosen book. Learners would produce their own problems and get others to solve them – a form of peer learning. These activities resembled the 'tasks' I was using in the mainstream Numeracy teaching. It seemed plausible to think that these activities and the pretend play were modelled after my own teaching; but the reading activities of the learners were entirely their own. (See Appendix I).

The Biliteracy Project team called these break-time activities 'voluntary activities' as they were spontaneously chosen by the children, with me as the teacher not directing them in any way. It was interesting that out of a class of roughly 35, about a third to half the children remained in the class during the breaks, though they were free to go out and play.

Also interesting, and very satisfying for me was the return of some of the students in 2017 (who had now moved to grade 4) to my class during the breaks to play, read, and interact with my current cohort. They complained that they were not doing such stimulating activities in their class. I had a very distinct feeling that there was a dumbing down of their education in grade 4. This could of course be due to the switch in medium to English, but also because they did not have access to the

chalkboard and to a reading corner. These children, now in grade 6, seemed to love the freedom, as well as challenge provided in my class.

1.4.7 Insights from the Biliteracy Project

My two-year experience in the Biliteracy Project convinced me to do more formal research based on more systematic teaching, so I enrolled for an MA by research (full thesis). I was also a full-time teacher in my school. This had the obvious difficulty of time required for a university MA degree. The Biliteracy Project provided me sustenance, as well as spurring my own determination to get a working curriculum for primary schools that is an alternative to the current traditional one.

I continued to learn more about how to design tasks, teach them, and observe how learners coped with them from my partners in the Biliteracy Project, based on the ideas of Prabhu (1987). But I also now focused more on using tasks for mother tongue literacy and cognitive development of the learners based on the ideas of Cummins (1996). I had to leave out the task-based teaching of English as a First Additional Language in favour of what Alexander (2005) calls Mother-tongue Based Bilingual Education (MTBBE). By this he meant developing a strong foundation for learning all school subjects in the home languages of the children

I also found a suitable level of content in Numeracy to which to apply the task-based teaching: Data handling. An understanding of tables and bar graphs is required by CAPS for primary school (see Chapter Three for a fuller discussion of the CAPS curriculum). The scholar who inspired me here was Vygotsky (1978).

1.5 The research question

In the light of my thinking as spelt out above and my concern to ensure that I was effectively mediating tasks in the logico-scientific mode, I worked on a research question that would adequately capture my interests. Finally, I arrived at the following question.

How does a teacher mediate learners' cognitive effort create the Zone of Proximal Development for the logico-scientific mode of cognition in a bilingual approach to education in the Foundation Phase in a township school?

1.6 Organisation of this thesis

In this section I briefly present the way in which this dissertation is organised. The focus of each chapter will be highlighted, as well as a very brief overview of the content of each chapter. The key aspects of each chapter will also be explained.

Chapter One introduced the research question by providing the background to the research and its historical context. By focusing on the Biliteracy Project (the pilot project) which was a precursor to the current research, this chapter highlighted the pedagogic issues that emerged during the Biliteracy Project and the lessons I learned from that project. I also spelled out the work of the scholars who inspired me and whose ideas I found relevant to my research.

Chapter Two provides the theoretical underpinnings for this study and a literature review of the work of scholars central to this research. These scholars are Vygotsky, Bruner, Prabhu and Cummins. Some of the key concepts that they have articulated are defined and their relevance to this study is discussed. In particular, the way in which the key concepts helped me to make sense of my experience of teaching is explored.

Chapter Three is a description of the research methods used to carry out the study. It describes the broad orientation of the research, the kinds of data I collected including the data-gathering procedures, such as video recordings and the process of converting video data into transcripts. Other aspects of the research design, such as a description of the research site and research participants, and methods of analysing the data are explained. In particular, this chapter focuses on the framework used to analyse data in the logico-scientific mode.

Chapter Four presents the analysis and interpretation of the data. In this chapter, episodes from classroom interaction are analysed for instances of teacher mediation. The teacher's plan is seen in the light of mediation, and selected episodes are used to show instances and forms of mediation.

Chapter Five consolidates the findings of the research, discusses their implications and provides recommendations for both future research and for practice.

The chapter that follows provides a literature review, which underpins this thesis.

CHAPTER TWO: LITERATURE REVIEW AND THE THEORETICAL FRAMEWORK FOR THIS STUDY

2.1 Introduction

In this chapter, I will be discussing the scholars whose work has inspired me to develop the theoretical underpinnings of my study. I will discuss the four scholars whose ideas and research have helped me to understand, critique and revise the pedagogic principles underlying my classroom practices. In focusing on each of them, I will be identifying the ideas I have drawn from them and show how I have synthesised them to create a network of concepts that are central to my research. The four scholars are Vygotsky, Prabhu, Bruner and Cummins.

While summarising the contributions of these scholars to my thinking, I will also refer to other scholars, whose work converges with, or develops the ideas of these four scholars.

2.2 Vygotsky's concept of mediation, zone of proximal development, and internalisation

Since 'mediation' is the central focus of my research, I will begin by discussing the work of Vygotsky. His concept of mediation in creating the zone of proximal development has haunted me ever since I was introduced to it during my BA Honours at Rhodes University. I grasped his idea of taking learners to a higher level because I felt that this was and still is my calling as a teacher. But I also believe that learners are active seekers of knowledge. Thus, I knew that the 'zone' had something to do with the higher and lower ends of the spectrum of knowledge. I knew that mediation had to do with starting from where learners are (that is, their everyday knowledge) in order to take them to a higher level (school knowledge), and that this is roughly what *mediation in the creation of the zone of proximal development* means.

But I could not see the fullness of his idea, and how to apply it. I, like most schoolteachers, never got the chance to understand the link between Vygotsky's theory and classroom practice. I left the university course curious, but unsure about how to access theories that would help me make sense of my classroom practices. Being a good teacher, committed to her class, I realised, was not enough. My desire to experiment with my class and my fortunate involvement in the Biliteracy

Project helped me to undertake my journey into theory. Also, equally fortunately, the approach to theory that was taken in the Biliteracy Project, was from a teacher-development point of view. This meant that I could try to both theorise my own practice (discover the underlying beliefs of my own classroom practices) and see how far it linked up with specialist theories.

2.2.1 Mediation

Vygotsky, in his most complete book, *Thought and Language*, hereafter T/L, (1986) gives the simplest definition of 'mediation' as follows: "With assistance, every child can do more than he can by himself – though only within the limits set by the state of his development" (Vygotsky 1986, p. 187).

This quotation says a lot: by 'assistance', Vygotsky means 'mediation'. It is not rote learning, which is what teachers in traditional schools do to assist learners. Such rote learning is direct 'teaching', whereas Vygotsky's 'assistance' is indirect, or mediated. As to the question: who provides the 'assistance', Vygotsky goes on to say it is a more knowledgeable person, usually an adult, and in schools, the teacher. Sometimes it can be a 'capable peer', which in schools translates as 'classmates'. Thus, adults or teachers or capable peers do the mediation.

This is an important idea, because Vygotsky is claiming that mediation has a social origin and is not something individualistic, attained by direct operations on objects, as eminent scholars such as Piaget (1959) and Montessori (cited by Lillard, 2005) have claimed. Nor is mediation to be understood as repeating after the teacher, a form of behaviourist teaching. In other words, the child/learner cannot go to a higher level of knowledge on his or her own, nor can he or she acquire knowledge through meaningless copying of the teacher or textbook, or blackboard writing. It is only by making a meaningful effort to cope with new knowledge, which is close to, but slightly out of the reach of the learner, that the learner can reach this goal. Therefore, the teacher's assistance to help the learner reach this goal is crucial. The teacher's assistance, guided by the learner's own level of understanding and potential, is what Vygotsky calls 'mediation in the creation of ZPD'. Vygotsky's theory of development is often referred to as a sociocultural theory, as its distinguishing feature is that all forms of mental activity are socially mediated and this is a

feature of all human cultures. Or as Lantolf puts it: “The central and distinguishing concept of sociocultural theory is that higher forms of human mental activity are *mediated* [own emphasis] (cited by Shabani, 2016, n.p.).

Vygotsky is clear, that some problems can be solved with the child’s ‘practical intelligence’ operating in the child’s visual field, that is to say the child’s use of sensorimotor abilities in an immediate environment of learning. However, such problem solving does not constitute higher levels of learning, for as he and Luria argue: “the child solves a practical task with the help of not only eyes and hands, but also speech” (Vygotsky, 1978, p. 15; Luria & Vygotsky, 1930).

Vygotsky did not specifically define the code or language that teachers use in their interactions, but in South Africa, we have to do so because of the colonial and apartheid legacy. This forces the majority of teachers and learners in this country to use a foreign language, namely English, as the medium of instruction. Vygotsky, as his texts showed, obviously meant by speech, the use of the mother tongue by teachers and learners. Further, Vygotsky is clear that learners tend to use the everyday language variety of the mother tongue, or “context-embedded” language (Cummins, 1996, p. 58) while teachers would have to expose learners to “context-reduced communication” (Cummins, 1996, p. 58). Wertsch (1985, p. 33) refers to this as “the principle of decontextualisation of meditational means”.

Vygotsky (1987) introduces the distinction between everyday concepts (EC) and language and scientific concepts (SC) *for school-age children*. Though Vygotsky writes about pre-school children learning through mediation in the ZPD, their learning is largely spontaneous, relative to concepts they acquire as part of formal schooling. In schools, children become *learners*, and are introduced to conscious, deliberate, systematic learning, with agents such as teachers, who are strangers and not their parents. They not only learn, but learn about learning, i.e. ‘metacognition’, and ‘metalanguage’.

In short, Vygotsky and his colleague Luria summed up their theory of mediation, by saying that human beings evolve through passing down knowledge acquired cumulatively in history, through the use of ‘cultural means’. By this he means the use of physical tools and signs (see Luria &

Vygotsky, 1930). Kozulin (2003) too, describes mediation as occurring through two key forms: via artefact-based mediation and via human mediation.

Though Vygotsky argues that language is the most highly developed of these tools, and is used to pass knowledge in the form of written texts, he by no means neglects the entire sign system, that include gestures, facial expression, intonation, drawings, dramatic enactment, knots to remember things, and others. All these sign systems are covered under the broader label 'semiotic system'. This use of semiotics to cover the total sign system used in mediation, proved to be important for my purposes, hence I draw attention to it. Yet, for the learner to acquire the language of texts, as in the earliest stages of language acquisition for the pre-school child: "To 'discover' speech, the child must think" (Vygotsky, 1987 cited by Wells, 1994, p. 54). Vygotsky gives primacy to thinking, which I think is why his book is called *Thought and Language* (the actual title is *Thinking and Speech*, if we go by the correct original translation given in Rieber and Carton's edition of Vygotsky's *Collected Works*, Volume 1 titled *Thinking and Speech)*. This 'thinking' as a process, and not thought as a product, is what is called 'comprehending of meaning' in educational discourse.

2.2.2 The Zone of Proximal Development (ZPD)

Vygotsky's theory of mediation, however, was always developed in the context of his most famous concept: the ZPD. Daniels (2015) affirms that the concept of 'mediation' is one of the central pillars of Vygotsky's contribution to social science. Vygotsky (1930, p. 86) defines ZPD as follows:

> The zone of proximal development … is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.

The phrase 'under adult guidance or in collaboration with more capable peers' of course refers to the concept of mediation; 'problem solving' refers to learners requirement to 'think through' knowledge presented to learners, and 'actual developmental level' refers to the existing knowledge that learners have through their own effort to solve problems without guidance. However, the

important word in this quote is ‘potential’. Vygotsky uses the metaphor of plants, when he says that the level reached on their own by learners is likened to the ‘fruits of development’, that is, knowledge which is already ‘ripe’. But he refers to the ‘potential’ to learn new knowledge as ‘the buds’ or ‘flowers’ of development (ibid.).

Though the term ‘distance’ suggests a physical zone, it is best to think of the ZPD as Vygotsky did as a metaphor, that suggests ‘flowers’ and ‘buds’ that stand for different levels of learning. In other words, the everyday knowledge of the learner is likened to a ‘fruit’ that is ripe, and the ‘buds’ as ripening, having the potential to be born, or towards which learners are groping but cannot reach by themselves. This groping is part of the ZPD; the other part of the ZPD is the teacher extending their groping to acquire school knowledge, school language and logical thinking.

It is also clear that there has to be a minimal level of knowledge the child must already have, in order to benefit by the ‘school’ knowledge that the teacher must transmit. This ‘threshold’ is what Vygotsky terms ‘ripeness’. It is essential that the teacher is aware of this learner knowledge. This is what in current educational discourse is called ‘prior knowledge’. There has to be a certain level of ‘ripeness’ for the ZPD to occur. A child cannot learn anything without this basic threshold. This threshold or prior knowledge is partly taken care of by educational policy and school curricula, but in township schools, where there is a great unevenness in knowledge of students who come to school, the teacher bears a greater responsibility in establishing the actual prior knowledge of individual learners.

To elaborate: Vygotsky was critical of most educationists in his day for testing students for what they already know, but ignoring their *potential* to know more, which, as already pointed out, is possible only with adult guidance. As mentioned earlier, he therefore made a distinction between ‘everyday concepts’ (EC) and ‘scientific concepts’ (SC), arguing that schools are places where this distinction becomes valid. The teacher must know the existing knowledge of the learner, in order to establish the potential knowledge the learner is capable of, under mediation creating the ZPD. But this existing knowledge is not the ZPD. What Vygotsky means by ‘teaching’ or ‘instruction’ was aimed at tapping the learners ‘potential’ to learn new things, or to use his own words: “instruction must be oriented towards the future” (Vygotsky, 1978, p. 189).

In addition, it is important to remind ourselves that Vygotsky was talking about all learning, inside and also outside schools, as learners' EC is in large part drawn from their outside school experiences and play a big role in their school knowledge. Shabani (2016, n.p.) reminds us of this in her words: "The concept of *mediation* suggests that human relations with the world are not direct but 'mediated' by physical and symbolic tools", wielded by human agents, such as parents, care-takers, grandparents, teachers, and knowledgeable peers.

2.2.3 Internalisation

Vygotsky states that mediation in the ZPD enables learners to acquire scientific knowledge, scientific thinking and decontextualised language through a process called 'internalisation'. First, pre-school children imitate the dialogue of adults in carrying out activities, something Vygotsky calls 'egocentric speech' (after Piaget who coined this term, but later scholars following Vygotsky renamed 'private speech'; Joseph & Ramani, 2011).

Then a further process of 'interiorization' occurs called 'inner speech' which finally becomes 'inner thought'. Once this process of internalisation or interiorization is complete in the child, the child is said to have mastery of the concept (and speech) and becomes an independent learner. In fact this is the goal, and the hope of all educationists, whether following Vygotsky's thought or not. Internalisation is a psychological process, called 'intra-psychological' and is not overtly visible, but can only be theoretically inferred. Vygotsky (1978, p. 57) states it as a law of child development:

> Every function in the child's cultural development appears twice: first, on the social level, and later on the individual level; first, between people (inter-psychological), and then inside the child (intra-psychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals.

Internalisation of concepts, logical thinking and textual language may not happen immediately after a teaching episode; it may take an unpredictable amount of time to happen.

2.2.4 Externalisation

Once internalisation happens, it becomes the new everyday knowledge of the learner and a new ZPD begins, that must be at a higher level than the learner's (by now) new everyday concept (EC). The acquisition of the previous ZPD is externalised as production in speech, or writing, or drawing by learners. When left to themselves, but in the presence of their peers, and also the teacher as quiet observer (as in free play during break time in my class), learners love to display this mastery of what they have internalised (See Voluntary Activities). But in formal teaching, it is important for the teacher to draw out this internalised knowledge and make it explicit, in other words to exteriorise it. This may not be considered part of the ZPD, but it is an important pre-requisite for the ZPD. Teachers often belittle this step and may make a gesture to refer to prior knowledge. As Moll (1990) points out, this is inadequate. ZPD is an active zone created by teacher mediation, leading to internalisation as Vygotsky points out (Vygotsky, 1978).

Equally important is externalisation which Vygotsky does not emphasise enough in his two famous books: T/L and MiS, and which other Vygotskian scholars have referred to as 'automation' or 'habit formation' (See Levykh, 2008, pp. 18-19). This is not to be confused with the behaviourist notion of automation or habit formation through repetition and reinforcement, but rather evidence that learners have truly internalised new knowledge.

2.3 Bruner's two modes of cognition

As mentioned in Chapter One, my learners often use break-time to engage in role play and other voluntary activities which involve the use of fantasy and imagination. I was already reading stories aloud to them in both isiXhosa and English using a dramatic way of reading and encouraging them to do the same, when they enacted some of the texts we were reading. This led me to reflect on the value of role play and pretend play and I was guided to the work of Bruner. In his book *Actual Minds, Possible Worlds*, I was delighted to find that Bruner's longest chapter is about two modes of thought, both of which he says are "modes of cognitive functioning … each providing distinctive ways of ordering experience, of constructing reality" (1986, p. 11). I had for a long time, when reading Bruner, assumed that by the narrative mode, he meant it as text or genre. This mistaken view supported my own view of teaching learners to grasp the text. I thought about storytelling

and role play, only as imaginative *genres* that would enrich the lives of my learners (and of course help in literacy development). This became clear to me as I read phrases from Bruner, such as "genre is also a form of telling" (Bruner, 1991, p. 14) emphasising the verb form rather than the product, and then again "they are also ways of telling that predispose us to use our minds and sensibilities in particular ways" (ibid., p. 15). My understanding of Bruner changed from a text-based view of narrative to using 'narrative-as-thinking'.

So, the two modes that Bruner identified: the paradigmatic or logico-scientific mode, and the narrative mode, are both modes of thinking. Of these two modes, logico-scientific (a term I will use throughout this thesis) is synonymous with the paradigmatic mode (Bruner's preferred term) and is analytical: it is the basis for all mathematics, sciences and disciplines requiring the provision of proof and logic to establish facts. This mode is highly valued in schools and in education generally. The logico-scientific mode underpins the curricula of school subjects such as numeracy, and from very early stages of formal schooling, children are taught to operate in this mode. As Bruner says, the language of this mode is "regulated by requirements of consistency and noncontradiction. Its domain is defined not only by the observable to which its basic statements relate, but also by the set of possible worlds that can be logically generated and tested against observables – that is, it is driven by principled hypotheses" (1986, p. 13).

Though I would have liked very much to also explore how mediation occurs in the narrative mode, I decided to limit the focus of this thesis to the logico-scientific mode.

2.4 Prabhu's task-based teaching and learning

While Vygotsky's ideas helped me to see the role of the teacher in mediation and Bruner helped me to name the activities that occurred in my classroom, it was in Prabhu's work (1987) that I found the means to develop classroom procedures that would lead to increased cognitive challenges and to the need for teacher mediation.

However, before I discuss Prabhu's influence on my classroom pedagogy, I would like to briefly comment on any convergences I found between Vygotsky's ideas and Prabhu's.

Both Vygotsky and Prabhu support the idea that teachers are experts in their particular field of knowledge, whether it be numeracy or literacy, or in school subjects like mathematics, history or physics. They have superior knowledge (through training and experience), and their goal, ideally, is to get students, through pedagogic processes that are meaningful and relevant, to an understanding and internalisation of this knowledge. Along with the internalisation of new knowledge, students also become familiar with new ways of thinking about and processing this new knowledge.

It is important to state this, because in current debates about teaching and learning, teachers are not seen to be so central to the teaching/learning project. Views of group work (collaboration) are emphasised and this can lead to all learners in a group remaining at the same level without someone to push them forward.

So, in both Vygotsky and Prabhu, there is an important conceptual distinction of a 'knower' and a 'learner'. However, what the learner already knows and brings into the interaction with the teacher or other learners, is the basis for the understanding and internalisation of new knowledge. The knower could be the teacher or a peer who has superior knowledge/competence in relation to the task being undertaken.

The interaction between teachers and learners (or between expert learners and novice learners) has to occur within what Vygotsky calls the ZPD, because it is within the ZPD that new processes and knowledges are acquired. Vygotsky, for example, believes that tests and assessments reveal what learners are capable of doing by themselves. However, it is much more important to show what learners can do with the help of a teacher, or a superior peer. By definition, what learners need to learn, has to be within the ZPD. For Prabhu too, though he does not talk about the ZPD, the interaction between teachers and learners has to be based on 'the right level of challenge', which I interpreted to mean, what learners can do with the help (mediation) of teachers. In other words, the task to be done, should not be easily achieved, nor should it be so difficult that learners are unable to even attempt it, or give up even before they begin. The 'right level of challenge' is therefore a concept that is similar to the ZPD! Prabhu actually refers to it as a "reasonable level of challenge" (1987, p. 56). He elaborates it in this way: "The concept of reasonable challenge implies

that learners should not be able to meet the challenge too easily but *should* [own emphasis] be able to meet it with some effort" (Prabhu, 1987, p. 56).

> Teacher-class negotiation – in the sense of a sequence of exchanges connecting one point to another on a given line of thought and adjustable at any point as it occurs – was thus identified as a classroom procedure which was both feasible and desirable. Opportunity for such negotiation became an important consideration in selecting classroom activities, and it was recognised that negotiation was most likely to take place – and to prove satisfying – when the demand on thinking made by the activity was just above the level which learners could meet without help (Prabhu, 1987, p. 23-24).

This is the closest that NSP comes to Vygotsky's concept of mediation creating the ZPD. The goal to be achieved is slightly above the learners' ability to achieve on their own but, can be achieved through interaction with a more competent person.

Further, In the *Notes* section of Chapter Three of his book**,** Prabhu makes his first explicit reference to Vygotsky and the concept of internalisation. He cites Vygotsky (1987, p. 86): "An operation that initially represents an external activity is reconstructed and begins to occur internally. … An interpersonal process is transformed into an intrapersonal one" Prabhu also cites Frawley and Lantolf (1985) who interpret Vygotsky's perception of this phenomenon (1987, p. 86):

> All human beings as children are initially integrated into the strategic process of reasoning through social interaction, between the self and a more experienced member of a culture, either an adult or an older peer who is capable of strategic reason. … The transition from inter- to intra-psychological reasoning through mediation, as we said earlier, is a dialogic process, a process in which an adult undertakes to direct a child through a task, and where the child provides feedback to the adult, who then makes the necessary adjustments in the kind of direction offered to the child.

These 'necessary adjustments in the kind of direction offered to the child' is a very apt way of defining mediation.

However, one important difference between Prabhu and Vygotsky is that Prabhu was developing a pedagogy for second language teaching and learning (English, in Prabhu's classroom experiments), whereas Vygotsky was not concerned primarily with language pedagogy. So Prabhu's concern was not with the acquisition of knowledge (content) per se, but with the unconscious acquisition of the rules of a new language. However, it does seem to me that Prabhu's

use of a pedagogy that uses reasoning processes, but that starts at the level of the learners' own cognitive abilities, might have been a good way of providing access to scientific knowledge and more generally for developing Bruner's logico-scientific mode.

While elaborating on task-based teaching and learning, Prabhu identifies three types of tasks: information, gap, reasoning gap and opinion gap tasks. The differences between these three types of tasks will be dealt with in Chapter Three, when I discuss the research methods I used and the frameworks for data analysis. It is however important to state here, that of the three types of activities, Prabhu believed that reasoning processes are most favourable for language learning.

2.5 Cummins' work on bilingual education and biliteracy

Cummins is perhaps the scholar who had given the deepest thought to the use of bilingualism in education. Because I intuitively felt that it would help my learners to see all written texts (class materials, worksheets, assignments and tests in two languages), I had started to translate all these teaching and learning materials from English to isiXhosa and vice versa. I had also translated all the display material in my classroom (songs, rhymes, stories, etc) so everything that the learners could see were in two languages. Therefore, when I was introduced to Cummins' work (1996; 2000), it immediately resonated with me.

I found a close a connection between bilingual approach to teaching and biliteracy, as they both are about exposure of learners to two languages in different ways. Sheri walker describes biliteracy as an individual ability to fluently speak, read, listen, and write proficiently in two languages (Walker, 2018). I was already preparing the learners for intermediate phase by exposing learners to texts written in two languages (isiXhosa and English), hoping that it was going to help their transition from isiXhosa as MoI to English as Medium of Instruction (EMoI) in intermediate phase.

Mother tongue was the medium of instruction, but texts were available in both languages, with no pressure for them to read. Learners were motivated to try to read English, which became a gradual internalization process. This later led to them mixing the two languages when expressing themselves in some instances.

I introduced learners to biliteracy to alleviate the pressure that was exerted on learners when they reached intermediate phase. That they must be competent enough in English, through exposure to it as FAL and subject, with less weighting allocated to it. Sheri claims that strong brains, better attention and task switching capacities are benefits of bilingual/biliteracy (Walker 2018). Sheri and Cummins have a similarity in their beliefs on dual approach. While Cummins talks of Transfer of mother tongue to English as effects of bilingualism, Walker talks about task switching capacities as benefits of bilingual/biliteracy.

Cummins believes that the mother-tongue should be the medium of instruction in a bilingual/dual medium approach. In other words, his cycle metaphor (see Cummins, 1996 and also Ramani et al., 2007, who took his ideas forward in South Africa), favoured the two equal-wheeled bicycle (symbolising equal bilingual medium of education), instead of the two unequal-wheeled bicycle, (transitional bilingual model), the single wheeled bicycle (monolingual model) or the two flat-wheeled bicycle (a semi-lingual model in two languages), to use his metaphor of the different kinds of bicycles.

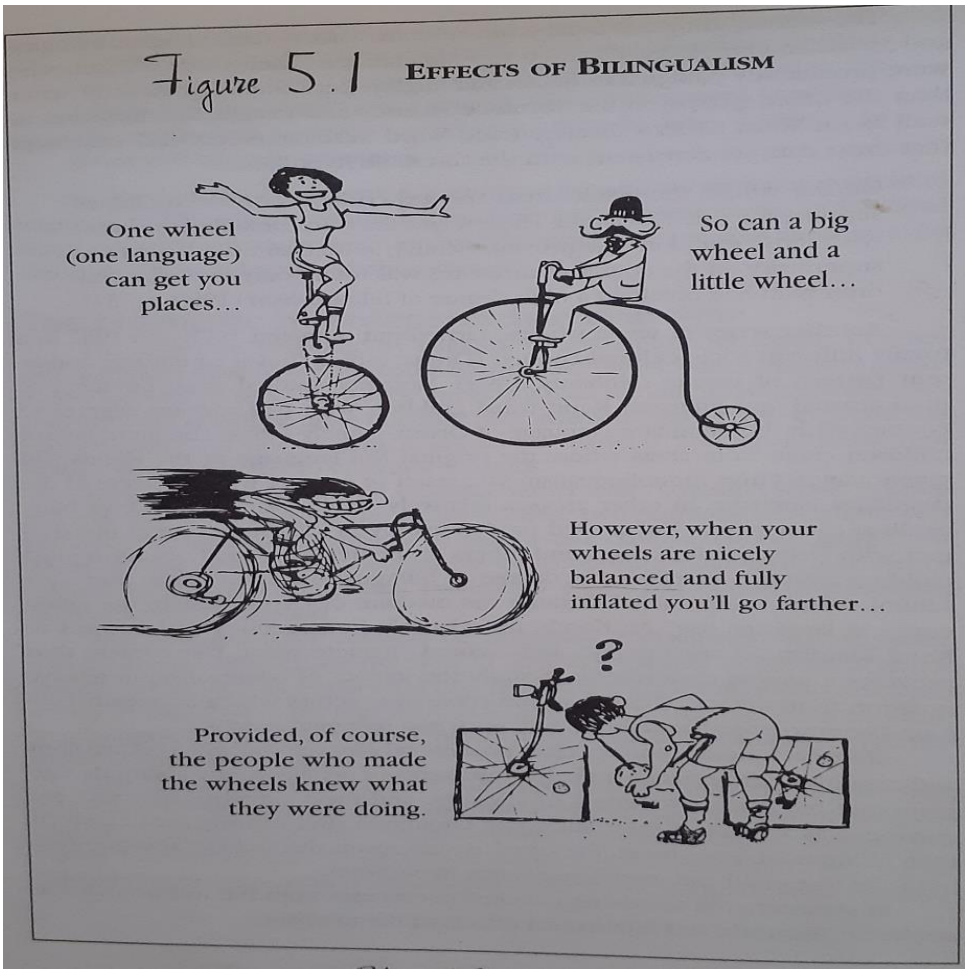


Figure 2.1: Effects of bilingualism

Since Cummins claims that research supports the view that 'deep learning' in the mother-tongue can be transferred to an additional language like English, when that language is used in a dual medium programme. Cummins expands on the concept of 'transfer' in several works, but that is not a matter I will go into, except to repeat that transfer from the mother-tongue (in South Africa – African languages) requires that they must be used for higher content and cognition (Cummins, 1996). Cummins brings this out through his concept of 'The Common Underlying Proficiency' (CUP), according to which surface features of two languages (like pronunciation, grammar and other formal aspects of a language) do not transfer across languages. But there are deep features, such as discourse that lie beneath the surface of languages, and these do transfer. CUP is useful in

understanding why transfer can be bi-directional, that is from mother-tongue to another tongue, and vice versa, when both languages are used in bilingual medium programmes. However, he is generally in agreement that mother-tongue based literacy, must start in the foundations of education, and the pedagogy must use high level content and cognitively challenging tasks to build the foundations.

In this section I will therefore be focusing only on Cummins' model of language and cognitive proficiency that he developed through the metaphor of the four quadrants, which I slightly adapted. The model is based on the intersecting lines of language and cognition and is similar to Vygotsky's theory (in T/L) that language and cognition facilitate each other, but in complex ways. The horizontal axis represents language development, the left end being everyday language or context-embedded language, and the right end of the spectrum is what Cummins labels as 'context - reduced', a language or academic language. The vertical axis stands for the spectrum of cognition: the top end for cognitively undemanding efforts and the bottom end for cognitively challenging efforts.

This intersection produces four quadrants. Quadrant A would be instances of everyday communication with low cognitive effort. Quadrant D is the polar opposite, where learners are expected to produce (in speech or writing) academic language that is the outcome of logical thinking around school-based knowledge. Quadrant A is what Cummins calls Basic Interpersonal Skills (BICS) and Quadrant D, Cognitive Academic Language Proficiency (CALP). The route that conventional education often takes is via Quadrant C, i.e. low cognitive efforts but highly formalistic (CALP-like) language. Much of the drills and repetitions, such as class chorus answers, fall into Quadrant C, so also do basic skills such as phonics and grammar. The pedagogic route that Cummins favours is via Quadrant B, i.e. the use of everyday language but for higher levels of cognitive reasoning around academic knowledge. This quadrant enables learners to use their everyday language but deploys their natural cognitive skills. Therefore, both everyday language and everyday cognitive reasoning are extended by the teacher who uses the language, cognition and knowledge of Quadrant D in communicating with learners. The use of Quadrant B pedagogy in the mother-tongue, has been the pedagogy used in the work of Ramani et al. (2007) and their

articles in the dual-medium undergraduate degree that has now been running for the last 15 years at the University of Limpopo.

2.6 Finding common ground between Vygotsky, Bruner, Prabhu, and Cummins

Though there are differences between these four scholars, I focus on what they share in common. All four scholars believe in the importance of cognition. Vygotsky uses the term 'higher levels of consciousness' throughout his writings, whereas Prabhu uses the term 'reasoning', and Cummins 'cognitively-demanding' efforts. Prabhu, Bruner and Cummins all show awareness of the theories of Vygotsky around cognition. In their own way, they endorse Vygotsky's concept of mediation in the ZPD. Cummins' four-quadrant model of language and cognition allows one to locate a constructivist pedagogy (where learners 'grapple with meaning' to use Prabhu's phrase) in Quadrant B. Prabhu's task-based approach would also be located in Cummins' Quadrant B, but with the further specification that reasoning-gap activities would be highly favoured in this quadrant (I will explain Prabhu's reasoning gap activities in Chapter Three).

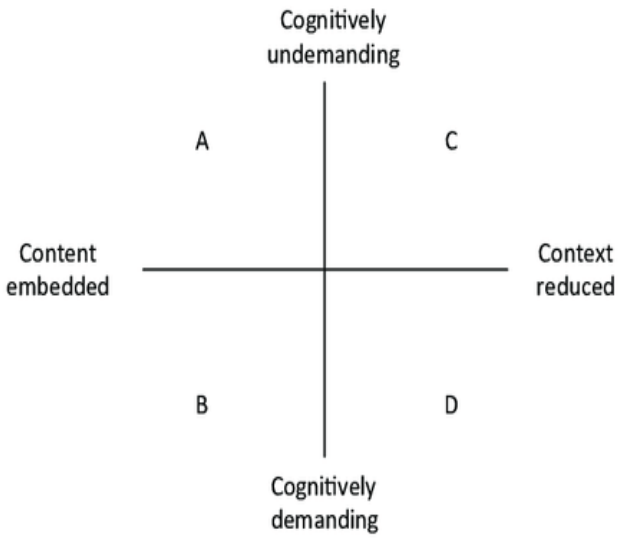


Figure 2.2: Four quadrants (Cummins, 1996)

All four scholars are critical, in their own way, of Quadrant C activities, believing such activities 'dumb down' learners. Cummins and Prabhu even believe that too much of Quadrant C activities would demotivate learners. Vygotsky would say Quadrant C activities fall below the Zone of

Proximal Development, and Prabhu, that they would represent too low a level of challenge. On the other hand, expecting learners on their own to achieve Quadrant D would be well above the ZPD.

Having discussed the four scholars whose work represent the theoretical underpinnings of my research; I will move on in Chapter Three to the research design for my study.

CHAPTER THREE: RESEARCH DESIGN AND DATA COLLECTION

3.1 Introduction

In this chapter, I describe the broad orientation of the research, the kinds of data I collected, the data-gathering procedures, and other aspects of the research design, such as a description of the research site and research participants. Drawing from the concepts discussed in Chapter Two, I will also present the framework for the analysis of the data for the logico-scientific mode.

3.2 Theory-driven action research by teachers

It is important to re-state here that the present research is a shift from teacher-professionalisation models based on policy implementation and training, to a teacher-development model. In a teacher development model (Barnes, 1975; Ramani, 1987; Cochran-Smith & Little; 1999, Gains, 2010), teachers become researchers of their own classrooms and investigate the extent to which their classroom practices promote effective learning.

Hence, the research design for teacher research relies heavily on classroom video or audio data transformed into transcripts, teacher's reflective notes and learners' outputs, like test results and writings. In my case, I needed to know whether the mediation I was doing in my lessons were leading to effective learning. Cochran-Smith and Lytle (1999, p. 19) see action research (a term used synonymously with 'teacher-as-researcher') as a "way to generate or enhance practical knowledge", believing such knowledge to be essential for teaching. The goals of a methodology that uses action research, or reflections on teaching and learning classroom practices, is thus very different from academic research that uses quantitative, qualitative and even 'mixed method' approaches. Teacher-research and action research are not only focused on classroom interactions but aim to transform teaching procedures and learning processes.

This research was also theory driven, but it was theory that I came to know about in the process of the Biliteracy Project mentioned in Section 1.4.7. Before then I was operating with an implicit theory based on experience, intuition and beliefs, without a deep understanding of theories. The

data shows my development as a teacher in the process of grappling with understanding theories and applying them in my practice. During the process of this research, I had come to understand the value of theory knowledge and its impact on teaching and learning. As I had mentioned earlier that I was still theory hungry after upgrading my studies, when the opportunity to interact with the two university academics presented itself, I took it with hopes of learning more. I then began to learn more about mediation in the zone of proximal development, and what it really meant. That is when my programme of teaching (lesson plans) and how each plan was to be implemented were informed. I now became aware of the outcomes and the kind of interactions that needed to happen, for the outcomes aimed at to be achieved. As Bickman (1987, p. 5) puts it, program theory is defined as, "the construction of a plausible and sensible model of how a program is supposed to work". Furthermore, it "clarifies the set of cause-and-effect relationships" believed to connect the things students do (i.e. programming) to the outcomes they are expected to achieve (Bickman, 1987, p. 5).

I became aware of theories that can be used to better enhance mediation, i.e. Prabhu's task-based teaching, Bruner's two modes of cognition, and Cummins' bilingual approach to education.

Theory implicated a number of aspects in my lesson preparations, teaching and the interactions that happened in the classroom. The process became more important, and the product became the results of the process. Being critical of my practices was also one of the things that I developed. When reflecting on my practices, I made use of the theories as a yardstick for determining if meaningful learning had taken place.

3.3 Research site

The school in which the research was conducted is a local school in Joza, a township outside Grahamstown-Makhanda. I am currently employed in this school.

It is a primary school starting from grade R and ending at grade 7 (8 grades) with an enrolment of 870 learners and 22 classrooms. According to the National Poverty Ranking of Schools (NPRS), the school is a quintile 3 school, with 26 teachers: seven male and 19 female teachers. Quintile 3 schools are not allowed to charge fees, so this school is a no fee-paying school and largely depends

on government funding to operate. The school is one of the beneficiaries of the School Nutrition Programme (SNP) that provides meals for the children on a daily basis. Children attending the school are from disadvantaged backgrounds, with parents that have little or no education and are jobless. Parents depend on the social grant money their children receive from the government, to provide for their home and school needs. Almost all the children at the school receive government funding (social grant). The school has together with the School Governing Body (SGB), devised means of fundraising to make sure the school fully operates, and the operation is sustained as the government funding is not enough.

3.4 Participants

The learners who participated in this research were 35 children, from ages eight to 12, with 20 girls and 15 boys in grade 3. They were a new batch of students to me, as I had taught a different group of students in the previous years. From 2015 to 2017, I worked with the same group of learners, following them from grade 1 to grade 3, and was therefore able to build their knowledge and competence, year upon year.

Unfortunately due to a break I had to take from my research in 2018, I now had a new group of students, who had been taught by two different teachers in grades 1 and 2. As the current students who formed my research participants were new to me, I had to work with them more slowly to discover what they could and could not do.

3.5 The logico-scientific mode

3.5.1 Choice of content for the logico-scientific mode

For the logico-scientific mode, I chose data-handling as the content area in Numeracy. There are many reasons for this choice. As Back and Pumfrey (2011, n.p.) assert, “data handling is one of the central activities in which real mathematicians engage: they are frequently analysing data that they have gathered in various contexts and looking for patterns and generalities within them. In schools we often undertake tasks in which we encourage children to collect data about themselves and their friends, but the emphasis tends to be on presenting data in a variety of forms such as bar

charts or pictograms. Analysis is often confined to identifying the most popular or least popular item". The children that these authors refer to are between the ages of five and 11 years.

This aligns with the CAPS recommendation that data handling must start in the early years of primary education. While in the Foundation Phase, CAPS recommend that only 5% of teaching time must be allocated to data-handling, in grade 4, it is given significantly more importance. This is difficult for learners, as in addition to the conceptual leap in grade 4, learners have to do this demanding work in an alienating new language, English. Sadly, because there are no specific guidelines on how to deal with data-handling, teachers tend to leave it out altogether. Indeed, in the grade 1 to 3 examinations, questions set on data-handling carry very little marks! So, without any introduction to data-handling in primary school, learners struggle in grade 4 and beyond. It is interesting too that bar graphs appear for the first time in an English First Additional Language textbook. See Appendix Q) In other words, data-handling tasks do not appear in isiXhosa, the learners' home language.

I therefore took it up as a challenge, to teach data-handling through a task-based approach in the mother tongue. As long as I taught using a looping experience (of following my learners from grades 1 to 3, from 2015 to 2017), I could gradually build up their confidence in data handling; but once looping stopped in 2018, I found it difficult to develop data handling in a sustained way. Some of the difficulties I faced will be discussed in Chapter Four on data analysis.

3.5.2 Task types

Prabhu talks about three types of activities which I also made use of during my interaction with my learners. These are: opinion, information and reasoning gap activities. They help facilitate cognition and while helping the teacher to challenge and mediate while teaching, the activities I developed were based on Prabhu's three task types which I will describe. Opinion gap activities involve identifying and articulating a personal preference or feeling to a given situation. The information gap activities involve transfer of given information from one form to another and from one place to another. Reasoning gap activities involve deriving some new information from given information through the process of inference, deduction, practical reasoning or perception of

relationship of patterns (Prabhu, 1987). Reasoning gap activities were dominant in the activities I did with the children and the reason for the choice will be given below.

3.5.3 Choice of reasoning-gap activities

I have found reasoning-gap activities to be more significant in meaning making. Children had to collect data, sort, record it and then transfer it to a master table, and answer reasoning and information gap questions on it. They in turn, had to translate the information into a bar graph. This task introduced the children to analytical skills.

3.5.4 Data collection for the logico-scientific mode

The types of mediation that occurred were captured through video recordings and were supplemented by my own observational notes. I had been making notes, to record initial ideas on task-based activities and my perceptions as they developed over time. To summarise, five kinds of data were collected: video recordings, occasional journal entries, learner test results, learner writings, and photographs.

From February to March, I completed six lessons on data collection, three of which were recorded. I watched the videos and went back to create more opportunities for the learners as I saw it fit and for gaps that needed to be filled. I also looked at my own practices and made innovations where I felt I needed to.

During this process I noticed that learners were getting acquainted with dealing with data handling, and their understanding and construction of tables and graphs improved. They have gone as far as creating bar graphs on the computer, which is a big shift from where they started (see Appendix J).

3.5.5 Analytical framework for the logico-scientific mode

Once I had taught the lessons on data-handling, I viewed and reviewed the videos to select episodes that looked productive for analysis. I then converted these video episodes into transcripts, using a simple framework showing information about the speakers/the utterances made and my comments

on them. I translated isiXhosa utterances into English. I surmised that such ‘hard data’ in the form of transcripts of interactions drawn from video recordings would show evidence of ‘mediation’. The analysis is framed within a Vygotskian perspective of cognition and activity.

The analytical framework for the logico-scientific mode involves the following steps:

a) assessing whether a particular task is at the right level of challenge (Prabhu) i.e. within the ZPD (Vygotsky)
b) identifying mediation episodes and contextualising them (in terms of when, where and how they occur, who are the participants in this episode)
c) describing the mediation in terms of the interactions and the semiotic means used; in other words: analysing the exact form the mediation takes: breaking down a difficult task, giving examples, reformulating, taking the learners through various steps to reach the resolution of the difficulty (Quadrant B activities, following Cummins)
d) assessing whether the mediation was successful or not.

In addition to the analysis of the mediation, learners test results and their classroom work will be analysed to show how effective the mediation had been or not. In addition, I will draw upon any reflections from my notes that are relevant to the analysis.

Photographs will be used where needed to make classroom activities vivid and to provide visual evidence.

3.6 Ethical issues

To obtain data using the children in my class, I adhered to ethical considerations from different people, including Rhodes University. I had informed my principal of the school of the nature and the objectives of the research. The head of department for the Foundation Phase under whose supervision I work was also informed and was aware of the objectives and the nature of the research. I also informed the children’s parents and obtained permission for their children to be part of the research. Consent letters for parents were written in isiXhosa and English assuring confidentiality and anonymity (see Appendix C). To maintain privacy, their children’s names will

not be disclosed and their eyes would be blocked out in photographs. The school's name has not been mentioned, except being referred to as a township school. The proposal was approved by the university's ethics committee.

In the next chapter, the analysis of data from the logico-scientific mode will be presented.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

In Chapter Three, I showed how I collected data for this research and the framework I will be using to analyse the data. I now offer my analysis of data from the logico-scientific mode and my interpretation of this data. The analysis will seek to address the research question: *How does a teacher mediate learners' cognitive effort create the Zone of Proximal Development for the logico-scientific mode of cognition in a bilingual approach to education in the Foundation Phase in a township school?* The main focus will be on the teacher's efforts to mediate tasks to enable learners to move beyond their current levels of knowledge and competence.

Below are the seven steps of the lesson dealing with how I planned and organised my interactions with the learners to facilitate for mediation.

4.2 The teacher's lesson plan (7 Steps)

4.2.1 Step 1: Group activity (data collection from different groups)

Ask children to find out from their groups, how many people like the different colours. The tables had the colours, yellow, red and green and I instructed them one colour one vote. I wanted data collection to be practical and meaningful (observe and mediate where necessary). The table looked like this:

IQELA/ GROUP A

Imibala/Colours	**Mthubi/ Yellow**	**Bomvu/ Red**	**Luhlaza/Green**	**Bebonke/Total**
Inani Labantwana Number of children				

4.2.2 Step 2: Teacher-directed activity (whole class)

I got the children to transfer information from the single strip table, to the master table. I wanted them to produce a master table. I asked them how many children liked a colour from their different groups and told them to record the information onto the master table which looks like this:

Itheyibhile yentlanganisela/ Master table

Inani Labantwana abathanda imibala/ Number of children who like colours

	Mthubi/Yellow	**Bomvu/ Red**	**Luhlaza/ Green**
IQELA/ GROUP A			
IQELA/GROUP B			
IQELA/GROUP C			
IQELA/GROUP D			
IQELA/GROUP E			
IQELA/GROUP F			
Bebonke/ Total			

4.2.3 Step 3: Teacher-directed activity (oral questions to the whole class)

After the master table was completed, I got the children to answer oral reasoning and information gap questions on the master table. I wanted them to analyse and interpret the master table. A few examples of these questions are given below.

1) Bangaphi abantwana abathanda umthubi kwiqela C/ How many children like yellow in group C?
2) Leliphi/ngawaphi i/amaqela athanda uluhlaza kancinane/ Which group/s like/s green the least?

3) Xa ujonge iqela B no C, leliphi elithanda ubomvu kakhulu/ If you look at group B and C, which group likes red the most?

4.2.4 Step 4: Teacher-directed (whole class collectively constructing a bar graph)

Collectively constructing, labelling, explaining, and asking questions leading to production of a bar graph. I asked the children to come and plot the information from the master table onto the graph. I wanted them to know a different way of representing data, i.e. in a bar graph, I asked a few questions on the graph, a few examples are given below:

1) Ngowuphi umbala othandwa ngabantu abaninzi/ Which colour is the favourite?
2) Ngowuphi umbala othandwa ngokulunganayo/ Which colour is equally liked?
3) Bangaphi abantwana bamaqela xa bebonke/ How many children are in the groups, altogether?
4) Wazi njani ukuba ibha grafu yeyantoni/ How do we know what the bar graph represents?
5) What is this bar graph about? What kind of title can we give it?

4.2.5 Step 5: Group activity (completing the single strip table and transferring it to the master table and answering questions on it)

Gave groups a table with favourite foods and the number of children who like them, but the totals were missing for some, and for some others, totals were provided. Asked them to complete the missing information and use it to fill in the master table and answer reasoning and information gap questions on it. Two examples of such a table are given below:

IQELA/GROUP R

Ukutya/food	**Umphokoqo/ African salad**	**Ipasta/ Pasta**	**Umngqusho/Samp**	**Bebonke/ Total**
Inani Labantu/ number of people	3	6	1	

IQELA/GROUP S

Ukutya/food	**Umphokoqo/ African salad**	**Ipasta/pasta**	**Umngqusho/samp**	**Bebonke/total**
Inani Labantu/ number of people		1	4	8

IQELA/GROUP T

Ukutya/food	**Umphokoqo/ African salad**	**Ipasta/pasta**	**Umngqusho/samp**	**Bebonke/total**
Inani Labantu/ number of people	2	1	3	

IQELA/GROUP U

Ukutya/food	**Umphokoqo/ African salad**	**Ipasta/pasta**	**Umngqusho/samp**	**Bebonke/total**
Inani Labantu/ number of people	2		4	12

The master table to be filled in looked like this:

Itheyibhile yentlanganisela /Master table

Inani labantwana abathanda ukutya/ Number of children liking different foods

	Umphokoqo/ African salad	**Iphasta/Pasta**	**Umngqusho/Samp**	**Bebonke/Total**
IQELA/GROUP R				
IQELA/GROUP S				
IQELA/GROUP T				
IQELA/GROUP U				
Bebonke/Total				

The information and reasoning gap questions they had to answer are shown below

1) Bangaphi bebonke abantu kwiqela U/ How many people are in group U?

……

2) Leliphi/ngawaphi i/amaqela athanda umphokoqo kancinane/ Which group/s like African salad?

……

3) Bangaphi abantu abathanda umphokoqo kwiklasi yonke/How many people like African salad from the whole class?

……

4.2.6 Step 6: Group activity (constructing a bar graph)

I challenged the children to draw a bar graph. I drew a table with clothing items on the chalkboard from which they had to refer. I wanted to know how many of the steps the children had internalised. The table on the chalkboard looked like this:

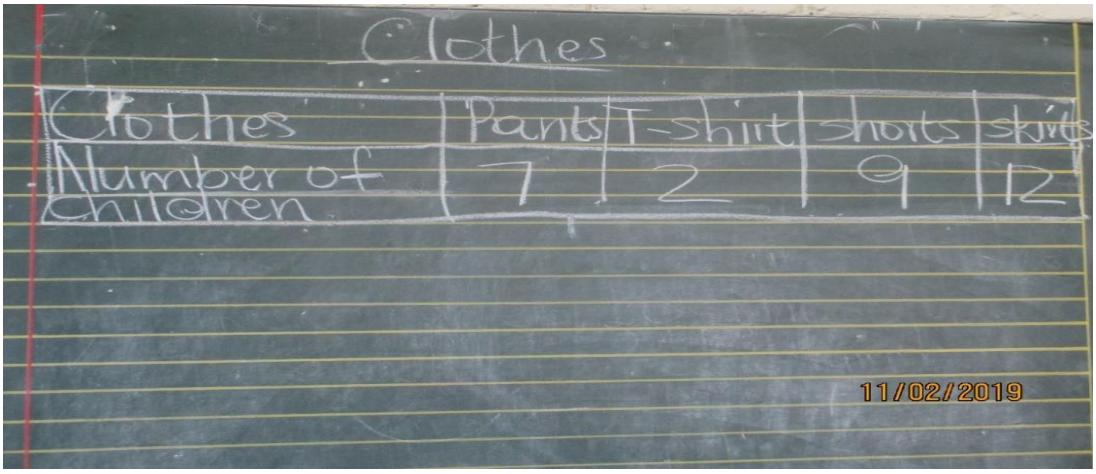


Figure 4.1: Clothes table

4.2.7 Step 7: Individual task (constructing a bar graph)

Gave the individual children a table with different foods. Ask them to individually construct the bar graph. I wanted to see if they could individually construct a bar graph.

Below is the table they used:

Ukutya /Food	**Umphokoqo/African Salad**	**Iphasta/pasta**	**Mngqusho/samp**	**Bebonke/total**
Inani Labantu/ Number of people	14	14	12	40

4.3 Reconceptualising the lesson plan as mediation

Going back to the research question: How does a teacher mediate learners' cognitive effort in the Zone of Proximal Development for the logico-scientific mode of cognition in a bilingual approach to education in the Foundation Phase? Vygotsky suggests that mediation in the Zone of Proximal has to do with meeting learners where they are (their everyday knowledge), taking them to a higher level (school learning). Vygotsky (1986, p. 187) gives a definition of mediation as follows:

> With assistance, every child can do more than he can by himself - though only within the limits set by the state of his development.

In my attempts to help learners work within their Zone of Proximal development, I used Prabhu's work (1987) to develop classroom procedures that would lead to increased cognitive challenges and the need for teacher mediation. Episodes will be selected from the 7-step lesson and analysed, to show the different forms of mediation, how they happened, and how they impacted on learning. Below, I will closely look at data analysis based on mediation.

4.4 Data analysis based on mediation

Below are the transcripts, analyses and interpretations of the forms of mediation that took place during my interactions with the learners. The key to the transcript is given below.

Key to the transcript:

The information in the transcripts is presented as follows:

1) The first column refers to the turn number for each turn taken by either the teacher or the learner/s.
2) The second column refers to the speaker (The teacher T or the learners, for example, L1, L2, etc for individual learners, LL for the whole class, and Gr D: LL for learners in a group).
3) The third column gives the actual utterance of the teacher or the learner/s and includes non-verbal actions by either the teacher or the learners. The teacher's actions are presented in square brackets [ ]. Any actions performed by a learner/s are captured using round brackets ()
4) As the actual utterances were originally in isiXhosa, they were translated into English; all the isiXhosa utterances are in **bold** font and the English translations are in *italics*.
5) The fourth column contains time of onset of the utterances expressed in minutes and seconds after the start of the lesson as reflected on the counter of the video camera.

4.4.1 Episode 1

4.4.1.1 Context

As shown earlier, there were seven steps that the teacher (myself) had planned, to show the children how to collect data from their group, transfer this data to a master table on the blackboard, and finally to convert the information from the master table to a bar graph. As explained, this is an important aspect of the unit on 'data handling' in the learning area of Numeracy.

In the excerpt below, the learners are engaging in step 1 (Task 1), namely, a group activity, in which the class is divided into six mixed ability groups: groups A, B, C, D, E and F.

Each member of each group has been given a strip of paper, with a blank table on it, which they are going to fill in. The group task involves each child choosing their favourite colour from the list

of three (Yellow, Red and Green). Each group is required to count the number of students opting for each colour and to write the total in the allocated space on the table. The rule was a person can only choose one colour. The strip of paper with the task and the table on it looks like this. As can be seen, all the labels are presented bilingually, both in isiXhosa and English.

Task 1

Kwiqela lakho, fumanisa bangaphi abantu abathanda umbala omthubi, ubomvu noluhlaza ubhale kwitheyibhile/ In your group, find out how many people like yellow, red and green, and write in your table.

Imibala/Colours	**Mthubi/Yellow**	**Bomvu/Red**	**Luhlaza/Green**	**Bebonke/Total**
Inani labantu/ Number of people				

While moving between the groups, I saw that five groups had completed this task, but Group D was lagging behind. I approached Group D and the following interaction took place. The transcript captures the interaction between me and the learners in Group D. This interaction is a form of mediation in groups, in which I was trying to move the learners from their inappropriate answer to the proper one. When I approached group D, they had just completed their table, which looked like this:

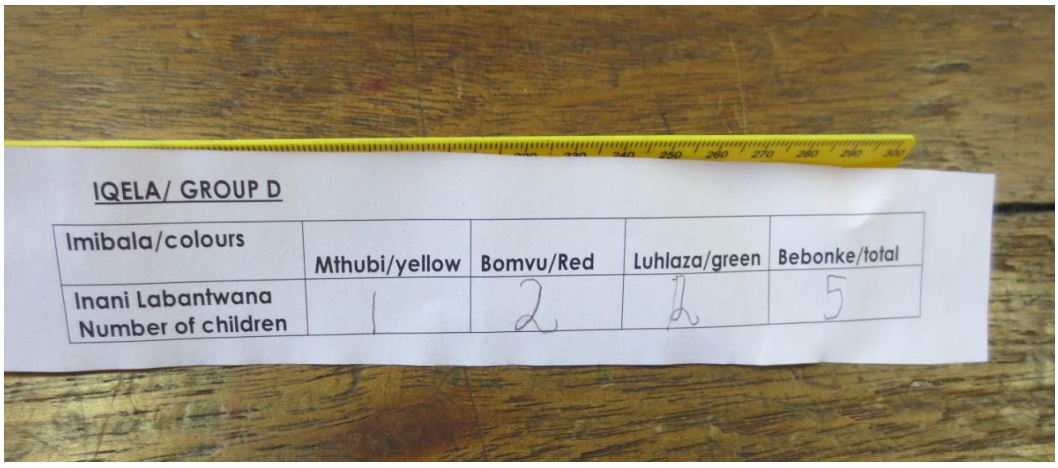


Figure 4.2: Group D Colours

4.4.1.2 Transcript of episode 1

T **No.**	**S**	**Utterances/ actions**
1	**T**	**Anikagqibi?** *Are you not finished yet?*
2	**L 1**	**Sigqibile** *We are finished*
3	**T**	**Khame ndibon'itotal** [approaching group D] *Let me see the total* **Ithini 'itotal yenu?** *What is your total?*
4	T	
5	**L 2**	**Ngu 5** *It is 5*
6	**T**	**Ngu 5? Nibangaphi apha?** *Is it 5? How many are you here?*
7	**L 2**	**Six**
8	**T**	**Ukhona ke umntu ongakhethanga komnye wemibala, animbalanga. Kumelba xa nisenz' itotal apha** [pointing] **ibe ngu 6, ngoba nibayi 6 ninonke apha** *There is one person who did not choose their favourite colour, you did not count him. You are supposed to get 6 when working out your total here, because you are 6 altogether here*
9	**Gr D LL**	(Reaching out for erasers to erase)
10	**T**	**Bangaph' abant' A-a** [gesturing] *How many people, A-a*
11	**Gr D LL**	(Start erasing)
12	**T**	**Surabha yima** *don't erase, wait*

13	**T**	**Bangaph' mabaphakamis' izandla abantw' abathand' umthubi?** *How many, put up your hands those who like yellow*
T No.	**S**	**Utterances/ actions**
14	**Gr D LL**	**(LL who like yellow put their hands up. The leader counts)**
15	**T**	**Bangaphi?** *How many are they?*
16	**Gr D L2**	Inaudible
17	**T**	**Apha kuni, nibhale bangaphi?** [repeats] *Here how many did you write?*
18	**Gr D L2**	Inaudible
19	**T**	**Lungsani ke** *Correct it*
20	**Gr D LL**	Group D LL erase the wrong number and put in the correct one
21	**T & L4**	(While group D members are correcting,) [discovers L 4] (writing the number under red instead of yellow),[pointing at the word yellow]
22	**T**	**Mthubi, nank' mumthubi, ngubomvu lo ubhale kuye** *Yellow, this is yellow, its red you have written under*
23	**L 4**	(Erases the number under red, and writes it under yellow)
24	**T**	**Itotal ke ngoku ithini? Khanidiboniseni, xa nilungisile nathi three phaya, itotal ithini?** *What is your total now? Add up, now that you have corrected and put three, there. What is it?*
25	**Gr D LL**	(Using fingers to calculate, whispering 6)
26	**Gr D L2**	**Iba ngu 6** *It's 6*
27	**T**	**Yilungise ke netotal** *Correct your total*

28	**Gr D LL**	(Erase their mistake and write the correct answer)

4.4.1.3 Analysis of the transcript

In turn 1, I asked the learners if they had finished. When they replied that they had, I asked for the total and realised that there was a mismatch between the total in their table (5) and the number of learners in Group D (6). Instead of just correcting the mistake, the teacher took the learners through a process of thinking, which involved the following steps:

1) Asking how many learners are in the group (turn 6)
2) When they answer correctly (6) pointing out that one of them has not chosen their favourite colour (turn 8)
3) Preventing the learners from erasing the inappropriate answer and from mechanically filling in the proper answer (turn 12)
4) Asking the learners to once again go through the process of choosing their favourite colours (turn 13)
5) Noticing that one learner is writing the number under the wrong heading (red instead of yellow), the teacher alerts the learner to this, who then changes it (turn 21)
6) The teacher then asks the group what the new total is, and when she gets the proper answer, signals that they have now finished this step (turn 27)

Only group D made the mistake of filling in an incorrect number as shown in Figure 4.2 above. This was an indication that the rest of the class mastered this step of the lesson.

4.4.1.4 Interpretation

I had assumed that the group task would be easy for the learners (that is, below their ZPD), but I discovered that for one group (D) even this task was a bit challenging. In looking at the transcript, I found that it had taken 27 turns for the expected answer to be arrived at. It may be the case that they were unused to doing this kind of data collection and found the task to be unfamiliar. This shows that a teacher's estimate of cognitive challenges can sometimes be inaccurate. I do believe

however, that with my mediation through mother tongue-based instruction (MTBI), the learners understood that they had failed to account for the colour choice of one member in their group and had to re-count.

The transcript also revealed that the problem may not always be a cognitive one, but may be due to a reading difficulty (a language issue). The error of one learner (L 3), who wrote the number under the wrong colour, could be due to the fact that this learner cannot read the name of the colour (either in isiXhosa or English). This learner generally did not know how to read, as I was able to see from other activities focused on reading (in isiXhosa classes). But because it was a group activity, I did not want to delay the group process by focusing on this one learner and mediating his reading difficulty. So, I just told him that he had put the number under red (in the table) instead of yellow, and I pointed to where yellow was. Then the learner L3 entered the number under the right colour. This is an instance of direct correction, with minimal mediation.

However, I have addressed the reading problem of Learner L3 outside the context of the group work in the Maths class. I will take up this issue of individual mediation in another part of this thesis, as that will be an example of my focus on individual learners who were below the ZPD of the group.

4.4.2 Episode 2

4.4.2.1 Context

The transcript below captured the interaction that took place in step 2, the teacher-fronted activity in which the learners were required to transfer the data collected from the various groups onto the master table. I had already prepared a blank master table on flip-chart paper, which I had stuck onto the chalk board. The master table looked like this:

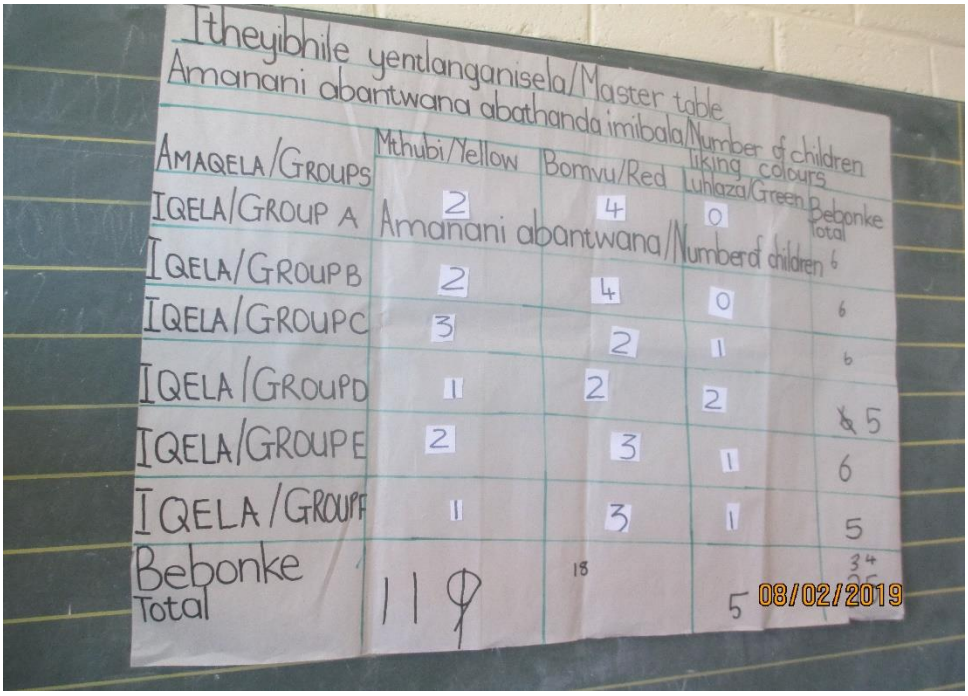


Figure 4.3: Master Table

For this activity they needed to be able to read/interpret their tables on their pieces of paper and use cut-out number cards to transfer what was on their tables onto the master table. An understanding of both the small table on their piece of paper and its relation to the master table was required.

All group members had the same information collaboratively constructed during step one. They all had to listen to the teacher's questions about how many people liked a particular colour in each group. Then they had to locate the number from their single strip table. They then needed to answer the question and look for the cut-out number answering the question and stick it in the correct place on the master table. This was a reasoning gap activity, as they were transferring information from the various groups to create a master table. It was going to be the same information from the various groups, but presented in a different form, the master table.

I started with something simple, by asking for the number of people who liked the colour yellow in each group. Yellow was the first colour in the first column. I made sure that I asked the questions sequentially starting from group A to F, in my mind trying to make it easy for everyone to pick up

what was required and how the master table could be filled. Be that as it may, I discovered a learner who was unable to read the information required from his piece of paper. The interaction below is indicative of the mediation that took place, taking the learner from being unable to fill in the table, to him being able to complete it.

4.4.2.2 Transcript of episode 2

T	**S**	**Utterances /actions**
29	T	**Group F bangaph abantw' abathand' umthubi**? *Group F, how many people like yellow*
30	Gr F LL	(hands up)
31	T	[Picks learner 4] **Bangaphi?** *How many are they*
32	L 4	**Bathathu** *There are three* (group *members say no and put their hands up)*
33	T	**Kuthen' usithi bathathu nje?** *Why are you saying there are three? Let us look*
	T	[approaching the learner]
34	T	**Aph' entweni yakho, kubhalwe bani?** *What is written on your table?*
35	L 4	(Inaudible)
36	T	**Ubhale bangaphi?** *How many did you write?*
37	**L 4**	[inaudible]

38	**T**	**Ubhale bangaphi?** *How many did you write?*
39	**L 4**	[inaudible]
40	**T**	**Ubhale bangaphi?** *How many did you write?*
41	**L4**	(Inaudible)
42	**T**	**Yeyiphi le ndaw' ujonge kuyo?** *Which place are you looking at?*
43	**T**	**Uph' umbal' omthubi/ khandibonise?** *Where is the colour yellow? Show me.*
44	**L4**	(looks for the word yellow, *and* points)
45	**T**	**Bangaph' abantw' abathand' umthubi?** *How many children like the colour yellow?*
46	**L**	**Uyi one** *There is one*
47	**T**	**Izak' izokhangel' u-one** *Come look for 1 then*
48	**T**	**Heke, sigqithe** *Let's move on*

The interaction above is what took place during the activity with the worksheet shown below. The completed single strip table is what learner L4 had to refer to, to transfer to the master table above.

Itheyibhile yentlanganisela/Master table

Amanani abantwana abathanda imibala/Number of children who like colours

	Mthubi/Yellow	**Bomvu/red**	**Luhlaza/Green**	**Bebonke/Total**
Iqela/ Group A				
Iqela/ Group B				
Iqela/ Group C				
Iqela/ Group D				
Iqela/ Group E				

Iqela/ Group F				
Bebonke/ Total				

GROUP F filled in:

Imibala/colours	**Mthubi/Yellow**	**Bomvu/Red**	**Luhlaza/Green**	**Bebonke/Total**
Inani labantu/Number of people	1	3	1	5
Bebonke/Total				

4.4.2.3 Transcript analysis

In turn 1, I asked group F how many people liked yellow. When L 4 responded very softly, through the show of hands that remained up, which was an indication that an incorrect answer had been given. I realized L4 was struggling to locate the answer from the table with data. Below are the steps I took in trying to help him understand what he needed to do to interpret the table.

1) I asked him how many people liked yellow in his group (line 29)
2) He gave me the numeral three, which was incorrect, then I asked him what number was written on his table (line 9)
3) Once he mumbled his answer, I picked up that he was unsure of his answer and place to find the correct answer. I then asked him where he was looking for his answer (line 41)
4) When he pointed at the wrong spot, I asked him where the name of the colour yellow was written (line 42)
5) He responded with the correct answer, that there was only one (line 45)

4.4.2.4 Interpretation

Learners had collected and filled in data themselves, which was a meaningful way to make an effort to cope with the new knowledge they were in the process of acquiring. I did this hoping they would be able to infer, deduct and solicit information when required to. L4 could not locate the answer from the single strip table. This was an indication of the children's unfamiliarity with working with columns and rows. Columns and rows are not part of their everyday diagrams which

they manipulate, but part of the data handling activities. My assumptions were, that my pedagogic strategy to teach data handling might have been different from what L4 was used to. I also assumed that L4 was below the required ZPD regarding data handling. This activity proved to be challenging for L4, when it came to soliciting a specific piece of information from the single strip table.

This was an information gap question, which was not cognitively challenging, but was simply to look for the information that was on his table to transfer it from the simple single group strip, to the various groups master table (Prabhu, 1987). The confusion of not knowing where to look for an answer, could have been that the process of internalisation took its time to happen, as step 1 involved filling in the table. Through mediation using language, I was able to assist L4 to locate the answer.

4.4.3 Episode 3

4.4.3.1 Context of the interaction

This was a teacher-fronted whole class activity on the completed master table. After producing the master table, learners had to answer information and reasoning gap questions asked orally. I wanted them to understand, analyse and interpret it. This activity required learners to listen to the teacher's questions, interpret them in relation to the master table and give responses. A few examples of the questions are given below:

1) Bangaphi abantwana abathanda umthubi kwiqela C/ How many children like yellow in group C?
2) Leliphi/ngawaphi i/amaqela athanda uluhlaza kancinane/ Which group/s like/s green the least?
3) Xa ujonge iqela B no C, leliphi elithanda ubomvu kakhulu/ If you look at group B and C, which group likes red the most?

4.4.3.2 Transcript of episode 3

Turns	speaker	Utterances/actions	time
74	**T**	**Bangaphi abantwana abathanda umthubi kwiqela C?** [repeats the question] **kufunek' ujonge phaya**[repeats pointing at the master table] *How many children like yellow in group C? you must look there*	0:00:05
75	**LL**	(Silent)	
76	**T**	**Sudlala ngerabha yiyek' irabha**[keeping order] *don't play with an eraser*	
77	**LL**	(Hands up)	
78	**T**	**Funeka ujonge phaya kula theyibhile ukuz' uyaz impendulo. Bangaphi abantwana abathanda umbala omthubi kwiqela C**[repeats the question] *You must look at the table, for you to know the answer. How many people like yellow I group C?*	
79	**LL**	(Hands up)	
80	**T**	[Picks a learner]	0:00:31
81	**L5**	**Bayi six** *There are six*	
82	**T**	**Hamb' uyosolathela, kwiqela C, wolathe umbala omthubi** [repeats the instruction] *Go point for us from group C, point at the colour yellow*	
83	**LL5**	(*goes* to the master table)	
84	T	[gives him a ruler to point]	
85	**LL5**	(points at group C and says) **bayi six** *There are six*	
86	**T**	**Kuthen' usithi bay six nje, wenze njani khandixelele** *Why are you saying there are six, how did you do it, tell me?*	0:01:08
87	**LL5**	(Inaudible)	0:01:12
88	**T**	Mh?	0:01:13
89	**LL5**	**Ndibalile** *I have counted*	0:01:15
90	**T**	**Ubale ntoni?** *What did you count?*	0:01:16

91	LL5	(Silent)	
92	**T**	**Ndiyaybona lent' uyenzileyo** *I can see what you've done*	
93	**LL5**	(Silent)	
94	**T**	[pointing] **Sithi abantwana abakwiqela C, abathanda umbala onjani? Omthubi** [together with LL5]. **Xa uze apha** [pointing at the word red] **unjan' lo mbala?** *We are saying, children in group C, who like which colour? Yellow. When you come here, what colour is this?*	
95	**LL5**	(Silent)	
96	**T**	[still pointing] **unjan' lo mbala?** *How's this colour?*	
97	**LL5**	**Ubomvu** *It's red*	
98	**T**	[moves the finger] **lon' unjani?** *How's this one?*	
99	**LL5**	**Ulhlaza** *Its green*	
100	**T**	**Sifun' ukwaz' abantwana kumbala onjani qha kuphela?** [showing one finger representing one] **kumbala o…..**[leaves it for the learner to finish the sentence] *From which only colour do we want to how many children there are? From the colour…..*	0:01:41
101	**LL5**	**Mthubi** *Yellow*	
102	**T**	**Omthubi, kwiqela C** [pointing] **bangaphi ke?** *The yellow one, how many are they then?*	0:01:46
103	**LL5**	**Bayi 3** *There are three*	0:01:47
104	**T**	*Very good*	

4.4.3.3 Analysis of transcript

In line 74 I asked how many people liked yellow in group C. This was an information gap question as the learners had to just locate the expected response. Learners were silent for a while. When hands went up, I picked L5, who gave the response in line (81) that there were six. In line 86, I asked why he was saying there were six, how did he get to six. His response was that he had calculated, which was his way of saying he had added up the numbers of people who liked all the colours in group C. I asked him what he had counted, and he was silent. I mediated by breaking the question down, and step by step went over group C and the different colours until we got to yellow. Using the key word only and a sign which was a finger representing it, I assisted L5 to understand that he needed to look at C under yellow only. That is when he discovered that the expected response was 3 in line (103).

4.4.3.4 Interpretation

This learner understood the question but did not know how to go about answering it. I had to mediate for him to discover the expected response. Not wanting to just tell him the expected response, I started by breaking down the question (Prabhu, 1987) into smaller chunks and rephrased it. In line (100) I used an open-ended question, allowing the learner to give his own interpretation of the question, which he did. Together step by step, with me pointing, and the learner reading, we went over the colours (yellow, red, green), sticking with group C. My mediation involved using the keyword only, and a gesture (one finger) matching the keyword. And that is when L 5 realised that I wanted to know people who liked only one colour (yellow) in group C, and he gave the expected response which was three. My assumptions were that L5 could not select the required information from the numbers that were representing the other two different colours (red and green).

4.5 Reconceptualising the lesson plan in terms of medium of instruction: English as medium

4.5.1 Episode 4

4.5.1.1 Context

For this step the goal was to teach the learners to transfer the information represented on the master table onto a bar graph, something that was new to most of them. My assumptions were derived from what I had done with them as far as step 3. Soliciting answers from single tables, comparing groups from the master table and soliciting a specific piece of information, proved to be challenging for two thirds of the class. For comparison purposes of how the LoLT can affect the interaction that needs to happen for effective mediation and cognition to happen in the classroom, short versions of the isiXhosa and English transcript will be shown and interpreted in this chapter. Full transcripts will be provided as appendices (see Appendix E).

This is the step where I switched from teaching in isiXhosa to English, as the lesson on data handling originated from an English CAPS prescribed book for grade 3 on page 30 (Borman et al., 2011).

Here I had to teach them what a bar graph was, what it is used for, what it looks like, and what it needs to have, and how the information on it comes about in order for it to be analysed and interpreted.

I had to introduce the learners to a bar graph, and how it should look like when information is represented on it. Transfer of information was done in the form of an interaction. I tried to ask questions and assist with answers, drawings and gestures to prompt some thinking. It was a step by step process of introducing a bar graph. It was a transfer of information stage. The master table and the bar graph used looked like this:

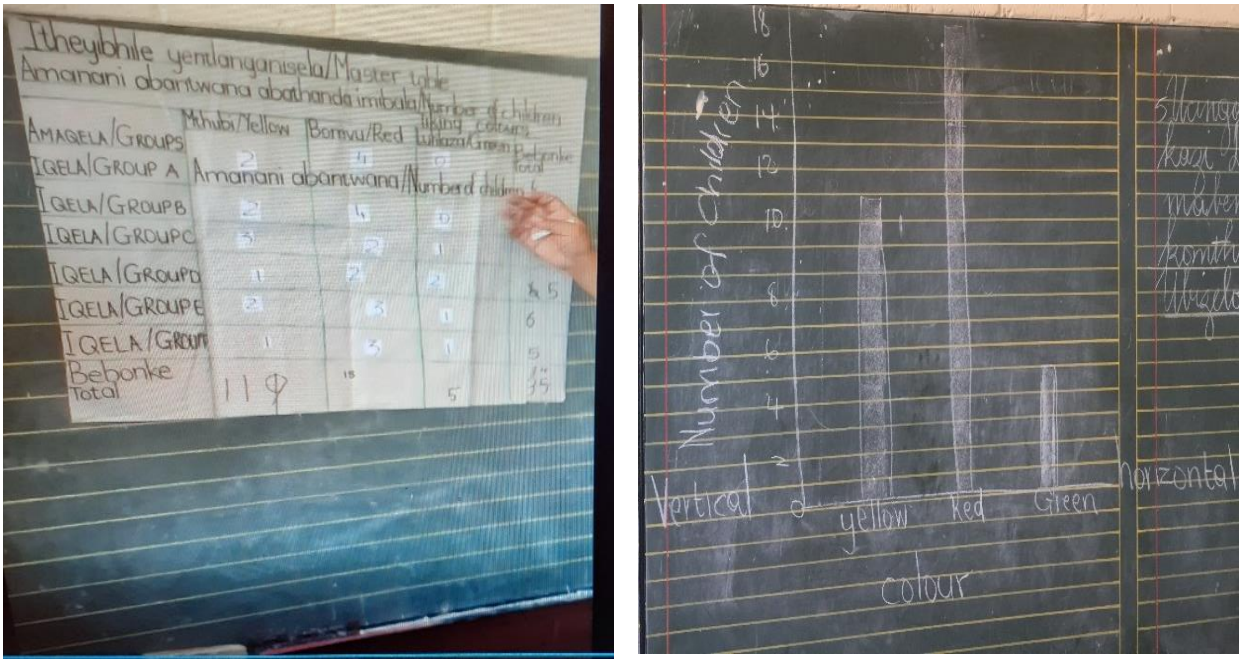


Figure 4.4: Master table and bar graph

4.5.1.2 Transcript of episode 4

T No	S	Utterances /actions
15	**T**	**Ngoku ke yonke le into siyenze apha, kufuneka siyenze egrafini. Kodwa ikhona into esizake siyenze ezawtshintsha kancinci. Asizuyenza ngesiXhosa, sizawtshintsha, sizawnxiba I English caps zethu. Masizinxibeni** *Now, what we have done here, we need to do it on a graph. But there is something that is going to change a bit. We will change and put on our English caps. Let us put them on*
16	**LL**	(Imitate putting on English caps)
17	**T**	**When we put on our English caps, what do we speak?**
18	**LL**	**English**
T	**S**	**Utterances / actions**
19	**T**	**English, Now, you gonna have to try your best and try your best to speak the language.** **Ok, now we have these** [pointing at the information on the master table] **but now we need to put this, this is the information** [pointing at the master table again] **in a graph.**
20	**T**	**Now, we have lines when we are drawing a graph, two lines. We have this line** [drawing a line starting from the top of the chalkboard down wards leaving space for graph labels]. **What do we call this line? The one that is straight up?**
21	**LL**	(Silent)

22	**T**	**The one that is straight up, does anyone know? starts with a v**
23	**LL**	(Silent)
24	**T**	**This line is a vertical line, what is the name of the line?**
25	**LL**	**Vertical line. (chorus)**
26	**T**	**I'm gonna write it here** [writing the name of the line]. **And its straight down, it's a vertical line. And then we have this one** [drawing a horizonal line joined at the bottom end of the vertical one]
T	**S**	**Utterances / actions**
27		**Does anyone know that one, it starts with an H? is there anyone who knows the line?**
28	**LL**	(Silent)
29	**T**	**It is a horizontal line. [**writes horizontal next to the horizontal line**]. This is a horizontal line nhe?** **So, when you are drawing a graph, you have to have these two lines. You have the vertical and the horizontal line** [pointing at them as she mentions them]
30	**T**	**Now who can remind me why are we drawing this graph? What are we going to do with the graph?**
31	**T**	(Hands up)

4.5.1.3 Analysis of transcript

Episode 4 was the step where co-construction of new knowledge was the goal; the knowledge of representing data in a different form, which was a bar graph. This I anticipated would be an exchange, as I had assumed that they had dealt with data handling from grade 2. This is how the interaction went:

In line 20 I asked them about the axes used in constructing a bar graph, a question to which I got a silent response. I mediated using gestures to show the vertical line, even giving the class a clue in line 22, that it starts with a v, but the silence continued. Seeing that they were unable to tell me, I had to give them the expected response and they had to say the word after me. The interaction was very minimal with a lot of silences, and inaudible mumbling. Mediation was difficult, as I could not tell what they were thinking.

4.5.1.4 Interpretation

I made the incorrect decision of introducing these learners to learning through the medium of English. This decision was influenced by) the lesson being derived from an English grade 3 CAPS prescribed learners book; ii) the pressure of knowing LoLT was going to change the following

year. Looking back, I prematurely exposed them to teaching and learning in their FAL, as it was still at the beginning of the first term. Cummins believes that a mother tongue should be the medium of instruction in a bilingual dual approach. He uses the metaphor of an equally cycled wheel (Cummins, 1996). The lesson turned into a safe talk session, where the learners and I were restricted from fully engaging with the concept targeted. I tried to engage them from the beginning of the lesson, and I could see it was going to be one of those rhythmically coordinated chorusing prompts and responses, which do not constitute learning (Hornberger & Chick, 2001). The timing was not right, which was a misjudgement on my side.

These learners had just been introduced to the biliteracy approach to teaching and learning. All the content subjects' instructions or notes (Maths and Life skills) were written in two languages side by side. Learners were not forced to read the English version of instructions or notes, but would voluntarily do so as and when they felt comfortable to try to. The language policy prescribes LoLT to be the mother tongue(isiXhosa). This is in line with Cummins' suggestion that, reinforcing children's' conceptual base in their mother tongue, provides a foundation for long term growth in English academic skills (Cummins, J, 1996, p. 104). These learners were going to switch to English used as LoLT the following year. Looking back, I realised that at this stage, I was only supposed to be concentrating on dealing with data handling concepts in their mother tongue. Once I was sure they have mastered data handling concepts, only then was I supposed to move on to using English as the LoLT, but in an English and not Maths lesson. So, they could not communicate with me, even if they knew the answers to my questions. They had not yet internalised the language. Communication was just limited to a single yes, no or a number. As I reflected on my lessons after interacting with them, I went back and prepared the same step of the lesson in isiXhosa, but starting at the master table stage. The context of the isiXhosa interaction is provided on the next page.

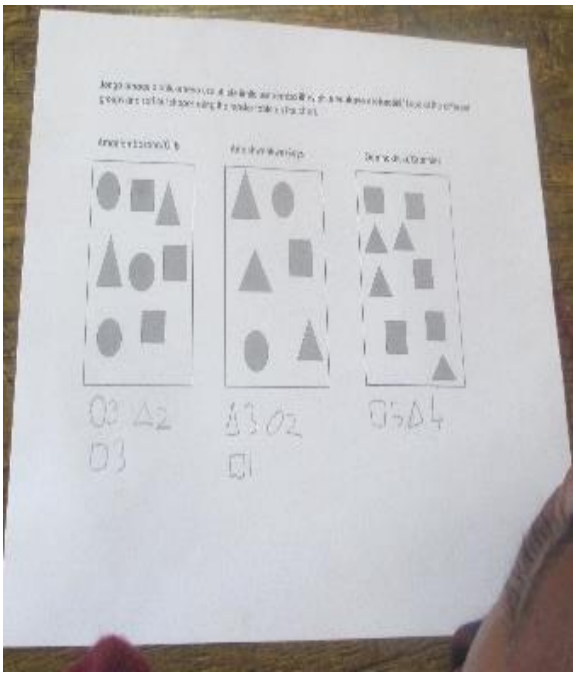
4.6 Reconceptualising lesson plan in terms of medium of instruction: isiXhosa as medium

4.6.1 Episode 5

4.6.1.1 Context of the interaction

After teaching using FAL, I felt I left out most learners in the class, as they could not communicate and comprehend what was taught. This step was developed to mediate bar graph drawing and was done in isiXhosa. I went back and prepared an isiXhosa worksheet, similar to step 1 and 2 using shapes. They were given a worksheet with three groups of people, boys, girls and grannies. For each group, there was a rectangle with circles, squares and triangles. First, they had to identify the shape, count and record how many per shape, per rectangle. Then this recorded information had to be transferred to a master table that was on the chalkboard. There were reasoning and information gap questions that had to be answered orally on the master table.

The information on the master table was then transferred to a bar graph. This is what the worksheet and the master table looked like:



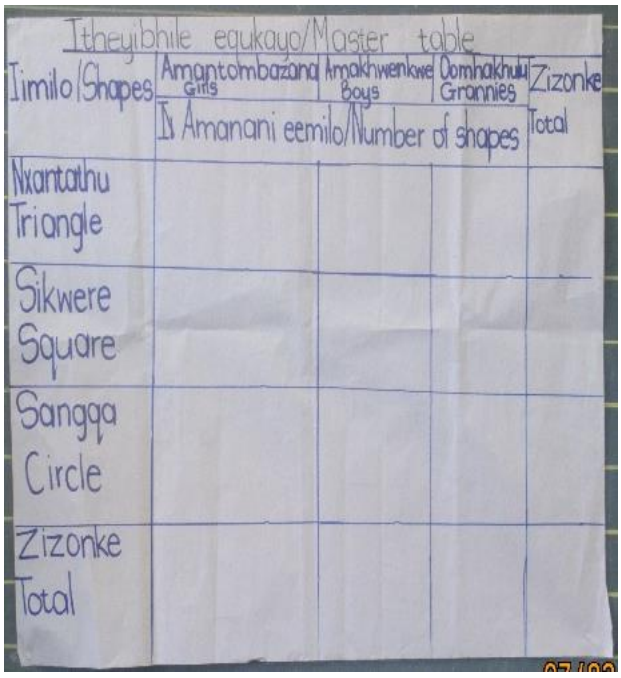


Figure 4.5: Worksheet and master table

4.6.1.2 Transcript of episode 4

T	S	Utterances /Actions	Time
		[Points at the column for totals]	**0:02:38**
55	**LL**	(Some calculating, a few hands up)	
56	**T**	[Pointing at the column for totals] **Zingaphi zizonke** *How many are they altogether?*	
57	**LL**	(Hands up)	
58	**T**	[Picks]	**0:02:46**
59	**LI**	**23**	
60	**T**	**Uthi ziyi-23** *She says there are 23*	
61	**LL**	**Yes teacher**	
62	**T**	**Sonke sifumana lonto?** *Are we all getting the same?*	
63	**LL**	**Yes teacher**	
64	**T**	Writes the answer 23 on the master table	
65	**T**	**Siwuphendule ke umbuzo, kuthe kanti, uthe umnt' obethetha wathi nantsiya** [pointing], **sathi leya, yeyona milo ithandwayo, sisatsho?** *We answered a question, somebody said this is the most liked shape, do we still maintain that?*	**0:03:11**
66	**LL**	Yes teacher	
67	**LJ**	No	
68	**T**	**Heke nanku u LJ uthi** [gesturing] **and ndiyamthanda, uwavulile amehlo.** [Pointing at the master table,] **kuthwe isikwere yeyona milo ithandwayo** *There you go, here is LJ, and I like her, she has her eyes open.*	

4.6.1.3 Analysis of transcript

In line 65 is a response to a question which I can remember I asked, but is not captured by the video. I asked which shape is the most liked by the three groups of people. The learners response was that it was a square. I then wanted to know why the learners were saying a square was the favourite shape. The response was because they saw the numbers 3, 4, and 5. Number 5 was the highest number of squares in the grannies' group, 3 was the highest number of squares in the boys' group. There was no group with 4 squares. The learners were making the mistake of counting even

the rectangle containing the shapes, and counting that as a square. After filling in the master table, I went back to the question asked earlier. The rest of the class was still looking at the master table. One learner strongly maintained that was not the right answer. A dialogue started between me and the class. Unfortunately, technology failed, as the battery of the video recorder died, and the dialogue could not be captured.

4.6.1.4 Interpretation

The answer given was not the correct answer, but I did not want to point that out at this stage. We were still filling in the master table and had not summed up the totals for the shapes yet. The answers given were according to what we had done thus far in the lesson. I wanted the class to go through the process of filling in the master table and getting the totals, then they were going to discover the correct answer. So, I went on to ask if they still thought squares were the favourite shape. One of the learners strongly disagreed. The learner who disagreed gave an answer that there were two favourite shapes, a square and triangle. We went back to looking at the totals, and those who discovered this also made a sign with their hands.

I went on to ask why they were saying there were two favourite shapes? The part where the learner strongly disagreed is the part that was not recorded as the battery of the recorder died. But as I remember, the learner argued that there were two favourite shapes. I went on to ask the class the reasons for her comment. Some were still in disagreement with her point. Instead of telling them what her reasoning was, as she was accurate, we all went back to the master table, and looked at the 2 shapes. At this stage of re-analysing the master table, more learners discovered that squares and triangles were tied and withdrew their disagreement. ‘

The context-embedded communication allowed me to ask for their reasoning, and they were able to negotiate meaning. Use of Cummins’ quadrant B combined with quadrant D for higher levels of cognitive reasoning around academic language, made meaning making possible. They were free to use their everyday language, but I had to extend it to quadrant D used for academic language, which I as teacher am expected to use to communicate. In the use of their basic communication

skills, there was a difference in the classroom interaction between the two mediums of instruction and this is presented below:

Differences between English and isiXhosa transcripts

English transcript	isiXhosa transcript
Too much teacher talk met with silent responses (48 turns) Safe talk.	Dialogue, with verbal and non-verbal responses. (109 turns dialogue)
Short non-elaborative responses allowing no follow up questions	Long elaborative responses, leading to more follow up questions
Majority of silent response from learners	No silent responses from learners
Learners could not express thought, teacher could not figure out what the learner's thoughts were.	Learners expressed their thoughts; teacher was aware of leaners' thoughts
Scared to try responding to questions and get inaccurate responses	Not scared to take risks, and get inaccurate responses

4.7 Reconceptualising the lesson plan in terms of the forms of mediation.

During my interactions with the learners over the seven steps of the lesson, different forms of mediation came into being. These forms of mediation were linked to the types of activities done. Sometimes, I would start with one form of mediation and would spontaneously change to a different form, warranted by a circumstance prevailing at that moment. Below is a selection of these forms of mediation as shown and analysed.

4.7.1 Episode 5: Peer mediation in groups

4.7.1.1 Context

In episodes 1, 2, 3, and 4, learners were actively and collaboratively engaged with data collection, recording, analysing, interpreting, and representing data in a different form. In this episode, I wanted to know how much of the activities in step 1, 2 and 3 had been internalised. They had to do a group activity that was similar to step 1, 2, and 3, but with different content (see appendix K).

4.7.1.2 Activity of episode 5

This type of mediation is difficult to record, as learners spoke very softly amongst themselves, but it did exist. In some instances, I would overhear learners talking to each other about the given task.

Tasks given to be done collaboratively, were tasks in which they performed better. I therefore assumed that there was some form of peer mediation taking place. As I have mentioned, it was difficult to capture learners' conversations, an example of an activity where peer mediation was plausible is given below:

Groups were given a table with favourite foods and the number of children who liked them, but the totals were missing for some, and for others, totals were provided and numbers missing in the middle (plausibly peer mediation and teacher mediation).

IQELA/GROUP R

Ukutya/food	**Umphokoqo/African salad**	**Ipasta/ Pasta**	**Umngqusho/Samp**	**Bebonke/ Total**
Inani Labantu/ number of people	3	6	1	

IQELA/GROUP S

Ukutya/food	**Umphokoqo/African salad**	**Ipasta/pasta**	**Umngqusho/samp**	**Bebonke/total**
Inani Labantu/ number of people		1	4	8

IQELA/GROUP T

Ukutya/Food	**Umphokoqo/African salad**	**Ipasta/Pasta**	**Umngqusho/samp**	**Bebonke/Total**
Inani Labantu/ number of people	6	1	3	

IQELA/GROUP U

Ukutya/Food	**Umphokoqo/African salad**	**Ipasta/Pasta**	**Umngqusho/Samp**	**Bebonke/Total**
Inani labantu/ number of people	2		4	12

Sebenzisa inkcukacha yamaqela ekwiitheyibhile ufakele kwitheyibhile yentlanganisela engezantsi/ Use the groups' information in the tables to fill in the master table below.

Itheyibhile yentlanganisela /Master table

Inani labantwana abathanda ukutya/ Number of children liking the food

	Umphokoqo/African salad	**Iphasta/ Pasta**	**Umngqusho/samp**	**Bebonke/Total**
AMAQELA/GROUPS	Amanani abantwana/ number of children			
IQELA/GROUP R				
IQELA/GROUP S				
IQELA/GROUP T				
IQELA/GROUP U				
Bebonke/Total				

Phendula imibuzo usebenzisa itheyibhile engentla /Answer questions using the table above

1) Bangaphi bebonke abantu kwiqela U/ How many people are in group U?

   ……..

2) Kwiqela R- bangaphi abantu abathanda ipasta/ In group R- how many people like pasta?

   ……

3) Leliphi/ngawaphi i/amaqela athanda umphokoqo kancinane/ Which group/s like African salad the least?

   ……

4) Xa ujonge iqela R no U, leliphi iqela elithanda umngqusho kakhulu/ If you look at group R and U, which group likes samp the most?

……

5) Bangaphi abantu abathanda umphokoqo kwiklasi yonke/ How many people like African salad from the whole class?

……

6) Kokuphi ukutya okuthandwa kakhulu yiklasi yonke/ Which food is the favourite (most liked by the whole class?)

……

4.7.1.3 Analysis

I cannot show a transcript for peer mediation for it was difficult to capture the learner's conversations during group activity. They spoke very softly so that even I could not make out what they were saying in their groups but could see they were talking. What they had to do here, is already explained in the context. Peer mediation can be seen from the results of the activity in comparison with the results of individual activity. A photo below shows peer mediation in a group.

Figure 4.6: Peer mediation

4.7.1.4 Interpretation

Results will not be interpreted here, but under the heading internalisation as a result of mediation.

4.7.2 Episode 6

4.7.2.1 Context

Step 6 was meant to challenge learners and see if they could construct, label and plot information on the bar graph. It was a step similar to step 1 and 5, where use of a given table with information was made, to construct a bar graph. They had to refer to a table drawn on the chalkboard to draw a bar graph. The table was similar to the tables done in step 1 and 5 but with different content. It is shown in Figure 4.7 on the next page.

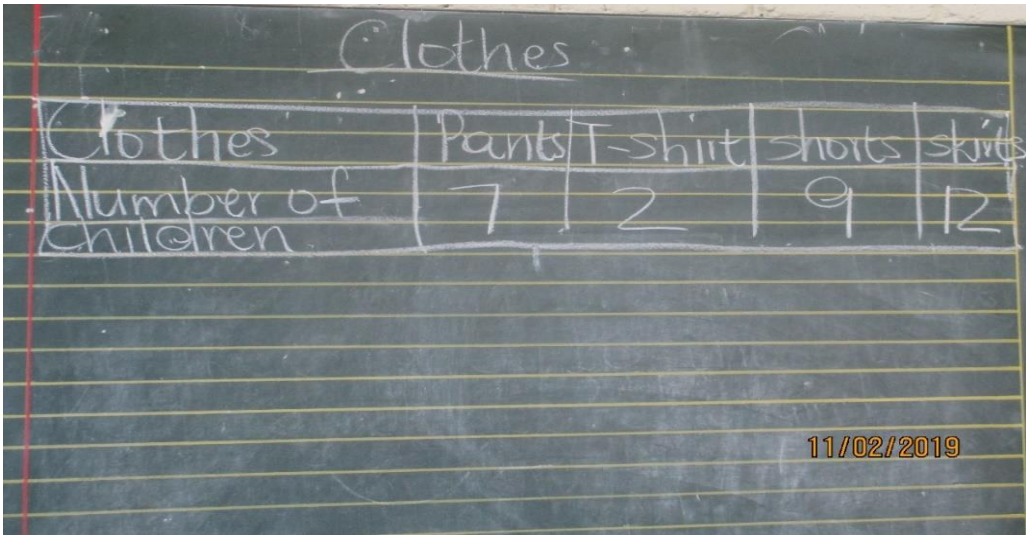


Figure 4.7: Episode 6 table

4.7.2.2 Transcript of episode 6

T	S	Utterances/actions
240	**T**	**Now, In front of you guys you've got a piece of paper, two pieces of paper. Nhe?**
241	**LL**	**Yes**
242	**T**	**Now, I'm going to give you a table. Listen L70. I am going to give you a table, and I want you guys to work as a group, to change that table into a bar graph.**
243	**T**	**I'm going to draw the table there** [pointing at the chalkboard] and I want you to change it into a bar graph
244	**T**	**But work as a group**
245	**LL**	(Talking starting to draw bar graphs, but they start writing their names.)
246	**T**	**Work as group, don't work alone** [reminding them]
247	**T**	**Don't worry about the date, don't write the date, no date writing. Leave your date, leave your name**
248	**LL**	(Some have written the dates some starting to draw lines using the ruler, others persisting on writing their names even though told not to worry about name writing)
	LL	(LL continue to struggle constructing the bar graph)
249	**Gr B**	(Talking as they are constructing)
250	**T**	**Are you guys talking?** [Asking other groups going around the class]
251	**LL**	(Lines not representing a graph drawn by group C, but columns with the names of clothing items)
252	**LL**	Going to the table to look for erasers
253	**T**	**Mm, just one rubber per desk**

254	**T**	**Now I want you to plot that information** [pointing at the table on the chalkboard that needs to be transferred into a bar graph, talking to Group C] **is that a bar graph?**
255	**Gr C**	(Stop and look at what they drawn and are quiet. They start looking for an eraser)
256	**T**	**L 65, why are starting drawing lines right at the top? Where's your vertical line? Where are you going to make the vertical line?**
256	**L 65**	(Quiet, looks up)
257	**T**	**The vertical line is the line that goes from up or down or down up**[demonstrating with hands] **like this**
258	**L 65**	(Stops, quiet, holding a ruler)
259	**T**	**A vertical line is that line that** [demonstrates with hands the direction of the vertical line]
260	**T**	Talking to L39 in group **A where would you put it?** [asking the number 1 on the vertical axis. L 39 counted in 2, but left no spaces between the numbers]
261	**L 39**	(Looks up, Silent)
262	**T**	**Where, where where, would you put it under? would you put it on your head? would you put on your desk?**[gesturing]**Now I need to know, where would you put your one here?** [Pointing at the vertical axis with numbers between zero and 2]
263	**L 39**	(Silent)
264	**T**	**If I asked you, now I want you to put 1, where would you put it?**
265	**L 39**	(Silent)
266	**T**	**Do you have a space for it?**
267	**T**	**Explain to them what it is they need to do** [talking to L 53 in group A]
268	**L 53**	Holds up his script to show his group members
269	**T**	**You must explain, they will just see the numbers and not know what they need to do** [talking to L 53]
270	**L 53**	(Looks at his script and keeps quiet)
271	**T**	**Talk to them**
272 273	**L 53**	**Kufunek' utsib' imigca**(pointing where lines need to be skipped) *You must skip a line*
  274	**T**	**Nantso ke** *There you go*
275 276	**L51**	**Umgc' oyi one?** (L59 from Group A asking L53) *One line?*
277 278	**L 53**	Ewe *Yes*
279 280	**L51**	**Nam nditsiba wona** *I am also skipping it*
281	**L 53**	(Looking at the group member's script sitting next to him). **iwrongo** (pointing at what at his own script, comparing it with the wrongly constructed graph)
282	**L 51**	(Corrects what L53 pointed out as wrong and gets back to confirm if she did it correctly this time).

283	**Gr B**	[Only one managed to draw one bar]. **Khawulezani** (L98 talking to group members) *Hurry up*
284 285	**Gr B**	L 98 abe t shirts bay 2 (leading the group) *For t shirts, there 2*

4.7.2.3 Analysis of the transcript

For this activity I was able to capture some of the learner's conversations. They had to draw a bar graph in their groups. This was their first attempt at drawing the bar graph after the teacher-directed whole class activity in episode 4 (See appendix M).

In line 273-282, L53 started mediating in his group by telling them how to draw the bar graph. He told group members to skip a line when writing numbers on the vertical axis. L51 asked if they needed to skip only one line. The exchange went on and they even compared answers.

4.7.2.4 Interpretation

The excerpt above shows that learners do mediate, but in their own way. They use BICS to communicate. This shows that BICS can be used to develop the process of learning and cognition**.** This form of mediation assists in dealing with a large class, where more groups need mediation than anticipated.

4.8 Teacher mediation in groups

This is mediation that happens in groups during group activity. This helps deal with a number of learners closely. It is meant to help learners that are introverts (shy) to go to the chalkboard or talk during whole class teacher-directed activity. This is the stage where a task is attempted publicly by different members of the class, and the outcomes of the attempt examined (Prabhu, 1987). It gives the learners and the teacher a chance to closely communicate without everybody else looking. It also shifts the focus onto one person. Lantolf claims: "The central and distinguishing concept of sociocultural theory is that higher forms of mental activity are mediated" (cited by Shabani, 2016, n.p.).

4.8.1 Episode 5

4.8.1.1 Context

Learners were given an activity similar to step 1, 2 and 3, but different content. The table had favourite foods with some totals missing, and others provided. It was a reasoning gap activity where they had to use the given numbers to work out totals. Where totals were given, they had to add them up and write their sum as the total. They also had to fill in the information from the single strip table to the master table and answer information and reasoning gap questions on it. The activity they had to do looked like this: (Appendix 4.9.1.1 Group classwork to test internalisation of step 1,2,3&4)

Group activity

Fumanisa amanani ashiyiweyo ugqibezele itheyibhile/ Workout the missing numbers and complete the table

IQELA/GROUP R

Ukutya/food	**Umphokoqo/African salad**	**Ipasta/ Pasta**	**Umngqusho/Samp**	**Bebonke/ Total**
Inani Labantu/ number of people	3	6	1	

IQELA/GROUP S

Ukutya/food	**Umphokoqo/African salad**	**Ipasta/pasta**	**Umngqusho/samp**	**Bebonke/total**
Inani Labantu/ number of people		1	4	8

IQELA/GROUP T

Ukutya/Food	**Umphokoqo/African salad**	**Ipasta/Pasta**	**Umngqusho/ Samp**	**Bebonke/ Total**
Inani Labantu/ number of people	6	1	3	

IQELA/GROUP U

Ukutya/Food	**Umphokoqo/African Salad**	**Ipasta/Pasta**	**Umngqusho/Sampa**	**Bebonke/ Total**
Inani labantu/ Number of people	2		4	12

Sebenzisa inkcukacha yamaqela ekwiitheyibhile ufakele kwitheyibhile yentlanganisela engezantsi/ Use the groups information on the tables to fill in the master table below

Itheyibhile yentlanganisela /Master table

Inani labantwana abathanda ukutya/ Number of children who like the food

	Umphokoqo/African salad	**Iphasta/ Pasta**	**Umngqusho/samp**	**Bebonke/Total**
IQELA/GROUP R				
IQELA/GROUP S				
IQELA/GROUP T				
IQELA/GROUP U				
Bebonke/Total				

Phendula imibuzo usebenzisa itheyibhile engentla /answer questions using the table above

1) Bangaphi bebonke abantu kwiqela U/ How many people are in group U?

……

2) Kwiqela R- bangaphi abantu abathanda ipasta/ In group R- how many people like pasta?

……

3) Leliphi/ngawaphi i/amaqela athanda umphokoqo kancinane/ Which group/s like African salad the least?

……

4) Xa ujonge iqela R no U, leliphi iqela elithanda umngqusho kakhulu/ if you look at group R and U, which group likes samp the most?

……

5) Bangaphi abantu abathanda uphokoqo kwiklasi yonke/ How many people like African salad from the whole class?

……

6) Kokuphi ukutya okuthandwa kakhulu yiklasi yonke/ Which food is the favourite (most liked by the whole class)?

……

4.8.2 Episode 6

4.8.2.1 Context

This was a step after the pre-tasks in step 1 and 5, where learners had to draw a bar graph in groups. I drew a table on the chalkboard but changed the objects into clothing items. I also changed the numbers in the table. They had to use the table to draw and plot the information on a bar graph. I

wanted to test how much internalisation of drawing a bar graph had happened. The table they had to refer to looked like this:

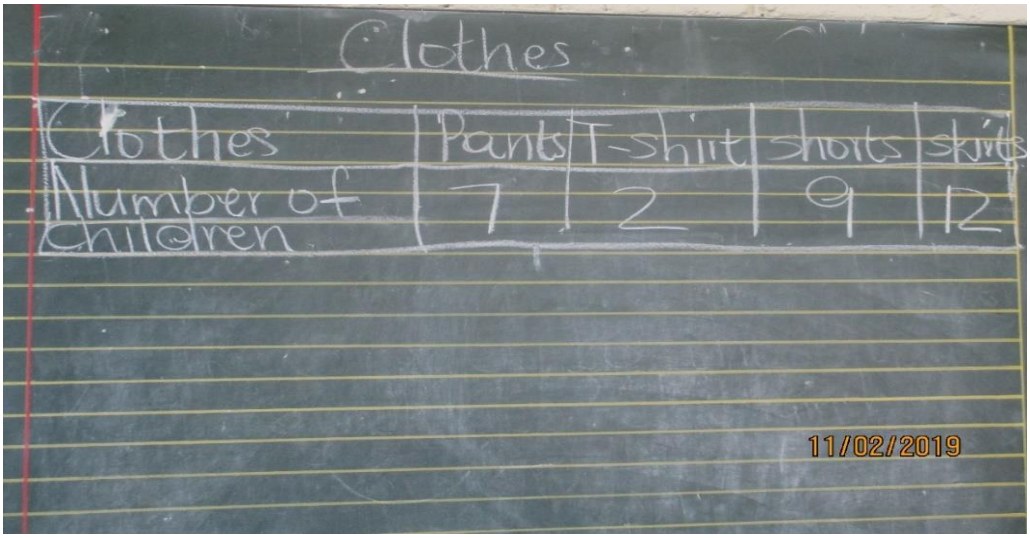


Figure 4.8: Episode 6 table

4.8.2.2 Transcript of episode 6

T	S	Utterances/actions
240	**T**	**Now, in front of you guys you've got a piece of paper, two pieces of paper. Nhe?**
241	**LL**	**Yes**
242	**T**	**Now, I'm going to give you a table. Listen L70. I am going to give you a table, and I want you guys to work as a group, to change that table into a bar graph.**
243	**T**	**I'm going to draw the table there** [pointing at the chalkboard] and I want you to change it into a bar graph
244	**T**	**But work as a group**
245	**LL**	(Talking starting to draw bar graphs, but they start writing their names.)
246	**T**	**Work as group, don't work alone** [reminding them]
247	**T**	**Don't worry about the date, don't write the date, no date writing. Leave your date, leave your name**
248	**LL**	(Some have written the dates some starting to draw lines using the ruler, others persisting on writing their names even though told not to worry about name writing)
	LL	(LL continue to struggle constructing the bar graph)
249	**Gr B**	(Talking as they are constructing)
250	**T**	**Are you guys talking?** [Asking other groups going around the class]
251	**LL**	(Lines not representing a graph drawn by group C, but columns with the names of clothing items)

252	**LL**	Going to the table to look for erasers
253	**T**	**Mm, just one rubber per desk**
254	**T**	**Now I want you to plot that information** [pointing at the table on the chalkboard that needs to be transferred into a bar graph, talking to Group C] **is that a bar graph?**
255	**Gr C**	(Stop and look at what they drawn and are quiet. They start looking for an eraser)
256	**T**	**L 65, why are starting drawing lines right at the top? Where's your vertical line? Where are you going to make the vertical line?**
256	**L 65**	(Quiet, looks up)
257	**T**	**The vertical line is the line that goes from up or down or down up**[demonstrating with hands] **like this**
258	**L 65**	(Stops, quiet, holding a ruler)
259	**T**	**A vertical line is that line that** [demonstrates with hands the direction of the vertical line]
260	**T**	Talking to L39 in group **A where would you put it?** [asking the number 1 on the vertical axis. L 39 counted in 2, but left no spaces between the numbers]
261	**L 39**	(Looks up, Silent)
262	**T**	**Where, where where, would you put, under? would you put it on your head? would you put on your desk? Now I need to know, where would you put your one here?** [Pointing at the vertical axis with numbers between zero and 2]
263	**L 39**	(Silent)
264	**T**	**If I asked you, now I want you to put 1, where would you put it?**
265	**L 39**	(Silent)
266	**T**	**Do you have a space for it?**
267	**T**	**Explain to them what it is they need to do** [talking to L 53 in group A]
268	**L 53**	Holds up his script to show his group members
269	**T**	**You must explain, they will just see the numbers and not know what they need to do** [talking to L 53]
270	**L 53**	(Looks at his script and keeps quiet)
271	**T**	**Talk to them**
272 273	**L 53**	**Kufunek' utsib' imigca** (pointing where lines need to be skipped) *You must skip a line*
  274	**T**	**Nantso ke** *There you go*
275 276	**L51**	**Umgc' oyi one?** (L59 from Group A asking L53) *One line?*
277 278	**L 53**	Ewe *Yes*
279 280	**L51**	**Nam nditsiba wona** *I am also skipping it*

281	**L 53**	(Looking at the group member's script sitting next to him). **iwrongo** (pointing at what at his own script, comparing it with the wrongly constructed graph)
282	**L 51**	(Corrects what L53 pointed out as wrong and gets back to confirm if she did it correctly this time).
283	**Gr B**	[Only one managed to draw one bar]. **Khawulezani** (L98 talking to group members) *Hurry up*
284 285	**Gr B**	L 98: Abe T- shirts bay 2 (one learner leading the group mixing isiXhosa with English) *For T- shirts, there are 2*

4.8.2.3 Analysis

The example of the bar graph drawn in step 4 from a teacher-directed whole class activity was still on the chalkboard. Learners were now expected to use the table drawn on the chalkboard to draw a bar graph and plot information from the table on the board. Each learner was given a grid paper to draw the bar graph. The step was challenging for almost all the learners. In line 256, I asked a learner who had drawn lines at the top of his page. He started drawing horizontal lines leaving no space for vertical lines. In line 283, only one learner managed to produce 1 bar.

4.8.2.4 Interpretation

This activity proved to not be a reasonable challenge, but learners were willing to attempt it. I could see that I needed to mediate all the groups, as only two learners seemed to know how to construct the bar graph. For that reason, I had to go back to whole class teacher-directed public mediation. I could not manage to do group mediation, as too many groups needed mediation to complete the task. This showed that class size can affect teacher mediation in groups, when the level of a challenge for an activity proves to be high.

4.9 Conceptualisation of lesson plan in terms of teacher-fronted lesson with teacher mediation

Teacher-fronted whole class activity is an activity that is a pre-task for the tasks that are to follow (Prabhu, 1987). It offers a teacher an opportunity to tap into the learners' logic of thinking. Such tasks are planned to invite public participation from the learners, and their mistakes are mediated publicly with everyone watching.

4.9.1 Episode 2

4.9.1.1 Context

The transcript below captures the interaction that took place in step 2, the teacher-fronted activity in which the learners were required to transfer the data collected from the various groups on to the master table. I had already prepared a blank master table on flip-chart paper, which I had stuck onto the black board. The master table looked like this:

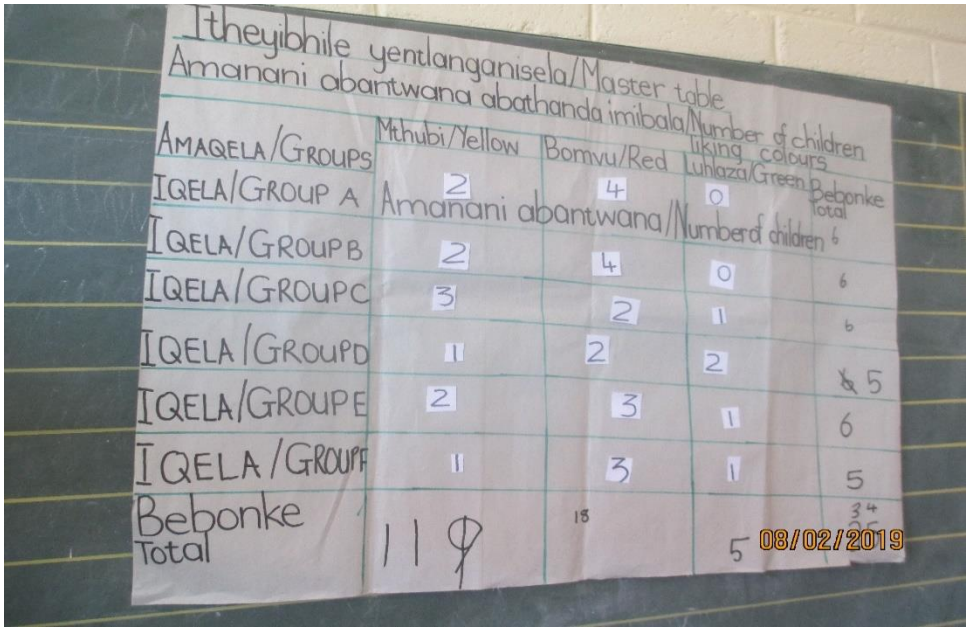


Figure 4.9: Master Table

For this activity they needed to be able to read/interpret their tables on their pieces of paper and use cut-out number cards to transfer data onto the master table. An understanding of both the small table on their piece of paper and its relation to the master table was required.

All group members had the same information collaboratively constructed during step one. They all had to listen to the teacher's questions about how many people liked a particular colour in each group and go look for the cut-out number from the table answering the question and stick it in the correct place on the master table. This was a reasoning gap activity, as they were transferring

information from the various groups to create a master table. It was going to be the same information from the various groups, but presented in a different form, the master table.

I started with something simple, by asking for the number of people who liked the colour yellow in each group. Yellow was the first colour in the first column. I made sure that I asked the questions sequentially starting from group A to F, in my mind trying to make it easy for everyone to pick up what was required and how the master table could be filled. Be that as it may, I discovered a learner who was unable to read the information required from his piece of paper. The interaction below is indicative of the mediation that took place, taking the learner from being unable to fill in the table, to him being able to complete it.

4.9.1.2 Transcript 2 of episode 2

T	**S**	**Utterances /actions**
29	T	**Group F bangaph abantw' abathand' umthubi**? *Group F, how many people like yellow*
30	Gr F LL	(hands up)
31	T	[Picks learner 4] **Bangaphi?** *How many are they*
32	L 4	**Bathathu** (group *members say no and put their hands up)*
33	T	**Kuthen' usithi bathathu nje?** *Why are you saying there are three? Let us look*
34	T	[approaching the learner]
35	T	**Aph' entweni yakho, kubhalwe bani?** *What is written on your table?*
36	L 4	(Inaudible)
37	T	**Ubhale bangaphi?** *How many did you write?*
38	**L 4**	[inaudible]

39	**T**	**Ubhale bangaph?** *How many did you write?*
40	**L4**	[Inaudible]
41	**T**	**Yeyiphi le ndaw' ujonge kuyo?** *Which place are you looking at?*
T	**S**	**Utterances/actions**
42	**T**	**Uph' umbal' omthubi/ khandibonise?** *Where is the colour yellow? Show me.*
43	**L4**	(looks for the word yellow, *and* points)
44	**T**	**Bangaph' abantw' abathand' umthubi?** *How many children like the colour yellow?*
45	**L4**	**Uyi one** *There is one*
46	**T**	**Izak' izokhangel' u-one** *Come look for 1 then*
47	**T**	**Heke, sigqithe** *Let's move on*

4.9.1.3 Analysis of transcript

In turn 1, I asked group F how many people like yellow. When L 4 responded very softly, through the show of hands that remained up, which was an indication that an incorrect answer had been given. I realized L4 was struggling to locate the answer from the table with data. Below are the steps I took in trying to help him understand what he needed to do to interpret the table.

1) I asked him how many people like yellow in his group (line 29).
2) He gave me the answer three, which was incorrect, then I asked him how many was written on his table (line 9).
3) Once he mumbled his answer, I picked up that he was unsure of his answer, and place to find the correct answer. I then asked him where he was looking for his answer (line 41).
4) When he pointed at the wrong spot, I asked him where the name of the colour yellow was written (line 42)

5) He responded with the expected response, that there was only one (line 45)

4.9.1.4 Interpretation

Learners had collected and filled in data themselves, which was a meaningful way to make an effort to cope with the new knowledge they were on the process of acquiring. I did this hoping they will be able to infer, deduct and solicit information when required to. L4 could not locate the answer from the single strip table. This was an indication of the children's unfamiliarity to work with columns and rows. Columns and rows are not part of their everyday diagrams which they manipulate, but part of the data handling activities. My assumptions were my pedagogic strategy to teach data handling might have been different from what L4 was used to. I also assumed that L4 was below the required ZPD regarding data handling. This activity proved to be challenging for L4 when it came to soliciting a specific piece of information from the single strip table.

This was a reasoning gap question. The students had to look for the information that was on his table to transfer it from the simple single group strip, to the various groups' master table (Prabhu, 1987).The confusion not to know where to look for an answer, could have been the process of internalization took its time to happen as step 1 involved filling in the table. Through mediation using language, I was able to assist L4 to locate the answer

4.10 Peer mediation in group on similar task type but different content

4.10.1 Episode 6

4.10.1.1 Context

A table was drawn on the chalkboard for the learners to use in drawing a bar graph. It was similar to the table used in step 2, but with different content. They had to use the table to draw a bar graph.

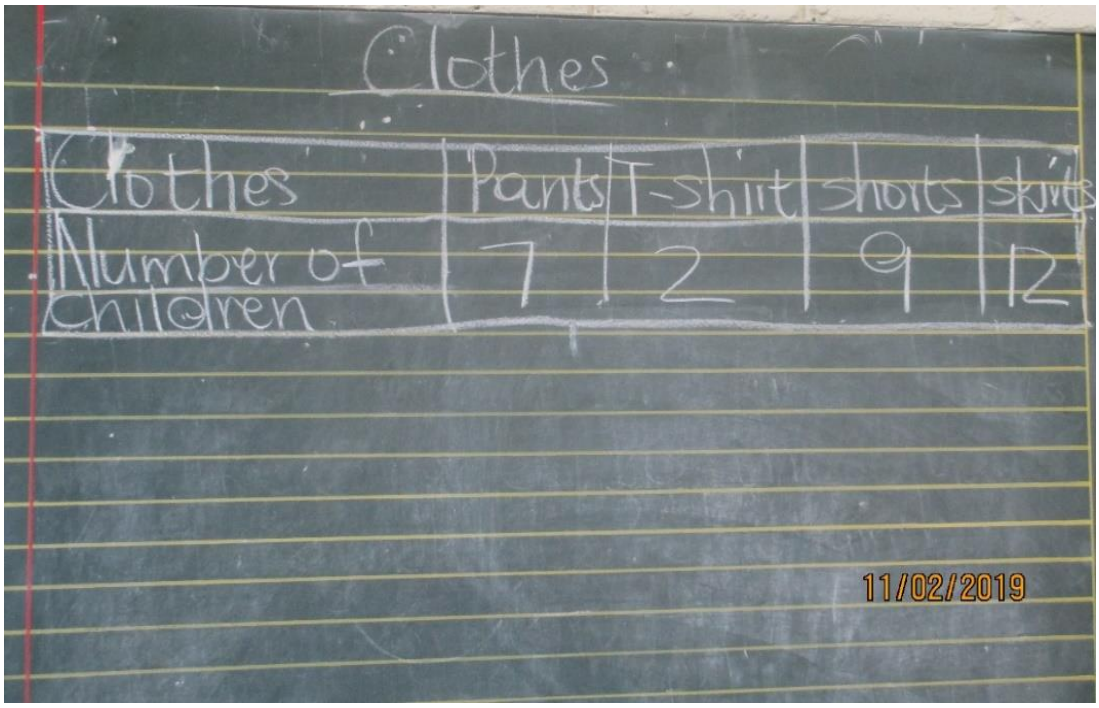


Figure 4.10: Bar Graph

4.10.1.2 Transcript of episode 6

T No	Speaker	Utterances/actions
240	**T**	**Now, In front of you guys you've got a piece of paper, two pieces of paper. Nhe?**
241	**LL**	**Yes**
242	**T**	**Now, I'm going to give you a table. Listen L70. I am going to give you a table, and I want you guys to work as a group, to change that table into a bar graph.**
243	**T**	**I'm going to draw the table there** [pointing at the chalkboard] and I want you to change it into a bar graph
244	**T**	**But work as a group**
245	**LL**	(Talking starting to draw bar graphs, but they start writing their names.)
246	**T**	**Work as group, don't work alone** [reminding them]
247	**T**	**Don't worry about the date, don't write the date, no date writing. Leave your date, leave your name**
248	**LL**	(Some have written the dates some starting to draw lines using the ruler, others persisting on writing their names even though told not to worry about name writing)
	LL	(LL continue to struggle constructing the bar graph)
249	**Gr B**	(Talking as they are constructing)

250	**T**	**Are you guys talking?** [Asking other groups going around the class]
251	**LL**	[Lines not representing a graph drawn by group C, but columns with the names of clothing items]
252	**LL**	Going to the table to look for erasers
253	**T**	**Mm, just one rubber per desk**
254	**T**	**Now I want you to plot that information** [pointing at the table on the chalkboard that needs to be transferred into a bar graph, talking to Group C] **is that a bar graph?**
255	**Gr C**	(Stop and look at what they drawn and are quiet. They start looking for an eraser)
256	**T**	**L 65, why are starting drawing lines right at the top? Where's your vertical line? Where are you going to make the vertical line?**
256	**L 65**	(Quiet, looks up)
257	**T**	**The vertical line is the line that goes from up or down or down up**[demonstrating with hands] **like this**
258	**L 65**	(Stops, quiet, holding a ruler)
259	**T**	**A vertical line is that line that** [demonstrates with hands the direction of the vertical line]
260	**T**	Talking to L39 in group **A where would you put it?** [asking the number 1 on the vertical axis. L 39 counted in 2, but left no spaces between the numbers]
261	**L 39**	(Looks up, quiet)
262	**T**	**Where, where where, would you put, under? would you put it on your head? would you put on your desk? Now I need to know, where would you put your one here?** [Pointing at the vertical axis with numbers between zero and 2]
263	**L 39**	(Quiet)
264	**T**	**If I asked you, now I want you to put 1, where would you put it?**
265	**L 39**	(Quiet)
266	**T**	**Do you have a space for it?**
267	**T**	**Explain to them what it is they need to do** [talking to L 53 in group A]
268	**L 53**	Holds up his script to show his group members
269	**T**	**You must explain, they will just see the numbers and not know what they need to do** [talking to L 53]
270	**L 53**	(Looks at his script and keeps quiet)
271	**T**	**Talk to them**
272 273	**L 53**	**Kufunek' utsib' imigca**(pointing where lines need to be skipped) *You must skip a line*
  274	**T**	**Nantso ke** *There you go*
275 276	**L51**	**Umgc' oyi one?** (L59 from Group A asking L53) *One line?*

277 278	**L 53**	Ewe *Yes*
279 280	**L51**	**Nam nditsiba wona** *I am also skipping it*
281	**L 53**	(Looking at the group member's script sitting next to him). **iwrongo** (pointing at what at his own script, comparing it with the wrongly constructed graph)
282	**L 51**	(Corrects what L53 pointed out as inaccurate and gets back to confirm if she did it accurately this time).
  283	**Gr B**	[Only one managed to draw one bar]. **Khawulezani** (L98 talking to group members) *Hurry up*
284 285	**Gr B**	L 98: Abe T shirts bay 2 (one learner leading the group, mixing isiXhosa with English) *For T-shirts, there are 2*

4.10.1.3 Analysis

In line 273-282 L53 he started mediating in his group by telling them how to draw the bar graph. He told group members to skip a line when writing numbers on the vertical axis. L 51 asked if they needed to skip only one line. The exchange went on and they even compared answers.

4.10.1.4 Interpretation

Learners do mediate, but in their own way. They use BICS to communicate. This shows that BICS can be used to develop the process of learning and cognition**.** This is the language that I can use to mediate but must always remember to get back to CALP.

4.11 Tests as self-mediation and internalization

Self-mediation and internalisation can only be realised through class tasks. Several class tasks were given to the learners, and the results will be presented and analysed below. These are results of the class work dated: 08-02-2019. The classwork had two sections. Below are the results for section 1.

4.11.1 Step 5 group activity

Questions 1-2 were information gap questions and questions 3-6 reasoning gap questions. The learner's scripts are in (Appendix M). The results below were analysed using Prabhu's framework of information and reason gap activities. Prabhu talks about reasonable challenge if approximately half the learners in the class are successful. He points out that it is possible for some learners to find a task easy, and others to find the very same task difficult (Prabhu, 1987). From the results, that possibility could be seen.

Table 4.1: Group activity results

Question no	Information gap questions	No correct	No incorrect	Reasoning gap questions	No correct	No incorrect
1	Information gap question	24	8			
2	Information gap question	17	15			
3				Reasoning gap question	18	14
4				Reasoning gap question	27	5
5				Reasoning gap question	18	14
6				Reasoning gap question	22	10

4.11.1.1 Information gap questions analysis

If you look at questions on the master table, question 1 and 2 were information gap questions. Question 1 shows a 75% pass which is quite high. The results show that learners found question 1 easy, or the group work could have had an influence on the results.

Question 2 shows a 56% pass rate, which proves that the question presented the learners with a reasonable challenge, even though it was an information gap question. This shows some level of success in mastering how to analyse and interpret the master table.

Table 4.2: Gap questions marks

No of learners	Marks obtained out of 4
32	4
1	3
1	2
1	1

4.11.1.2 Reasoning gap questions analysis

Question 3 and 5 showed a 56% percent pass rate. These results show that the questions posed a reasonable challenge for the learners. They had to look at all the groups' information, compare and analyse it.

Table 4.3: Drawing and plotting information from the master table on a bar graph

No of learners	Marks obtained out of 9
3	9
1	8
5	7
5	6
2	5
2	4
2	3
4	2
6	1
5	0

Sixteen obtained between 55 to 100% in this bar graph construction, which was 46% of the class who managed to obtain a reasonable mark. This proved to be a very difficult activity for the learners. It was a group activity, but that did not help much, like in previous activities. I could pick up as they worked, that it was their first time they were required to draw a bar graph and plot some information on it. The three that obtained a full mark, were from the same grade 2 class, which made me think they had dealt with drawing bar graphs before.

4.12 Interpretation in terms of Vygotsky and Prabhu's theories of internalization and mediation

Mediation compels the teacher to identify the learner's zones, for a teacher cannot mediate what he/she does not know. Learners need to be met where they are and be assisted to get to where they need to be. Vygotsky (1930, p. 80) defines ZPD as follows:

> The zone of proximal development is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.

The lessons have to be carefully thought of and planned to facilitate the process of taking learners from their everyday knowledge to new school knowledge. This can be done through interaction with the learners, using activities that will facilitate and promote cognition. For some learners to internalise learning there must be mediation.

From this chapter I came to the realisation that, mediation is necessary for cognition. Mediation leads to internalisation, which can later lead to externalisation of the internalised knowledge. Group work can facilitate both peer and teacher mediation. This form of mediation gives the teacher an opportunity for close interaction, and shifts the focus off only one person, which could bring about anxiety on the individual.

There is also one-on-one teacher mediation, which happens during teacher-directed whole class activities. A learner is mediated publicly with everybody watching and learning from it.

For effective mediation to take place, Prabhu's different activities need to be deployed. For the data handling lesson, I used the opinions, information and reasoning gap activities, that helped mediate learning and facilitate for cognition. Tasks need to be well planned and sequenced to help mediate the learning and internalisation process.

Language plays a very big role in mediating. Learner comprehension and cognition becomes meaningful when it is in their mother tongue. Cummins' talks about BICS which can be deployed

for comprehension without compromising CALP. He also claims that MTBI should be used throughout the foundation phase years. Concepts need to be learnt in the child's mother tongue.

Finally, a teacher needs to be able to deal with the different zones that children are at, and take advantage of the differences in ability, especially for group work. Interactions in the classroom between teacher and learners and amongst learners themselves, can only be prompted by the type of activities the teacher plans.

In my final chapter, I look at the central findings of the research, the limitations of the study and make recommendations for further research.

CHAPTER FIVE: CONCLUSION

5.1. Introduction

This chapter will present an overview of the key findings of the research and reflections on some of the insights generated from the interactions had with the learners in the process of doing the research.

To recapture the aim of the research, the study sought out to find out how teacher mediates learners' cognitive efforts creating the Zone of Proximal Development for the logico-scientific mode of cognition in a bilingual approach to education in the Foundation Phase in a township school?

My findings will be based on three issues that are still not being adequately addressed: the low level of cognitive work in South African schools, the failure to use the home languages of children throughout schooling as a medium of instruction and assessment (while providing excellent access to English as subject) and a top-down approach to both policy development and teacher professionalisation.

5.2 Findings related to the low level of cognitive work in South African schools

The key question of the study is, how does a teacher mediate the learner's efforts create the zone of proximal development for the logico-scientific mode of cognition in a bilingual approach to education. In our township schools, teaching has been about giving children activities that have low cognitive function level demands, that do not challenge and develop them from below the zone to a higher zone of proximal development. Vygotsky, in his book, *Thought and Language*, defines mediation as follows: "With assistance, every child can do more than he can by himself - though only within the limits set by the state of his development" (Vygotsky, 1986, p. 187).

This quote is crucial for teachers, as learner's come to school with some living knowledge that needs to be identified, developed and pushed forward through assistance, not transmission. How this can be done is through tasks that will assist with the identification, development and

advancement of the learners' cognitive development. In this study, use of Prabhu's three different activities, and opinion, information and reasoning gap activities were deployed to influence and inform my pedagogic practices. Prabhu's research did not find value in opinion gap activities, but for the beginning of the data handling lesson, this type of activity was crucial. Therefore, for some lessons, or parts of the lesson, opinion gap activities can be useful, a teacher has to make the judgement. For the data handling lesson interaction, I found all three activities useful in meaning making, as they helped with high levels of cognition in the process of teaching and learning. Through these tasks, and mediation, I was able to take the learners from where they were, to a different zone. At the end of the data handling lesson, they were able to construct a bar graph. Not only that, but it went as far as being able to use a computer to construct bar graphs. For activities and computerised graphs, see Appendix J.

5.2.1 Mediation of learner's efforts

The question of who mediates what, and how, is what has emanated from the study. As Vygotsky pointed out, that a knowledgeable adult or peer can provide assistance. In the case of this study, it was the teacher who was the more knowledgeable peer. For mediation to happen, a type of activity that will facilitate for mediation must be given. If learners are given low level cognitive challenging activities, there will be no space for mediation, and therefore, no development and advancement. Prabhu talks about the concept of reasonable challenge, which learners must meet with some effort. This can be achieved only through well thought out teacher's plans. Organising and adjusting the learning content to be taken for interaction, can bring about tasks with reasonable challenge. Not only that, but through use of information and reasoning gap activities as shown in my lesson plan, and will be seen from the interactions provided as transcripts in the Appendix F I had to change CAPS material to challenge the learner's effort, as activities on data handling did not take the issue of reasonable challenge into consideration.

Data handling mostly focused on the product (produced graph) not on the process. The process provides an opportunity to engage, challenge, assist and advance the learners, as it involves analytical skills. Therefore, I chose data handling for the logico-scientific mode. It gave me and the learner's an opportunity to explore the cognition process through meaningful interactions.

5.2.2 Learners' active engagement and participation in meaning making

Use of mother tongue instruction, especially in the foundation phase, is important for both teacher and learner interaction in meaning making. Cummins places emphasis on Mother Tongue Based instruction in a bilingual approach. One of the findings emanating from the study, is that, mother tongue language allows learners to make efforts in meaning making, guided by the teacher's redesigned activities. In his four quadrants, he talks about quadrant D, where learners are expected to produce academic language, whether in speech or writing as an outcome of their logical thinking (Cummins, 1996). Through the process of data collection, recording, analysing and changing it from one form to a different form, learners were actively involved in meaning making. Task sequencing, which involved dealing with tasks that were similar to the task that was going to test comprehension, offered opportunities of grappling with meaning making and internalisation with mediation provided. Thereafter, they would be followed by a similar task type, but with a challenge. In-between the interactions, there were written activities to test internalisation, which needed to be monitored. These written activities were in step 5, 6 and step 7. The sequence of tasks is a way of developing and advancing learners to a higher level of mental functioning.

At the beginning of the lesson, the learners experienced difficulty in step 2 and 3 of the seven-step lesson. But as they progressed, they internalised the analytical process, and were able to perform similar task types, but with different content. Testing internalisation during the process of meaning making is important, not testing at the end of it (product). A teacher's plan needs to carefully organise activities were there is teacher interaction involving meaning making, and comprehension must be tested in written form not only orally.

5.2.3 Learners' activities

Activities during interactions had to vary and used as build ups for the next. This is what Prabhu refers to as pre-tasks that set the scene for the task but are used as a scaffold. Learning is mediated in the process of meaning making, not after learning has taken place. From the seven-steps lesson I wanted the learner's to be able to interpret the bar graph, but the process of how it came about was crucial, for them to internalise graph analysis. The activities were developmental, and the level

of challenge became higher as the interaction progressed. Learners attempted to do the activities even if they found them challenging. In Section 4.7, episode 5, learners had to complete the single strip table and transfer the information to the master table to answer questions on it. This activity was dominated by reasoning gap questions, and they made efforts to answer them, as results show in Section 4.13. In step 6 they made efforts, even though they struggled, to create a bar graph, until I decided to stop them and started teaching how to construct a bar graph all over again, through an engaged interaction. In step 7 of the lesson they made efforts to individually construct a bar graph.

5.2.4 Mediation as both time- consuming and time-saving

The first interaction on data handling took me an hour. An hour from our timetable designed according to the weighting prescribed in CAPS document, is only possible if there is a double period in that particular subject. It took longer as I had to make sure that everybody was on board. In step 1, I had to mediate group D, as they were unable to see the connection between their choice of colours and how they had recorded the information. The whole class had to wait for me to mediate group D, and that took a little bit more time. Mediation can take more time, resulting in a teacher not adhering to the timetable.

Time was also saved, as when mediation is provided, internalisation gradually happens, leading to accurate responses. These responses do not need the teacher to go back over the same lesson, guiding them through what traditionally is called corrections, which was in itself a waste of time on meaningless interaction. During correction time, learners were usually told the expected responses, with no comprehension of how the decision was reached.

5.2.5 Peer mediation and group composition

I observed from the interactions I had with the learners, the importance of mixed ability groups for peer mediation to happen. As Vygotsky says it, the more knowledgeable learner can be the one providing assistance. This alleviates too many groups waiting for a teacher’s attention. In some groups the more knowledgeable learner takes the lead when a need for mediation arises. This gives the teacher more time to deal with a different group.

Peer mediation offers an opportunity for learners to use BICS to understand a cognitively challenging concept. The teacher needs to make sure to introduce them to CALP. So, BICS can be used to achieve CALP. The BICS language is not the official language that is accepted for a particular subject. For example, there is mathematical literacy that must be used, terms like more than, less than, that is CALP. When they use BICS, they use them as if it is a race competition and one runner overtakes the other; I do not have the video recording of the learner's using BICS, as they spoke softly most of the time. Therefore, in my daily interactions with them, when the majority could not understand the isiXhosa words I used, I would ask those who understood, to give the rest of the class alternative words. For example, in dealing with data handling, especially the comparison question, these were some isiXhosa terms I used, to facilitate comprehension. How many more squares are there to triangles? In isiXhosa zininzi kangakanani izikwere koonxantathu? Using BICS- zizogqitha ngabani oonxantathu izikwere? This is a section where we were orally analysing the master table on shapes – Section 4.6, episode 5 line (68).

5.3 The limitations of the study

As I have mentioned in Chapter One, I had been forced by circumstances to suspend my study started in 2017. This affected my research subjects, as at the end of 2018, looping, which was the school's internal policy (not prescribed by the Department of Education) came to an end. Looping involves keeping discrete groups of similarly aged students together for a period of several years with the same teacher (Grant, Johnson, & Richardson, 1996). This batch of research subjects is not a group that I had started with in grade 1. Initially I felt that this situation was a limitation to my research, as I was dealing with learners that were not used to being actively involved and challenged in the process of learning. The type of interaction with the current batch was different from the one I had with the looping batch. Looking back, the aforementioned circumstances offered me an opportunity to think of different ways to mediate in the process of creating a zone of proximal development. I developed strategies of finding out the learner's prior knowledge and was able bring them to the required level, to take them to a different zone.

Mediation through language and classroom dialogue was not as it should have been, given the use of reasoning gap questions. The dialogue occurred once, when I was repeating the master table

using isiXhosa as the medium of instruction. But the learner did not have peers to argue against, as they quickly withdrew once they saw how self-assured she was (see Section 4.6, episode 5, line 65-68). It would have been interesting to see what form the debate amongst learners would have taken, and my role as a teacher.

I also think it would have been interesting to see how other foundation phase teachers deal with data handling, and what type of activities they do. For this study I only have assumptions originating from the interactions I had with the new batch of children. I assumed from the responses I got from the learners, that they were used to only answering the questions on the bar graph, but did not know how it came about.

5.4 Implications of the study

One of the three aims I have listed in my introduction to Chapter Five was the 'failure to use home languages as medium of instruction' and the forcible replacing of home-language with English, especially for advanced concepts like data-handling.

Use of a biliteracy approach is crucial, especially for learners in our schools, where the LoLT changes to English from grade 4 onwards. It is important to introduce foundation phase learners to reading and writing in both languages (isiXhosa and English). Consistent exposure to reading in both languages, with emphasis on comprehension, could gradually help their communication and cognizing in both languages later on. Interaction was limited and restricted immediately I switched to English in step 4 of the lesson. This step was prompted by a lesson which emanated from an English CAPS prescribed book for grade 3, which they could not comprehend. The steps were attempts to contextualise the bar graph concept. The silence suggested that teachers focus on mother tongue instruction, at the expense of FAL, a language they are expected to use for learning from grade 4 onwards.

Teachers need to understand that mother tongue-based instruction does not mean low level cognition. When I challenged the learners to explain in their mother tongue (isiXhosa) why they had given a particular response, they were unable to articulate their reasons. With time, they were able to explain.

Teachers need to be flexible in interpreting CAPS, to adjust the learning content in a way that will facilitate cognition. Suggested activities from the textbook or the policy document need not be done exactly as suggested, but changes need to be made and how the activities will be made reasonably challenging and mediated. That way they can accommodate for meaningful interaction between the teacher and the learners to take place. The activities must make learners grapple with meaning making, and making efforts to move from where they are, to where they need to be.

The process of teacher learner interaction needs to be given value, as it is the one that can bring about real learning, if well thought of and planned. Unsuccessful efforts do not mean no learning has taken place.

Group work composition must be of mixed ability. Putting learners who are academically weak in a one group, will not bring about the collaborative work needed, for the process of cognition. Vygotsky (1978) claims that valuable learning takes place through social interaction with a knowledgeable tutor. Knowledge is socially constructed, before it is internalised and mediated.

A teacher's plan is a necessary condition for conducive classroom management and organisation and to help monitor the meaning making process. The interaction has to be goal directed, not just occurring because it has to. A plan of action should assist with meaningful interactions and learning efforts.

5.5 Recommendations

This section talks to recommendations arising from the findings of the study.

5.5.1 Awareness of theories and how to link them with practice

When I started teaching, I went and improved my studies, where I was introduced to theory. I became aware of a few theories, but I was not sure how they could be applied in my practice. I used my own uninformed methodologies, in accordance with my own interpretation. I could not convince anyone about my practices based on theory, but only based on practicality. As a teacher I need to be aware of the theory of mediation creating the ZPD. That can only happen through research.

5.5.2 Need for mother tongue LoLT in foundation phase

A firm foundation through MTBI must be built, by engaging learners with cognitively challenging activities to develop and advance the learner's ZPD. An understanding of both BICS and CALP is necessary, for one can be used to develop the other.

Mother tongue must be used to develop FAL, through the bilingual approach to teaching. I have at some instances in my interaction with learners, dealt with certain topics in isiXhosa before I dealt with them in English. For example, some of the English stories are non-fiction, which led to difficulty in comprehension when dealing with them in English as a subject. This is what happened to the data handling lesson, but this time it was done as Maths, not language. When I went back to the English lesson dealing with the bar graph, learner's comprehension was much better than when I attempted it the first time. Results for this will not be shown for this research, as it was an English lesson. This has a potential to address the problem that learners face from grade 4 onwards.

5.5.3 Consideration of teacher's input to the curriculum

Teachers need to be given space to arrange and adjust the curriculum as they see fit, without the rigid prescription of time and boundaries as to how far a teacher can engage a certain theme or topic. Teaching and learning depend on the interactions a teacher has with the learners. The pace at which that happens, largely depends on how the lesson was planned and how the learners respond to the interactions they have with the teacher.

5.5.4 Mediation

Mediation must be the centre of learning and teaching, for the process of learning and teaching is more important than the product, and there would not be a product without the process. If the process is not given priority, then the product becomes weak too. That is why we are still faced with challenges with regard to learners grasping and containing meaning. Scratching only the surface of the learning content with activities that do not promote meaning making, is not teaching and learning. The DBE needs to develop teachers with regard to mediation, so that they can understand the benefits of mediation, and its implementation.

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Appendices

Appendix A: Principal's Consent

I, Nompumelelo Frans, who has been a teacher for twenty-six years at C. M. Vellem H P, has been working with Michael and Esther Ramani on a biliteracy project for the past two and half years. We focused on trying out new and old teaching methodologies and merging them to come up with innovative learning and teaching strategies. During this time, we have been taking videos and photos with the learner's parents' permission obtained beforehand. I have now developed an interest to do my masters, and that is why I am requesting permission to use the data collected earlier on. I am also here by requesting permission to conduct research in my class using the learners. My research will include taking photos, videos, auto ethnographic journal and learner's work. Every step will be taken to make sure learner's identity and the school are kept unanimous. The person who will take the learner's photos and videos will sign a confidentiality form, of which you will have a copy of. All the data collected will be viewed by the person taking photos, and videos and my supervisors and myself only, and will not be used for anything else other than my research. Data will be destroyed on completion of my research. Learners will benefit from my research as it will improve my pedagogic practices which will improve teaching and learning. I have also written to the learner's parents asking for their permission as well. My head of department has also been written to, asking for permission from her as well, you will have copies of all the letters written to the various people, and the confidentiality form that will be signed by the photographer attached.

I will appreciate if you will respond in writing.

Thanking you in advance

N. G. Frans

Appendix B: HOD Consent

HOD CONSENT LETTER

I, Nompumelelo Frans, who has been teacher in the school for 26 years has developed an interest to study and do Masters. This is why I am asking permission to do research in my class using the learners in it. My research will include taking Photos, videos, learner's work and an autoethnographic journal. There will be a person coming into my class in my presence, taking photos and videos of the learner's, with parent's permission obtained. This person will sign a confidentiality form, which will ensure to safeguard the identity of the learner's and the school. All of this data will be used for my research only, and will be destroyed on completion of my Masters. I have also asked for permission from the principal as well. Copies of the principal and parent's permission request will be attached as well. Learners will benefit from the research as it will improve my pedagogic practices and teaching and learning will definitely improve as well.

I will very much appreciate if you could respond in writing.

Thanking you in advance.

N. G. Frans

Appendix C: Parents' Consent

PARENT'S CONSENT LETTER

Dear parents, I, Nompumelelo Frans, the class teacher of your child, who is currently teaching your children in 2019, hereby request permission to conduct research using your daughter/son. I have been working with Professors Michael Joseph and Esther Ramani for a number of years, and developed an interest in furthering my studies by doing Masters which requires me to do research using your daughter/son. This will involve taking photos, video recordings and some of their journals and written tasks. I promise this data will solely be used for my research purposes and will be safely kept and used between my supervisors, examiners and myself. Your daughter/son's identity will be kept unanimous and their eyes blocked. The photos and videos will be taken in my presence, by people who have signed a confidentiality form to safeguard your child's identity. I have also written to obtain permission from my Principal and my Head of Department. Your child will benefit from the research as I will learn different ways of teaching, which will improve my teaching methods and learning will be much better. I will appreciate if you respond in writing, stating your child's name and your name, your response and signature.

Thank you

N.G. Frans

Bazali, Mna Nompumelelo Frans ofundisa umntwana wakho, ndicela imvume yokwenza uphando ndisebenzisa umntwana wakho. Kwiminyaka eliqela edlulileyo bendisebenza no Professor Michael Joseph noProfessor Esther Ramani, ndade ndanomdla wokufunda ndenze iMasters, zona

ke ezifuna ukuba ndenze uphando ndisebenzisa umntwana wakho. Olu phando luzakubandakanya ukuba ndithathe iifoto, vidiyo rhekhoda ukubhalwa kwejenali nemisetyenzana yomntwana ebhaliweyo. Ndiyathembisa ukuba konke oku ndikukhankanyileyo kwakube kukhuselekile ,kwaye kuya kusetyenziselwa uphando kuphela, kwaye kuya kuba phakathi kwam, abathathi beefoto nevidiyo rekhoda abahlohli nabavavanyi bam kuphela. Amagama abo nobuso babo buyakufihlakala. Umfoti uyakutyikitya isivumelwano semfihlakalo phambi kokuba aqale. Ndicele imvume kwinqununu, nowongamele isebe labaqalayo apha esikolweni osentla kwam. Umntwana wakho uyakuzuza kolu phando njengoko ndiza kufunda ngeendlela ezahlukeneyo zokufundisa kuphucuke indlela endifundisa ngayo. Ndingavuya ukuba unokuphendula ubhale negama nefani yomntwana wakho ngokupheleleyo nelakho uze usayine wakube uchazile ukuba uyavuma okanye akuvumi.

Enkosi

N G. Frans

2019-02- 06

Mna ……..(ifani negama lomzali) ndiyamvumela umntwana wam u……(ifani negama lomntwana) ukuba abe yinxalenye yophando.

Ifani negama: …….. ……..

Isityikityo……..

I…….(surname &name of parent) give permission for my child ……..(surname &name of child) to be part of the research.

Surname &name…….

Signature

…….

2019-02- 06

Mna ……..(ifani negama lomzali) andimvumeli umntwana wam u……(ifani negama lomntwana) ukuba abe yinxalenye yophando.

Ifani negama: …….. ……..

Isityikityo……..

I…….(surname &name of parent) do not give permission for my child ……..(surname &name of child) to be part of the research.

Surname &name…….

Signature

…….

Appendix D: Bar graph transcript

IsiXhosa

T	S	Utterances /actions
1	**T**	**Yonke le nkcukacha, singayibonisa kwintoni?** *All this information can be represented on what?*
2	**LL**	**Bha graf** (chorus) *On a bar graph*
3	**T**	**Ndizayzoba ke, nizandincedisa nhe?** *I am going to draw it, are you going to help me neh?*
4	**LL**	**Yes teacher**
5	**T**	**Ndincediseni ke** *Help me then*
6	**LL**	(Chorus) **vertical line, horizontal line**
7	**T**	[Using a T square, draws a horizontal line, and says] **This is my vertical line**
8	**LL**	**No teacher** (chorus)
9	**L A**	**Yihorizontal leyo** *That's a horizontal line that one*
10	**T**	[Erases] **ok** **Ndiyenze njani** *How must I do it?*
11	**LL**	**Straight,** (some showing with fingers how to draw the vertical line)
12	**T**	**Oh, ndiyayibona ke ngoku, enkosi** [draws the vertical line] *Ok, now I can see, thank you*
13	**T**	**Ngubani ongavumelani nam ba yivertical line le?** *Who doesn't agree with me that this is a vertical line?*
T	**S**	**Utterances /actions**
14	**LB**	**Hayi** (softly) *No*

	LL	**Hayi yiyo** (stopping LR from disagreeing) *No, it is*
15	**T**	**Hayi kaloku suvumelana nam, akho nt'irongo xa ungavumelani nam, suvumelana nam, sizoyxoxa** *No, there is nothing wrong with you disagreeing with me. Let's disagree, so that we can negotiate*
	L C	(Stands up, points at the chalkboard, talking)
16	**T**	[Spots LS, quiets the class] **Khanimen uyathethat uLS**
17	**LC**	**Sorry teacher lena iright** (Pointing at the vertical line) *Sorry teacher, this one is correct*
18	**T**	**Oh, uthi lena iright** *Oh, he says this one is correct*
19	**LL**	(Chorus saying the next line to be drawn) **Horizontal line**
20	**T**	[Draws a horizontal line [talking to the whole class] **Namhlanje amanani, mamela, namhlanje asizubala ngo 2, sizawbala ngo one** *Today we are not going to count in twos, but in ones*
21	**T**	**Siqala kuban'kanene?** *From which number do we start?*
22	**LL**	(Chorus) **Naught, zero**
	T	[Writes the numbers]
	LL	(In chorus, call out the numbers for the teacher to write)
T	**S**	**Utterances /actions**
23	**LL**	**1,2,3,4,5,6,7,8,9,10**
24	**T**	**Siyamdinga u 10?** *Do we need the number 10?*
25	**LL**	(Chorus) **No teacher**
26	**T**	**Ngoba kuthen? kuthen singenawgqitha siye ku 10** **Jonge kula theybhile** *Why not? Why can't we proceed until 10? Look at that table*
27	**LL**	(Few hands up)
	T	[Picks]

28	**LD**	**Ngoba besibala ngo1** *Because we were counting in 1's*
29	**T**	**Noba besibala ngobani, besingenakugqitha kutheni singenawgqitha, siyuwtsho ku 10, siyowtsho ku 20** *Even if we were counting in any multiples, why don't we need to go up to 10, or 20?*
30	**L E**	**Kub'engekh'u 10** *Because there is no number 10*
31	**T**	**Akekho phi?** [repeats] *From where the number 10 missing is?*
32	**LL**	(Some talking, others hand up)
33	**T**	[Picks]
34	**LF**	**Kwi theybhil** *From the table*
35	**T**	**Very good**
T	**S**	Utterances /actions
36	**T**	**Ukhon' u 10 apha?** *Is there a number 10 here?*
37	**LL**	(Chorus) **No teacher**
38	**T**	**Ngoko asikhw' isdingo sokba simenze u10 phaya** *So, there is no need for us to have 10 there* [pointing at the bar graph]
	T	**Masilabhelishe ke** [writing on the vertical axis] *Let's label now*
39	**LL**	(Talking telling the teacher what to write) **inani Labantwana** *Number of children*
40	**T**	[Stops and asks] **Are those children?** [pointing at the master table] **Kukho noomhakhulu phaya** *There are also grannies there*
41	**LL**	**Number of people** (Changing from word children)
	T	[Erases children, writes people]
42	**T**	**Apha ngezantsi ndibhala ntoni?**

		What must I write below here?
43	**LL**	**Iimilo /shapes** *Shapes*
44	**T**	[Writes and finishes] **Ndimel'uqala ngeyiph' imilo ke ngoku** [pointing at the master table] *Which shape am I supposed to start with?*
45	**LL**	(Hands up)
	T	[Picks]
46	**LG**	**Nxantathu** (rest of the class saying triangle as well) *Triangle*
47	**T**	**Andizubhala negama, ndizawthatha ngowzoba yabon?** *I won't even write the word, I will just draw it, can you see?*
T	**S**	**Utterances /actions**
48	**T**	**Kulandele ntoni?** *What follows next?*
49	**LL**	**Iskwere** *A square*
50	**T**	[Draws a square]
51	**LL**	**Isangqa?** *A circle?*
52	**T**	**Khandxelele ke ngoku, bangaphi oonxantathu?** *Now tell me, how many triangles are there?*
53	**LL**	**Balithoba** *There are 9*
54	**T**	**Kufuneka ndiyibeke phi ke ngoku apha** [slowly going above the triangle to start making a bar Puts chalk]. **Ndiright apha?** *Where must I put the bar? Am I right to put it here?*
55	**LL**	(Chorus) **yes teacher**
	T	[Deliberately puts it almost past the triangle]
56	**LL**	**No teacher**

57	**T**	**Izondilungisa ke** *Come correct me then*
58	**LL**	(Hands up)
59	**T**	(Picks) I**za LX** [erases the bar drawn and rejected] *Come LX*
60	**LH**	(Learner X goes start constructing a bar above the triangle)
	LL	**Hayi** *No*
T	**S**	**Utterances /actions**
61	**T**	**Hay, sanuthi hay umnt' engekagfqibi, myeken' agqibe** *No, don't say no before a person is finished, let him finish*
	L I	(Finishes)
62	**T**	**Uright?** *Is he correct?*
63	**LL**	(Some say yes, others say no, but realize that he is right)
64	**T**	**Ok, size ngantoni?** *Ok, what's next?*
65	**LL**	(Chorus) **Ngeskwere** *With a square*
66	**T**	**Zingaphi izkwere?** *How many squares?*
67	**LL**	**Zilithoba** *There are nine*
68	**T**	[Construct the bar correctly but crookedly]
69	**LL**	**No**, (some say yes, others insist on) **No teacher**
70	**T**	[Picks a learner to come rectify]
	LK	[Erases the crooked bar, and draws one accurately]
71	**T**	**Uright?** *Is she correct?*
72	**LL**	**Yes teacher**
73	**T**	**Ok, zingaph' izangqa?** *How many circles are there?*

74	**LL**	(Chorus) **Zintlanu** *There are five*
T	**S**	**Utterances /actions**
	T	[Constructs a bar for the circles]
	LL	(Some learner's hands are up, while teacher constructs a bar, query 5 that is not clear)
75	**T**	[Writes 5 clearly] **Nankuya ke u -5 ndimbhalile uyabonakala** *There is -5, I have written clearly*
76	**T**	**Ok ke ngoku, masijongeni phaya** [pointing] *Ok now, let's look there*
77	**T**	**Zeziph' iimilo ezithandwa ngokufanayo?** *Which shapes are liked equally?*
78	**LL**	(Some hands up, others looking at the table)
79	**T**	[Pointing] **Jonga apha** *Look here*
80	**T**	[Picks]
81	**L M**	(Inaudible)
82	**T**	**Unyansile?** *Is that true*?
83	**LL**	**Yes teacher**
84	**T**	**Zinangaphi zombini?** *How many do they both have?*
85	**LL**	**Zina 9, 4** (two different answers given) **There are 9**
86	**T**	**L Z, uyavumelana nathi?** *Do u agree with us?*
87	**LN**	**Yes teacher**
T	**S**	**Utterances /actions**
88	**T**	**Oh, ok, yeyiphi imilo ethandwa kancinci?** *Which shape is the least liked?*

89	**LL**	(Hands up) Y**es teacher, yes teacher**
90	**T**	[Picks]
91	**L O**	**Sisangqa** *It's a circle*
92	**T**	**Uthi sisangqa, bangaphi abantu abathanda isangqa?** *She says it's a circle, how many people like a circle?*
93	**LL**	(Chorus) **Bahlanu** *There are five*
	T	[Repeats in agreement]
94	**T**	**Bangaphi aba bantu bebonke?** [pointing at the bar graph] *How many people are here altogether?*
95	**LL**	(Hands up)
96	**T**	[Picks]
97	**LP**	23
98	**T**	**Uthi bayi 23 unyansile/** *She says there 23, is that true?*
99	**LL**	**Yes teacher**
100	**T**	**Sibafumana njan'ba bayi 23?** *How did we know that there are 23?*
101	**LL**	(1 learner answers) **Udibanisa u 9 no 9 no 5** *You add 9 and 9 and 5*
102	**T**	**Uphi u 9 no 9 no 5 aba sibadibanisayo?** *Where is the 9, and 9 and 5 that we are adding up?*
T	**S**	**Utterances /actions**
103	**LL**	(Few hands up)
104	**T**	[Points out that the table is not to be used] **Izondibonisa lo 9 no 9 no 5 sibadibanisayo** *Come show me this 9 and 9 and 5 that we are adding up*
105	**LL**	(Few hands up)
106	**T**	[Picks]
107	**L Q**	(Goes to the bar graph on the chalkboard, points at all three bars)

108	**T**	**Ok, very good. Oright ke. Ngoku ndizakunika iphepha ozakubhala kulo. Eli liqubude** *Alright then, now I am going to give you a piece of paper to write on. Flip turn that one*
109	**LL**	(Working on the individual task given)

Appendix E: Transcript of interaction in episode five of step four [non mediation step]

T	S	Uterrances / actions
1	**T**	**Ebetheni, besikhangl' amanani atheni?** *What was wrong with these numbers, what numbers were we looking for?*
2	**L**	**Afanayo**(responds *randomly* without being picked, just immediately after the *question.* *That are the same*
3	**T**	**Amanan' afanayo, mm** [still expecting more responses] not ncam *Numbers that are the same, mm not exactly*
4	**LL**	(Hands up)
5	**T**	[Picks]
6	**L7**	**Amanan' angafaniyo** *Numbers that are not the same*
7	**T**	**Amanan' angafaniyo, entwenini?** *Numbers that are not the same, in what?*
8	**LL**	(2 hands up)
9	**T**	[Picks]

10	**L 8**	**Besikhangele sisonk'eklasini** *We were looking at how many we are in the class*
T	**S**	**Uterrances / actions**
11	**T**	**Besikhangele Sisonke eklasini** **Yonke lento, sikhangelba sibangaphi sisonk' eklasini** *We were looking how many we are in the class*
12	**T**	**And then ikhona ke apha ikhangela ntoni?** [pointing at the master table title] **imibala. Yintoni le ilapha?** *There is something here, what is it looking for? Colours, what is this here?*
13	**LL**	**Imibala** *Colours*
14	**T**	**Besikhangel' ba bangaph 'abantw'abathanda imibala leya mithathu, umthubi, ubomvu, uluhlaza, nhe?** *We were looking at how many people like the three colours, yellow, red, green, nhe*
15	**T**	**Ngoku ke yonke le into siyenze apha, kufuneka siyenze egrafini. Kodwa ikhona into esizake siyenze ezawtshintsha kancinci. Asizuyenza ngesiXhosa, sizawtshintsha, sizawnxiba I English caps zethu. Masizinxibeni** *Now, what we have done here, we need to do it on a graph. But there is something that is going to change a bit. We will change and put on our English caps. Let us put them on*
16	**LL**	(Imitate putting on English caps)
17	**T**	**When we put on our English caps, what do we speak?**
18	**LL**	**English**
T	**S**	**Utterances / actions**
19	**T**	**English, Now, you gonna have to try your best and try your best to speak the language.**

		Ok, now we have these [pointing at the information on the master table] **but now we need to put this, this is the information** [pointing at the master table again] **in a graph.**
20	**T**	**Now, we have lines when we are drawing a graph, two lines. We have this line** [drawing a line starting from the top of the chalkboard down wards leaving space for graph labels]. **What do we call this line? The one that is straight up?**
21	**LL**	(Silent)
22	**T**	**The one that is straight up, does anyone know? starts with a v**
23	**LL**	(Silent)
24	**T**	**This line is a vertical line, what is the name of the line?**
25	**LL**	**Vertical line. (chorus)**
26	**T**	**I'm gonna write it here [writing the name of the line]. And its straight down, it's a vertical line. And then we have this one** [drawing a horizonal line joined at the bottom end of the vertical one]
T	**S**	**Utterances / actions**
27		**Does anyone know that one, it starts with an H? is there anyone who knows the line?**
28	**LL**	Silent
29	**T**	**It is a horizontal line. [**writes horizontal next to the horizontal line]**. This is a horizontal line nhe?** **So, when you are drawing a graph, you have to have these two lines. You have the vertical and the horizontal line** [pointing at them as she mentions them]
30	**T**	**Now who can remind me why are we drawing this graph? What are we going to do with the graph?**
31	**T**	Hands up
32	**LL**	Quiet very few contemplating putting hands up
33	**T**	**What are we going to do with this graph?**
34	**LL**	One hand up
35	**LL**	Another hand joins
36	**T**	Picks the second hand that went up
37	**L 9**	**Numbers**
T	**S**	**Utterances / actions**
38	**T**	**Yes, we are going to put numbers, but which numbers?**

39	**L 10**	(Hand up)
40	**T**	[Picks L10]
41	**L 10**	**We going to see how many are people in the class**
42	**T**	**Mh, yes, we are going to see how many people are in the class, but we said we want to take this information [pointing at the master table] and put it on the graph. But we say we are going to plot it.**
43	**T**	**This information that is on this master table. [pointing] this is our master table. We are going to plot it on the…. graph nhe? that's why we are drawing this graph. Because, you can show us how many people like which colour, using the master table, but you can do that on the graph as well.**
44	**T**	**So, how do we do this on the graph? That's what we are going to learn, and that's what we are going to do.** **Now, what do you think the title of this graph should be?**
45	**LL**	(Silent)
46	**T**	**What do you think the title of our graph should be, because the graph needs a title? We can't have it without the title.**
47	**LL**	(Silent)
48	**T**	**What do you think the title of the graph should be?**
T	**S**	**Utterances / actions**
49	**LL**	(Silent)
50	**T**	**Do you know a title?**
51	**LL**	**Yes**
52	**T**	[Gets a big book. Opens it]. **Here I've got a story, and I have a title.** [Pointing at the story title] **what is the title of this story?**
53	**LL**	(Reading) **bear has a cut**
54	**T**	**Mm, now we need to have a title for the graph as well, what do you think the title should be?**
55	**T**	**Colours.** [repeating and answer given by L as the title of the bar graph, labelling the graph] **On the side to**….[pointing at the lower bottom of the horizontal side of the graph]
56	**LL**	**Ten twelve fourteen** [teacher writing numbers on the vertical side] **children saying the numbers before the teacher writes**

57	**T**	**So, we can count in twos, but we know that between this** [pointing between zero and two] **what number is there?**
58	**T**	[Picks]
59	**L13**	(Silent)
60	**T**	**L14**
61	**L14**	**One**
61	**T**	**One**
T	**S**	**Utterances / actions**
62	**T**	**Between two and four, there's number there**
63	**LL**	(hands banging chest)
64	**T**	**Don't make a sound, just do this** [showing them by putting a hand on the chest silently]
65	**T**	[Picks**]**
66	**L50**	**3**
67	**T**	**3, so, you know that between these numbers, there are numbers missing. Ok?** **We said here, we will write colours** [writes the label colours]. **A person who will be looking at this has to know that on this is side** [pointing at the horizontal axis] **there are colours, and on this one,** [pointing at the vertical axis] **we have a number, but a number of what?**
68	**LL**	(Few hands up)
69	**T**	**Numbers of what?**
70	**L16**	**Number of colours**
71	**T**	**Is it the number of colours? [**pointing to the numbers at the vertical axis]
72	**LL**	(Few hands up)
73	**T**	[Picks]
74	**L12**	**Number of those who like colours**
75	**T**	**Yes, the number of children, because we were talking about children here**
T	**S**	**Utterances / actions**
76	**T**	[Writing number of children on the vertical axis] **So, on this side, we have number of children** **And on this side, we have colours.** [pointing at the horizontal axis]

		And on this side, we have colours. [pointing at the horizontal axis]
77	**T**	**What is our first colour? Look at the master table**
78	**LL**	(Hands up)
79	**T**	[Picks]
80	**L 45**	**yellow**
81	**T**	**Our first colour is…. Yellow, so we have to start with the first colour, looking at the master table**
82	**Gr A**	(Arguing over the activity)
83	**Gr A**	(Working, constructing a bar graph) **yenzelw' urabha le** (talking to group members)
84	**T**	[talking to a different group] **khanindixeleni bethunani niyibhalile**……[*rest inaudible]*
T	**S**	**Utterances / actions**
85	**T**	**Nijongile aph' ebhodini? Igraf yakho izawphuma ixinene. Yandbon' uyellow ndimbhalile? Ndashiy' isthuba, ndobhal' ured, ndashiy' isthuba ndobhal' ugreen. Ngoku izawxinana le yakho ungakwazi nobhala kwezi ndawo**. [pointiont] **Yabon'umphokoqo ligama lide, umngqusho ligama lide.** (gr A is arguing not audible exactly about what. But they are comparing answers in some instances) *Are you looking at the chalkboard? You will produce a cluttered graph. Can you see that I have written yellow, I left space, I wrote red and left space and wrote green. Now, yours is going to be cluttered, that you won't even be able to write on these spaces. Can you see, African salad is a long word, Samp is a long word.*
86	**LL**	**Working in their groups, constructing a bar graphs**
87	**T**	[Talking to group C L 19 doesn't want to work with group] **u L19 akafun' usebenza nabanye, uyazenzela**
88	**T**	**Three, double**
89	**L20**	Inaudible
90	**T**	**Four, double**
91	**L20**	Inaudible
92	**T**	**Five double**
93	**L20**	Inaudible
94	**T**	**Six double**
95	**L20**	(Silent)
T	**S**	**Utterances / actions**

96	**L 20**	Quiet not answering all the questions
97	**T**	**The vertical line is the line that goes up** [using hands to show the vertical line] **or down, or like this** [hand starting from the bottom up]
98	**L 20**	Confused
99	**T**	**A vertical line is that line that**
100	**T**	**Where would you put it?**
101	**L 30**	**Quiet, looks up.**
102	**T**	**Where would you put it? Mh?, where where**
103	**T**	**Would you put it under, on your head, would you put it on your desk? Now I need know where you would put it.**

Appendix F: Logico-scientific mode transcript

IsiXhosa transcript

T	S	Utterances/ actions
1	**T**	**Uthi siskwere, unyansile?** *She says it's a squeare, is that true?*
2	**LL**	**Yes teacher**
3	**T**	**Kungoba kutheni esisithi siskwere nje mhalwumbi?** *Why are we saying it's a square?*
4	**L L**	(Hands up)
5	**T**	**Kutheni sivumelana nay' ba siskwere esthandwa kakhulu?** *Why do we agree with her that it's a square?*
6	**LL**	(Hands up)
7	**T**	[Picks]
		Simamele, nguban' lu culayo? *Who is singing?*
8	**L A**	Ubon'u thathu, none abone no ntlanu *She sees three, four and five*
9	**T**	**Ubona ntoni?** [Talking to the whole class] *What does she see?*
10	**LL**	**Uthathu none nontlanu** *Three, four and five*
11	**T**	**Baze benze ntoni xa bebonke Xa bedibene?** *What do they add up to altogether?* [gesturing] repeats
T	**S**	**Utterances/actions**
12	**T**	[Picks]
13	**LB**	**Zidibene ngu9?**

		Is it nine, altogether?
14	**LL**	**Yes teacher**
	T	[Writes 9 on the chalkboard]
	L C	**10, 10** (Randomly, and insisting)
	T	[Waits some children insist the answer is 9]
	LL	**9** (Majority saying) **its 9**
15	**T**	**Siyavumelana naye?** *Do we agree with her?*
16	**LL**	**Yes teacher** (chorus)
17	**T**	[Writes 9 on the master table chart]
18	**T**	[Pointing at the master table] **apha, sizazfumana bangaphi? Oonxantathu?** *How many triangles will we find?*
19	**LL**	(Hands up)
20	**T**	**Oonxantahu bangaphi bebonke, abathandwayo phaya**, [repeats] *How many triangles are liked?*
21	**LL**	(Hands up)
22	**T**	[Picks]
T	**S**	**Utterances/actions**
23	**LD**	**Thoba** *Nine*
24	**T**	**Unyansile?** *Is that true?* [Writes 9 on the master table]
25	**LL**	**Yes teacher**
26	**T**	[Pointing] **izangqa?** *Circles?*
27	**LL**	(Hands up)
28	**T**	[Picks]
29	**LE**	**Zihlanu** *There are five*
39	**T**	**Zihlanu, unyansile?** *There are five, is that true?*
31	**LL**	**Yes teacher**

32	**T**	**Sifun' ukwazi ke ngoku, amantombazana?** Pointing at the master table, on the girl's column] *We now want to know, what about girls?*
33	**LL**	(Hands up) **yes teacher yes teacher**
34	**T**	[Picks]
35	**LF**	(Inaudible)
36	**T**	[Rephrasing the question] **Zizonke imilo ezi zingaphi** [pointing] *How many shapes are there altogether?*
T	**S**	**Utterances /actions**
37	**LF**	**Zi eight** *There are eight*
38	**T**	**Uthe zingaphi?** [Asking the class] *How many did she say?*
39	**LL**	**Zi eight** *There are eight*
40	**T**	**Khon' omnyu' oneliny' inani?** *Is there anyone with a different number?*
41	**LL**	**No teacher**
42	**T**	[Pointing] **zingaphi iimilo ezisemakhwenkweni?** *How many shapes do boys have?*
43	**LL**	(Hands up) **yes teacher yes teacher**
44	**T**	Picks
45	**LG**	**Ziysix** *There are six*
46	**T**	**Uthi ziyisix, unyansile?** *She says there are six, is that true?*
47	**LL**	**Yes teacher**
48	**T**	**Zingaph' iimilo ezikomhakhulu?** *How many shapes do grannies have?*
49	**LL**	(Hands up) **yes teacher yes teacher**
50	**T**	[Picks]
51	**L H**	**9**
52	**T**	**Unyansile?** *Is that true?*

53	**LL**	**Yes teacher**
54	**T**	[Writes the answer on the master table]
T	**S**	**Utterances /Actions**
		[Points at the column for totals]
55	**LL**	(Some calculating, a few hands up)
56	**T**	[Pointing at the column for totals] **Zingaphi zizonke** *How many are they altogether?*
57	**LL**	(Hands up)
58	**T**	[Picks]
59	**LI**	**23**
60	**T**	**Uthi ziyi-23** *She says there are 23*
61	**LL**	**Yes teacher**
62	**T**	**Sonke sifumana lonto?** *Are we all getting the same?*
63	**LL**	**Yes teacher**
64	**T**	Writes the answer 23 on the master table
65	**T**	**Siwuphendule ke umbuzo, kuthe kanti, uthe umnt' obethetha wathi nantsiya** [pointing], **sathi leya, yeyona milo ithandwayo, sisatsho?** *We answered a question, somebody said this is the most liked shape, do we still maintain that?*
66	**LL**	Yes teacher
67	**LJ**	No
68	**T**	**Heke nanku u LJ uthi [gesturing] and ndiyamthanda, uwavulile amehlo. Pointing at the master table, kuthwe isikwere yeyona milo ithandwayo** *There you go, here is LJ, and I like her, she has her eyes open.*
T	**S**	**Utterances /actions**
69	**T**	**Uth'u L J ha-a asiyona mpendulo leyo** *She says that's not the only answer*
70	**T**	**Yeyiphi LJ, eyona milo ithandwayo?** *Which one is the most liked LJ*
71	**LJ**	**Ngunxantathu nesikwere** *It is the triangle and square*

72	**T**	**Uthi ngunxantathu nesikwere** *She says it's the triangle and square*
73	**T**	**Makaphakamis'umnt'othi, haybo, uyaphazama** **Mna andivemelani naye** *Hands up anyone who thinks that she is mistaken, I don't agree with her*
74	**T**	[Repeats]
75	**LL**	**No**
76	**T**	**Nanku uLK ingath' ufun' uthetha** *Here, it looks like LK wants to say something*
77	**L K**	Withdraws, sleeps on his desk
78	**LM**	**Zimbini ezithandwa kakhulu** *There are two favourites*
79	**T**	[Repeats In agreement]
80	**T**	**Kungoba kutheni sisithi zimbini?** Why do we say there are two?
81	**LL**	Hands up
82	**T**	Picks
83	**LN**	**Kuba zinenani elifanayo** *Because they have the same number*
84	T	**Repeats in agreement** [pointing] **apha, iimilo ziy-9, nalapha ziy-9** *Here there are 9, and over there are 9*
85	T	**Yeyiphi imilo elandela unxantathu noskwere?** [Repeats adds most liked] *Which shape is the second liked, after the triangle and square?*
86	LL	(2 hands up, some pointing at the master table, looking for answers)
87	T	[Picks]
88	LO	(Inaudible)
89	T	**Yeyiphi imilo elandela unxantathu nesikwere**[gesturing] **ngoba unxantathu nesikwere babambene, yeyiphi ke ngoku elandela**

		Which shape is the second liked following the triangle and square? The triangle and square, are equally liked, which one is the second liked after them?
90	LL	(More hands up)
91	T	[Picks]
92	LP	**Sisangqa** *It's a circle*
93	T	**Yintoni?** [talking to the whole class] *What is it?*
94	LL	**Sisangqa** (chorus) *It's a circle*
95	T	**Yeyiphi imil' engathandwayo? [**Repeats] *Which shape is not the favourite?*
T no	**S**	**Utterances /actions**
96	LL	(Hands up $^{3}/_{4}$ of the class)
97	T	[Picks]
98	LQ	**Sisangq**a *It's a circle*
99	T	**Sisangqa** [in agreement] *It's a circle*
100	T	**Ngabaphi abantu abanemilo abangyifuni noyibona, abangayithandiyo?** *Which group of people has a shape that they don't like at all?*
101	LL	(Not many hands up)
102	T	**Kwaba bantu bathathu, sinamantombazana, amakhwenkwe nomhakhulu. Ngabaphi abanemilo abangayithandiyo?** [gesturing] **iyeyiphi lo milo?** *From the three groups of people, we have girls, boys and grandmothers, which group has a shape that they don't like at all? And what shape is that?*
103	LL	(More hands up)
104	T	[Picks]
105	LR	(Inaudible)
106	T	**Andimva tu, uthethel'ezantsi** *I can't hear at all; he is speaking very softly*
107	LR	(Does not repeat)
108	T	[Picks LS]

109	LS	**Amakhwenkwe** *Boys*
110	T	**Amakwhenkwe? Yeyiphi le milo angayithandiyo amakhwenkwe?** *Boys? Which shape don't they like?*
111	T	**Khanimen' yim' yim' yima, uthi ngamakhwenkwe [goes to the master table and points] Nang' amakhwenkwe, yeyiphi le milo angayithandiyo amakwhenkwe?** *Wait, [repeatsx3], she says its boys, here are the boys, what shape don't they like?*
112	LS	(Silent)
113	T	**LS nang' amakhwenkwe nhe? [**Pointing at the boy's column from the master table running the pointer down all the shapes] **yeyphi le milo angayithandiyo**? *LS, here are the boys, what shape don't they like?*
114	LS	**Sisangqa** *It's a circle*
115	T	**Uthi ngamakhwenknwe, awasthand' isangqa**[running the pointer down the boys column from the master table] *She says its boys who don't like the circle*
116	T	Pointing] **masijongeni isangqa, zingaphi izangqa emakhwenkweni?** [asking the class] *Let's look, how many circles are there in the boys' column?*
117	LL	(Chorus) **zimbini** *There are two*
118	T	**Unyansile ke ngoku uba amakhwenkwe awasthand' isangqa?** *It's true that boys don't like the circle?*
119	LL	Chorus) **no teacher**
120	T	**Ngabaphi abantu abanemilo abangayithandiyo?** *Which group has a shape that they don't like?*
121	LL	**Yes teacher** (more hands eager to answer)
122	T	Picks
S		

123	LT	**Oomhakhulu** *Grandmothers*
124	T	**Oomhakhulu [in agreement]. Yeyiphi le milo bangayithandiyo oomhakhulu** *Grandmothers, what shape don't they like?*
125	LL	Hands up
126	T	Picks
127	LT	**Sisangqa**
128	T	Pointing] Uthi sisangqa, masibon'uba unyanisile na *She says it's a circle, let's see if that's true*
129	LL	Some say no, majority says a strong yes
130	T	Ok, akho nomnye koomhakhulu othandayo isangqa. Ok sizawgqitha ke apha. Yonke le nkcukacha[pointing] singayibonisa kwentoni?
131	LL	Bha grafu together
132	T	Kwibha grafu

Appendix G: IsiXhosa bar graph transcript

T	S	Utterances /actions
1	T	Ndizayzoba ke nizandincedisa nhe?[taking the T-square] *I am going to draw it, and you are going to help me, are you?*
2	LL	Yes teacher
3	T	Ndincediseni ke *Help me then*
4	LL	Vertical line, horizontal line (chorus)
5	T	Draws a horizontal line and says] this is my vertical line
	LL	Chorus) no teacher. horizontal line
6	T	Ok, erases the line. Ndiyenze njani? Asking the class] *How must I do it?*
7	LL	Some are showing with their hands how it should look like. Others are saying vertical line
8	T	Oh, ndiyayibona ke ngoku, enkosi [draws the vertical line] *Oh, I can see now, thank you*
9	LL	In chorus) vertical line. (One learner is on his feet, moving on to the next line, the horizontal line, showing with hands)
10	T	Nguban'ongavumelani nam uba yivertical line le? *Who doesn't agree with me that this is a vertical line?*
11	LL	Only one learner doesn't, but quickly changes and agrees)
12	T	Hay kaloku, suvumelana nam sizoyxoxa, akho nt' iwrong xa ungavumelani nam
13	LU	Stands up, says something, inaudible
14	T	Khanimeni uyatheth'u LU, uthini LU? *Wait, LU is talking, what are you saying LU?*

15	LU	Sorry teacher le iright *That one is correct*
16	T	Oh, uthi lena iright *He says this one is correct*
17	LL	Leading the teacher) horizontal line
18	T	J[oins the vertical line with the horizontal line] Mamela ke, amanani namhlanje asizubala ngoo2, sizakubala ngoo1. Siqala kubani kanene? Listen, today we will not count in 2's, but we will count in 1's. What number do we start with? Remind me
19	LL	Naught (chorus).1, 2,3,4,5,.6,7,8,9,10,11 Calling out numbers for the teacher to write
20	T	[Writing out the numbers, stops at 9 and asks] Siyamdinga u10? *Do we need the number10?*
21	LL	No chorus
22	T	Ngoba kutheni? Kutheni singenakgqitha siyotsho ku10 *Why? Why don't we have to go up to the number 10?*
23	LL	Few hands up
24	T	[pointing] ujong' apha kule theybhile *You mut look at the table*
25	T	Picks
26	LV	Ngoba sibala ngoo1 asibali ngoo2 *Because we are counting in 1's not in 2's*
T	**S**	**Utterances /actions**
27	T	Noba besibala ngoo1, noba besibala ngoo2, kuthen singenawgqitha siyotsho ku10, siyotsho ku20? *Even if we were counting in 1's or 2's, why not count to 20?*
28	LL	Few hands up
29	T	Picks
30	LW	Kub' engekh' u10 *Because there is no 10*

31	T	Akekho phi u 10? x 2 *Where is 10 missing from?* Hay hay yima suthetha, [managing the class] *No wait, stop talking*
32	LL	Few hands up
33	T	Picks
34	LX	Kwitheybhul *From the table*
35	T	Kwtheybhul very good, ukhona u 10 apha? *From the table is there number 10 here?*
36	LL	Chorus) no teacher
37	T	Ngok' asikhw' isidingo soba simenze u10 phaya Putting the pointer down] masiyeni ke[moving closer to the master table] T*herefore there is no need to have the number 10 there*
38	T	Writes on the vertical axis] learners say number of children in chorus, others remember they have to start with the Xhosa version and say) inani Labantwana) *Number of children*
39	T	Stops and asks, are chose children? [pointing at the master table
40	LL	No teacher
41	T	Sinoomhakhulu phayana *We have grannies there*
42	LL	(Changing)Number of people
T	**S**	**Utterances /actions**
43	T	Erasing number of children] inani Labantu *Number of people*
44	T	Apha ngezantsi ndibhal ntoni?[pointing below the horizontal axis *What must I write below here?*
45	LL	(Spontaneously) iimilo others say shapes *Shapes*

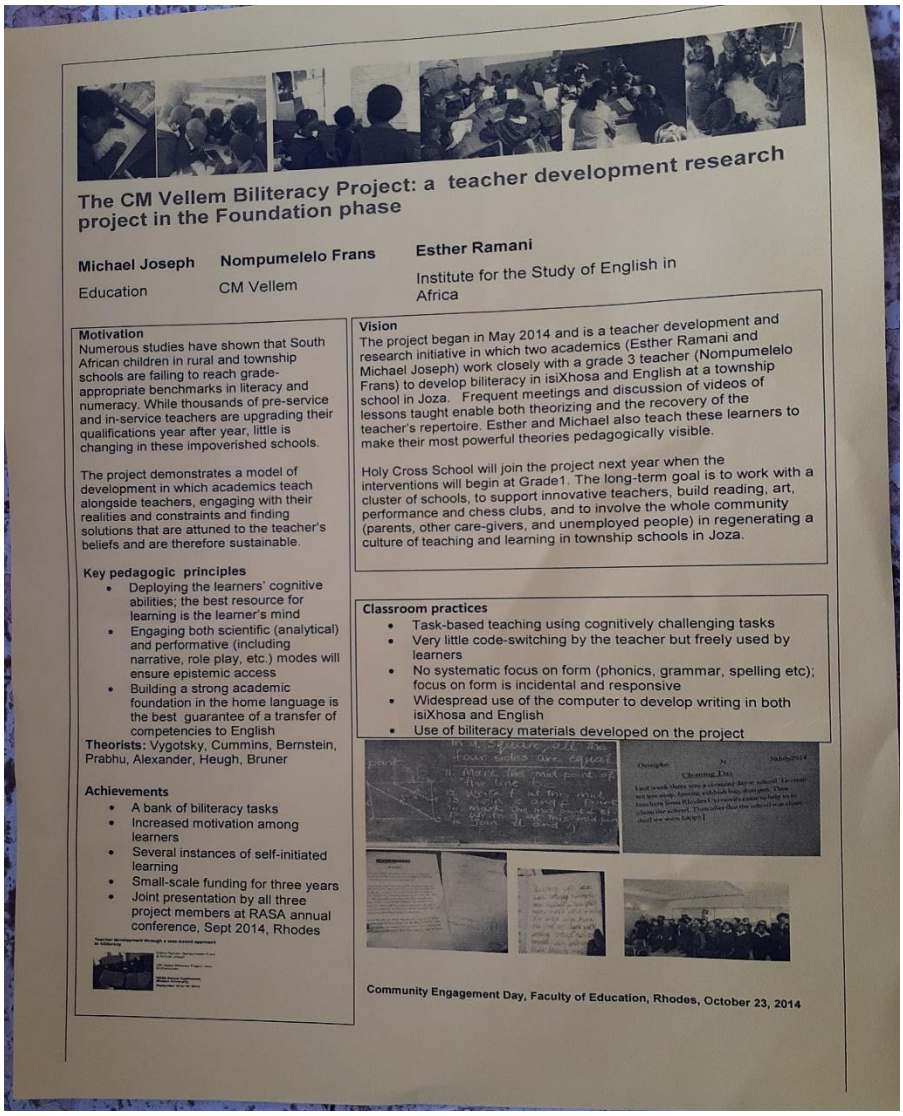
46	T	Writes
47	T	Ndimel' uqala ngeyiph' imilo ke ngoku *Which shape must I start with?*
48	LL	Hands up?
49	T	Picks
50	Y	Nxantathu *Triangle*
51	T	Andizubhala negama, ndizawthatha ngozoba, yabona? [draws] *I won't even write shape names, I will just draw, can you see?*
52	T	Kulandele ntoni? *What next?*
53	LL	(chorus) isikwere *A square*
54	T	Draws the square and triangle
55	T	Khandixelele ke ngoku, bangaph' oonxantathu? *Now, tell me, how many triangles are there?*
56	LL	Hands up
57	T	Picks
58	L Z	Balithoba *There are nine*
T	**S**	**Utterances /actions**
59	T	Kufuneka ndiphele phi ke ngoku apha? *Where must I stop?*
60	LL	(chorus) 9
61	T	[starts constructing a bar deliberately skew from the triangle]
62	LL	No teacher
63	T	Izondilungisa ke *Come correct me then*
64	LL	Hands up
65	T	Come A
66	LA	Constructs a bar above the triangle (one learner says no)

67	T	Suthi hay umnt' engakagqib' ubhala, myek' abhal' agqibe *Don't say no when one hasn't finished writing, let him finish first.*
68	T	Uright?
69	LL	Yes teacher
70	T	Size ngantoni? *What's next?*
71	LL	Zizkwere *Its squares*
72	T	Zingaph' izkwere? *How many squares*?
73	LL	Zilithoba *There are nine*
74	T	Draws a crooked bar
75	LL	No teacher, no teacher (one learner very persistent on no)
T no	**S**	**Utterances /actions**
76	**T**	Picks 1 to come correct]
77	**LB**	Erases the crooked bar, draws a new one from bottom up
78	**T**	Uright? Is she correct?
79	**T**	Ok, zingaph' izangqa? *How many triangles?*
80	**LL**	Chorus) zintlanu *There are five*
81	**LL**	Complaining about the number 5 not being clear)
82	**T**	Erases the not so clear 5 and writes a clear 5. Ndimbhalile ke nanku uyabonakala. Siyambona sonke? *I have written 5 here, can we all see?*
83	**LL**	Yes teacher
84	**T**	Ok masijongeni ke ngoku. Masijongeni phaya [pointing at the bar graph]. Zeziphi iimilo ezithandwa ngokulinganayo? Jonga pha [directing them to the bar graph] *Let's look there, which shapes are equally liked?*
85	**LL**	Yes teacher

86	**T**	Picks
87	**LC**	Nxantathu neskwere *Triangle and square*
88	**T**	Is that true?
89	**LL**	Yes teacher
90	**T**	Zinangaphi zombini? *How many do they both have?*
91	**LL**	9
92		
93	**T**	LD uyavumelana? *LD do you agree?*
94	**T**	Ok, yeyiphi imilo ethatndwa kancinci? *Which shape is the least liked?*
95	**LL**	Hands up
96	**T**	Picks
97	**LE**	Sisangqa *It's a circle*
98	**T**	Uthi sisangqa, bangaphi abantw' abathandi isangqa? *She says it's a circle how many people like the circle?*
99	**LL**	Chorus) bahlanu *There are five*
100	**T**	Bahlanu [in agreement] *There are five*
101	**T**	Bangaphi aba bantu bebonke? *How many are these people altogether?* [Gesturing]
102	**LL**	Hands up
103	**T**	Picks
104	**LF**	23
105	**T**	Uthi bayi 23, ubafumana njani? *He says there are 23, how does he know?*
106	**LL**	Hands up
107	**T**	Picks [stops those looking at the master table, refers them to the bar graph]
108	**T**	Picks

109	**LG**	Sidibanisa u 9 no9 no5 *We add 9+9+5*
110		
111	**T**	Uph'u 9, no9, no5 aba sibadibanisayo? Ngoba asiayisebenzisi leya [mastertable], sijonga apha [bar graph]. Izondibonisa *Where is the 9, and 9 and 5 that we are adding?*
112	**LL**	Hands up
113	**T**	Picks
114	**LI**	Goes to the chalkboard, points at all 3 bars using the pointer
115	**T**	Ok, oright ke. Mamela ke ngoku. Ngoku ndizakunika elakho iphepha. Eli liqubude, akuzulsebenzisa
116	**T**	Issuing out a worksheet for an individual task

Appendix H: Biliteracy Project poster



The CM Vellem Biliteracy Project: a teacher development research project in the Foundation phase

Michael Joseph Education

Nompumelelo Frans CM Vellem

Esther Ramani Institute for the Study of English in Africa

Motivation

Numerous studies have shown that South African children in rural and township schools are failing to reach grade-appropriate benchmarks in literacy and numeracy. While thousands of pre-service and in-service teachers are upgrading their qualifications year after year, little is changing in these impoverished schools.

The project demonstrates a model of development in which academics teach alongside teachers, engaging with their realities and constraints and finding solutions that are attuned to the teacher's beliefs and are therefore sustainable.

Key pedagogic principles

- Deploying the learners' cognitive abilities; the best resource for learning is the learner's mind
- Engaging both scientific (analytical) and performative (including narrative, role play, etc.) modes will ensure epistemic access
- Building a strong academic foundation in the home language is the best guarantee of a transfer of competencies to English

Theorists: Vygotsky, Cummins, Bernstein, Prabhu, Alexander, Heugh, Bruner

Achievements

- A bank of biliteracy tasks
- Increased motivation among learners
- Several instances of self-initiated learning
- Small-scale funding for three years
- Joint presentation by all three project members at RASA annual conference, Sept 2014, Rhodes

Vision

The project began in May 2014 and is a teacher development and research initiative in which two academics (Esther Ramani and Michael Joseph) work closely with a grade 3 teacher (Nompumelelo Frans) to develop biliteracy in isiXhosa and English at a township school in Joza. Frequent meetings and discussion of videos of lessons taught enable both theorizing and the recovery of the teacher's repertoire. Esther and Michael also teach these learners to make their most powerful theories pedagogically visible.

Holy Cross School will join the project next year when the interventions will begin at Grade1. The long-term goal is to work with a cluster of schools, to support innovative teachers, build reading, art, performance and chess clubs, and to involve the whole community (parents, other care-givers, and unemployed people) in regenerating a culture of teaching and learning in township schools in Joza.

Classroom practices

- Task-based teaching using cognitively challenging tasks
- Very little code-switching by the teacher but freely used by learners
- No systematic focus on form (phonics, grammar, spelling etc); focus on form is incidental and responsive
- Widespread use of the computer to develop writing in both isiXhosa and English
- Use of biliteracy materials developed on the project

Community Engagement Day, Faculty of Education, Rhodes, October 23, 2014

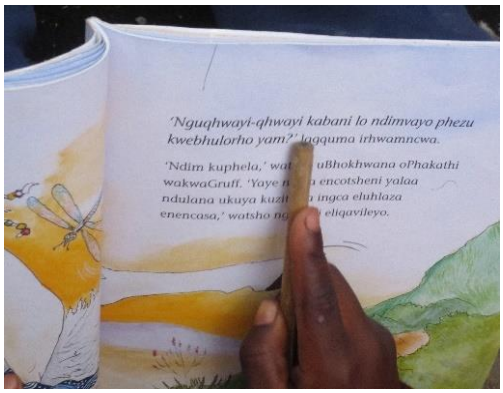
Presentation made at the Community Engagement day (2014)

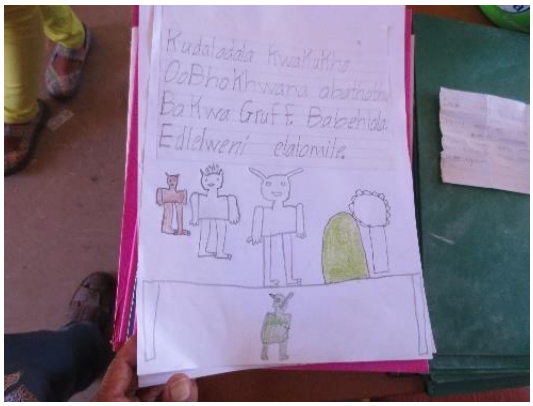
Appendix I: Reading corner photographs (Section 1.4.6)

Break time voluntary group reading

Break time voluntary chalkboard writing

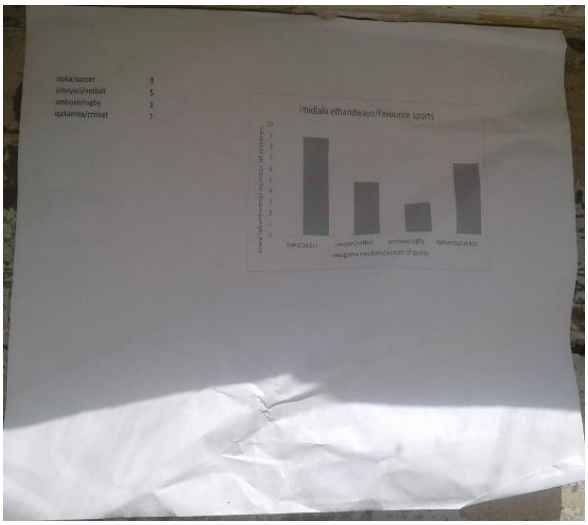
Break time solitary reading and written text after dramatic expressive reading aloud by the teacher


'Nguqhwayi-qhwayi kabani lo ndlmvayo phezu kwebhulorho yam?' lagquma irhwamncwa.
'Ndim kuphela,' wat uBhokhwana oPhakathi wakwaGruff. 'Yaye n encotsheni yalaa ndulana ukuya kuzh ingca eluhlaza enencasa,' watsho ng eliqavileyo.


Kudalaadala KwaKuthi
OoBhoKhwana abathathu
Ba K.wa Gruff. Babehlala
Edlelweni elalonvile.

Appendix J: Bar graph construction on the computer (individual activity)

(Section 3.5.4)

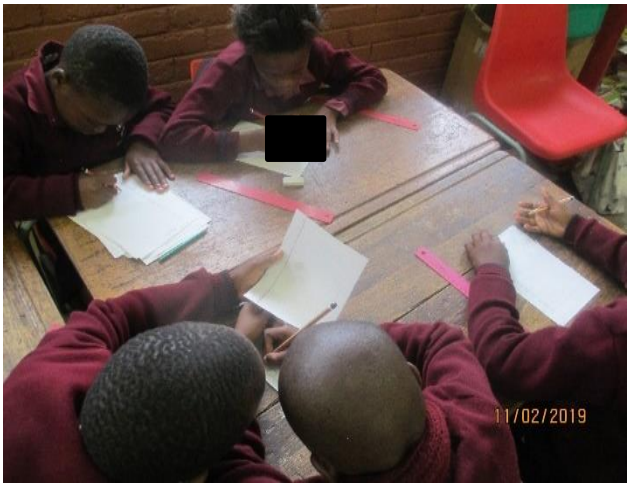


Appendix K: Peer mediation in groups

(Section 4.7.1.1)

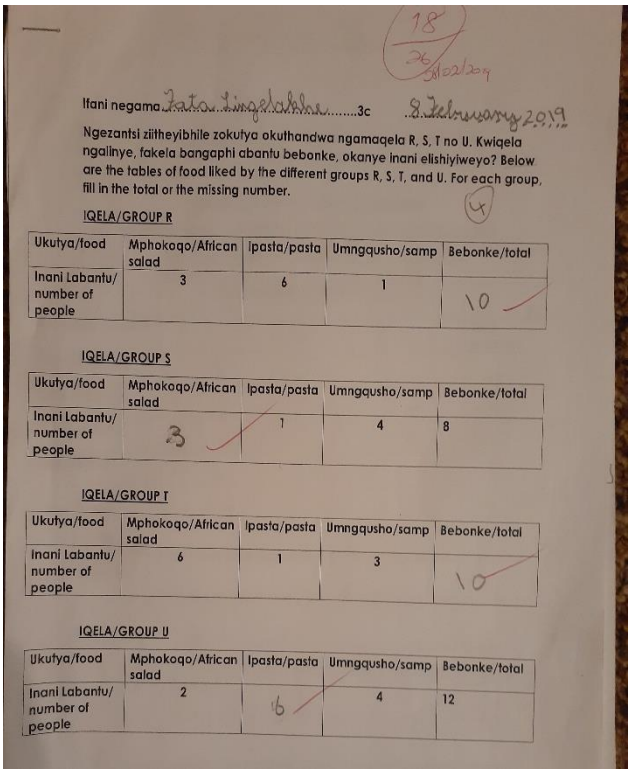
Appendix L: First time bar graph construction in groups

(Section 4.8.1)



Appendix M: Completed single/master table and bar graph constructed in groups (2nd time)

(Section 4.8.1.3)



Ifani negama Tata Lingelabahe 3c 8 February 2019

Ngezantsi zitheyibhile zokutya okuthandwa ngamaqela R, S, T no U. Kwiqela ngalinye, fakela bangaphi abantu bebonke, okanye inani elishiyiweyo? Below are the tables of food liked by the different groups R, S, T, and U. For each group, fill in the total or the missing number.

IQELA/GROUP R

Ukutya/food	Mphokoqo/African salad	Ipasta/pasta	Umngqusho/samp	Bebonke/total
Inani Labantu/ number of people	3	6	1	10

IQELA/GROUP S

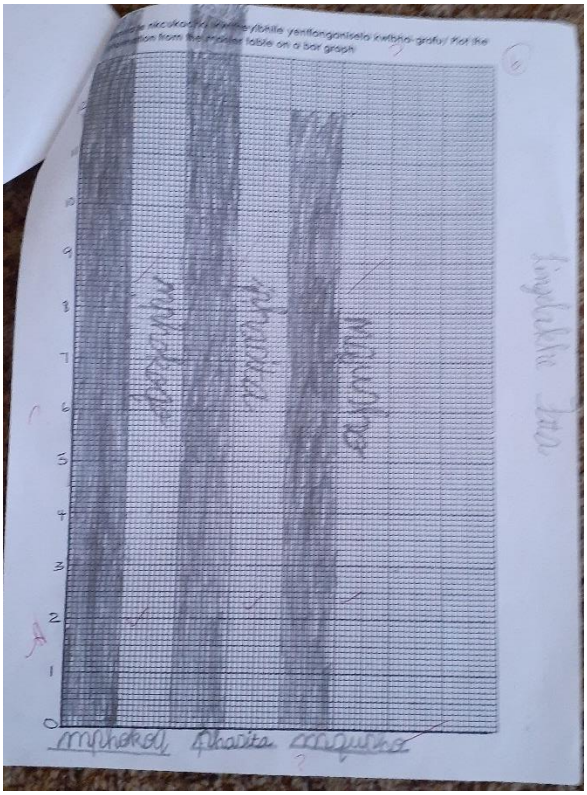
Ukutya/food	Mphokoqo/African salad	Ipasta/pasta	Umngqusho/samp	Bebonke/total
Inani Labantu/ number of people	3	1	4	8

IQELA/GROUP T

Ukutya/food	Mphokoqo/African salad	Ipasta/pasta	Umngqusho/samp	Bebonke/total
Inani Labantu/ number of people	6	1	3	10

IQELA/GROUP U

Ukutya/food	Mphokoqo/African salad	Ipasta/pasta	Umngqusho/samp	Bebonke/total
Inani Labantu/ number of people	2	6	4	12

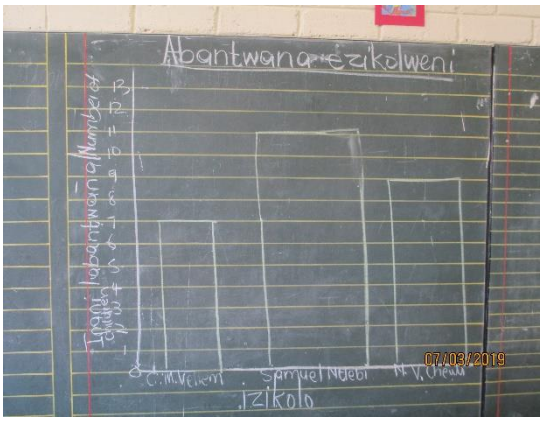


Appendix N: Self-mediation in classwork (individual activity)

(Section 4.13.1)

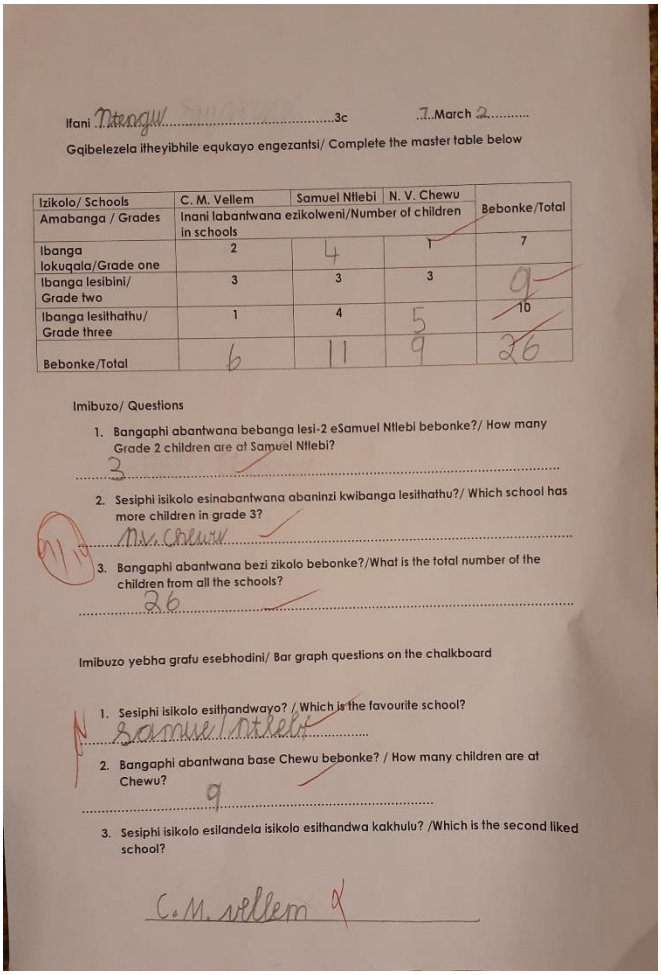
Appendix O: Publicly constructed bar graph whole class teacher directed activity

(Section 4.9)



Appendix P: Individual classwork (self-mediation) table completion, answering questions and bar graph construction (3rd time, repeat of step 7, different date, different content)

(Section 4.2.7)



Ilani ...3c ...7..March 2.....

Gqibelezela itheyibhile equkayo engezantsi/ Complete the master table below

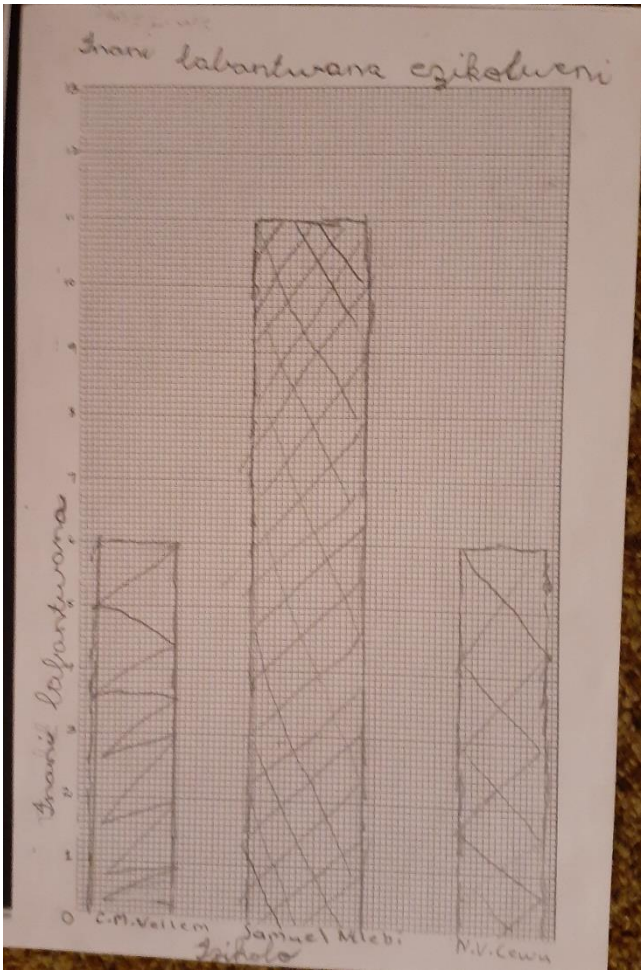
Izikolo/ Schools / Amabanga / Grades	C. M. Vellem	Samuel Ntlebi	N. V. Chewu	Bebonke/Total
	Inani labantwana ezikolweni/Number of children in schools			
Ibanga lokuqala/Grade one	2	4	1	7
Ibanga lesibini/ Grade two	3	3	3	9
Ibanga lesithathu/ Grade three	1	4	5	10
Bebonke/Total	6	11	9	26

Imibuzo/ Questions

1. Bangaphi abantwana bebanga lesi-2 eSamuel Ntlebi bebonke?/ How many Grade 2 children are at Samuel Ntlebi?
   3
2. Sesiphi isikolo esinabantwana abaninzi kwibanga lesithathu?/ Which school has more children in grade 3?
   N.V. Chewu
3. Bangaphi abantwana bezi zikolo bebonke?/What is the total number of the children from all the schools?
   26

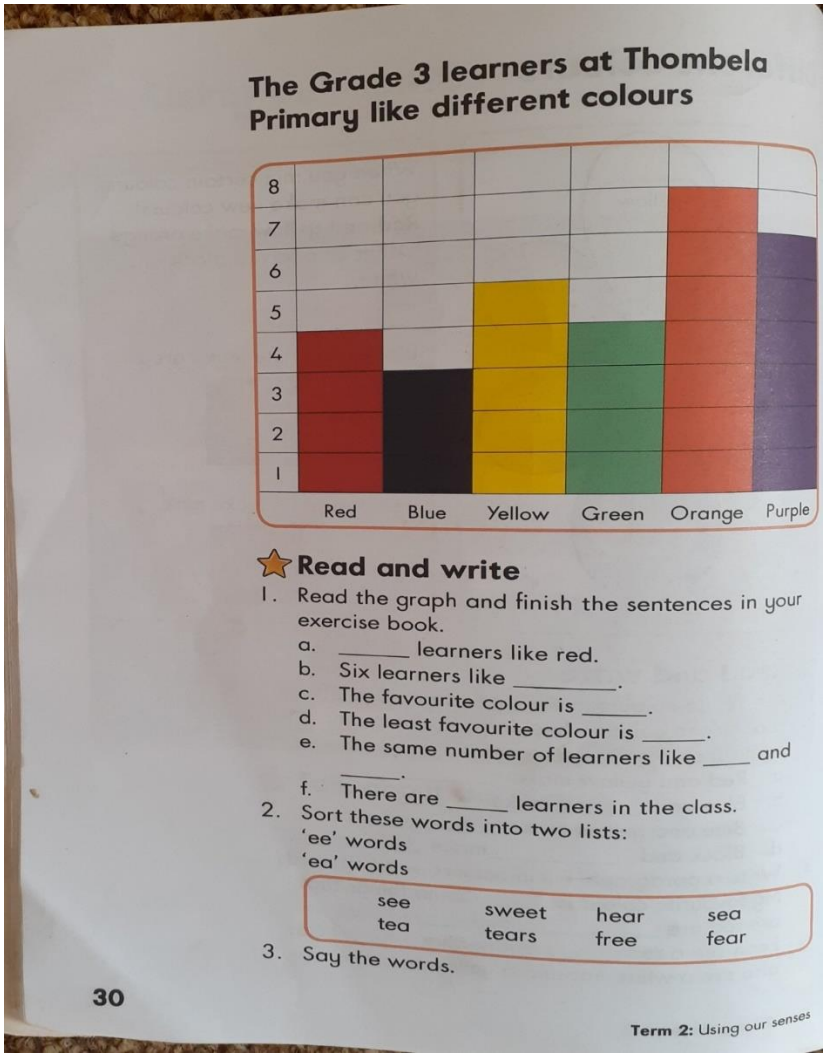
Imibuzo yebha grafu esebhodini/ Bar graph questions on the chalkboard

1. Sesiphi isikolo esithandwayo? / Which is the favourite school?
   Samuel Ntlebi
2. Bangaphi abantwana base Chewu bebonke? / How many children are at Chewu?
   9
3. Sesiphi isikolo esilandela isikolo esithandwa kakhulu? /Which is the second liked school?
   C.M. Vellem



Appendix Q: Non- fiction story coming from an English textbook not an isiXhosa textbook (Borman et al, p. 30)

(Section 3.5)



The Grade 3 learners at Thombela Primary like different colours

Read and write

1. Read the graph and finish the sentences in your exercise book.
   a. _____ learners like red.
   b. Six learners like _____.
   c. The favourite colour is _____.
   d. The least favourite colour is _____.
   e. The same number of learners like ____ and _____.
   f. There are _____ learners in the class.
2. Sort these words into two lists:
   'ee' words
   'ea' words

see	sweet	hear	sea
tea	tears	free	fear

3. Say the words.