‘Bridging discourses’ in a bilingual South African Mathematics classroom with a collaborative teaching model

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Declaration

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: _____ Date: _____

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Abstract

The majority of South Africa's learners have to access a curriculum in a language which is not their home language. Research has been conducted into several aspects of the challenge that this poses to educators and learners alike and how classroom discourse reflects this reality. This case study of a rural, bilingual Mathematics classroom in a holiday programme run by an NGO focuses on classroom talk to identify bridging discourses (Gibbons, 2006) used by the teacher, learning facilitator and learners. These bridging discourses serve to draw together the 'everyday' language of the learners and the subject-specific language of school Mathematics as well as to mediate between the culturally and linguistically disparate learners and teacher.

I draw on a sociocultural view of learning, in particular the notion of mediation (Vygotsky, 1978), to frame this study. Classroom talk is conceptualised as a means of jointly constructing meaning (Mercer, 1995) which is framed by different discursive practices in different cultural settings (Gee, 1999; Alexander, 2001). Hence my research question is: within the particular discursive space of this classroom, how is mathematical meaning mediated through 'bridging discourses'?

The case study was comprised of all five Grade 11 Mathematics lessons in the week-long programme. The data set consisted of video and audio recordings from these lessons as well as interviews conducted with the participants in the programme.

The discursive practices of the classroom were found to be framed by the language ideologies of the participants, and largely followed typical classroom patterns, despite the particular linguistic make-up of the classroom and a commitment from the NGO staff to draw on learners' full linguistic repertoires. Bridging discourses operated in a back-and-forth manner along the mode continuum, between languages, registers and semiotic systems to provide message abundancy in this EFL environment. The learning facilitator offered particular opportunities for bridging discourses to develop, especially with regards to the uptake of learner contributions.

List of acronyms and abbreviations

BICS – Basic Interpersonal Communication Skills

CALP – Cognitive Academic Language Proficiency

EAL – English Additional Language

EALT – English Additional Language Teacher

EFL – English Foreign Language

ESL – English Second Language

IRE/F – Initiation-Response-Evaluation/Feedback

LoLT – Language of Learning and Teaching

ME – Mathematical English

NGO – Non-governmental Organisation

NSC – National Senior Certificate

OE – Ordinary English

SGB – School Governing Body

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Chapter 1: Introduction

Rationale and research aim

How language should be used in education is a debate of much consequence in South Africa – a country with eleven official languages and most of its citizens functioning as multilinguals. Parents, learners, educators, researchers and politicians all have a vested interest in seeking out the best policies and practices with regards to language in education. A key task is to find productive ways to serve learners who are learning through a language which is not their home language – the situation in which the majority of South African learners find themselves.

As a language teacher and researcher, I am passionate about this quest. It was thus with great interest that I learned of the programme being run by Focus Education[1] in a rural part of the Eastern Cape province of South Africa which adopted an experimental approach to language in their bilingual[2] classrooms. This programme became the focus of my study with the following aim:

> to investigate the language practices in a localised intervention which responds to the challenges of educating the majority of South African learners in a language which is not their home language.

The South African language in education context

In 2007, only 7% of South African learners were recorded as having English as a home language. By Grade 4, 79.1% of learners had English – for the large majority an additional language - as their language of learning and teaching (LoLT). In 2009, less than 1% of learners were studying English as an additional language in the Foundation Phase (Department of Basic Education, 2010a). For most Grade 4 South African learners, this entails a switch to a LoLT in which they have very low proficiency. This

[1] Names of institutions, places and participants have been changed to protect identities
[2] In this context, 'bilingual' refers to a classroom in which there are two languages spoken as a home language amongst the participants.

means that from Grade 4 onwards most learners are playing catch-up by simultaneously learning English and studying all their subjects through the medium of English culminating in a National Senior Certificate (NSC) exit examination written in English. Added to this burden is the legacy of Apartheid-era teacher education (Adler & Davis, 2006) which has resulted in South African teachers being poorly equipped to teach both content and language skills in English. These factors combine to pose an enormous challenge to teaching and learning in South African classrooms.

It is worth reviewing briefly how this status quo came to be. South Africa's Language in Education Policy (1997) aims to 'promote multilingualism, the development of the official languages, and respect for all languages used in the country' (Department of Education, 1997, p. 1). The onus is on the school governing bodies (SGBs) to implement these aims through their own school's language policy. There is a non-prescriptive list of suggestions about how the SGBs can implement this policy, some requiring more radical change and resources than others. In a resource-scarce sector such as education, it is fair to assume that policy makers and interpreters in schools will opt for the most achievable and resource-light option. In the majority of cases this is to offer one LoLT (usually English) determined by the parents and another official language as an additional language.

The question of which is the best LoLT for learners can be considered through three lenses: ideological, cognitive and practical. While academics have explored the cognitive benefits of additive bilingualism as a language policy (Heugh, Siegruhn, & Pluddemann, 1995; Baker & Garcia, 1995), the ideological and practical concerns of parents result in the majority of South African schools choosing English (Cleghorn & Rollnick, 2002; Probyn, 2005; Taylor & Vinjevold, 1999). The ideological reason for choosing English is that parents want their children to learn in the language of socio-economic power in the country and internationally (Janks, 2004). The practical reasons have to do with the poor quality of teaching and learning in English Additional Language (EAL) in South African schools (Kapp, 2004, Hendricks 2007). This is due to the lack of adequately trained English Additional Language teachers in a system which made a

three year diploma the only available training for a Black[3] secondary school teacher (Adler & Davis, 2006). If parents had to rely solely on instruction in the EAL classes for their children's acquisition of English, they would not become proficient in the language, and so in choosing English as LoLT, parents are hoping that their children will learn English in each subject class.

Given that the language policy of using English as LoLT is unlikely to change in the foreseeable future, and that most learners are additional language English speakers, it is worrying that there is a silence in the official language policy on issues of language development across the curriculum. Learners should be helped in all subjects to develop subject-specific language knowledge and skills in English in order to access the curriculum, as it is the LoLT, and also because it constitutes 'powerful knowledge' (Young, 1971) and potentially gives access to social and economic capital in society (Bourdieu, 1991).

The legacy of Apartheid schooling, the current Language-in-Education Policy context and the constraints on human and other resources in education result in the challenge outlined at the beginning of this chapter. Teachers and learners are taking up this challenge in different ways using a variety of resources with varying outcomes. Some of these practices include: code-switching into the learners' home language for a variety of purposes and to varying degrees in the classroom (Adler , 1998; Setati et al, 2002; Probyn, 2009); a focus on the language of the discipline by content subject teachers (Probyn, 2009); use of other semiotic devices such as gesture and graphics (Stein, 2000); disguising the incompetence of the teacher and the learners through 'safe-talk' (Chick, 1996); and reverting to traditional teaching methods which place few spoken language demands on the learners (Arthur, 1994).

A teaching and learning strategy which has not been widely practised (much less documented) in South Africa is the use of more than one language by more than one 'teacher' in one classroom. It is this particular method which has been employed by

[3] Racial terms: White, Black and Coloured have been used in line with those used by the Apartheid classification system in order to reference the lasting effect of inequality that Apartheid has had on education

Focus Education, a non-governmental organisation (NGO) operating near Sophumelela Village in the rural Eastern Cape.

Language in rural education in South Africa

South Africa's rural areas present many challenges to learning Mathematics before lessons even begin. Poverty, isolation and unemployment are present realities in rural areas and poor services and infrastructure, such as roads, as well as the HIV/AIDS pandemic, make daily living a laborious business (Nelson Mandela Foundation, 2004; Gordon, 1999; Department of Education, 2005). Education in rural areas is perceived by parents as being inferior to urban education (Nelson Mandela Foundation, 2004), and indeed schools in rural areas achieve lower results in the NSC examination. Three of the schools which participated in the holiday programme which is the focus of this study achieved the following matriculation pass rates: 9.2 %, 42.1 %, 20.5 % in comparison with the Eastern Cape average which was 51% (Department of Basic Education, 2010b). Challenges from within the classroom include under-qualified teachers, lack of teaching and learning resources, outdated teaching methods and a language of instruction, English, which is a foreign language to learners (Cleghorn & Rollnick, 2002).

Håkan Ringbom describes the rural South African situation well in his definition of a foreign language learning situation where 'there is little or no opportunity for the learner to use the language in natural communication situations' (Ringbom, 1987, p. 27). English-speakers are inaccessible to Sophumelela learners and the official policy of offering English as LoLT in rural schools masks the reality that English is not necessarily the LoLT in practice. Where teachers are not proficient in English, they may avoid reading and writing in lessons (Taylor & Vinjevold, 1999). Also, the classroom talk may consist of a variable mix of English and the home language of the learners (Probyn, 2005).

As the issue of learning through a foreign language has attracted much interest from within South Africa and internationally over the years, many government bodies, NGOs and private sector groups have involved themselves in trying to address it. The ministerial committee on rural education recommended changes to existing language-

in-education policy and more strategic uses of code-switching as a means of curriculum reform in rural schools. It also promoted dialogue between NGO and government-funded projects to optimise all programmes (Department of Education, 2005).

Focus Education's programmes

Focus Education has been working since 2009 with selected learners and teachers near Sophumelela to enhance Mathematics and Science achievement. During the early stages of their work, the English-speaking staff of Focus Education found that their lack of Xhosa language skills and the learners' low levels of proficiency in English made communication, including teaching and learning, a challenge. As a vehicle for addressing this language dilemma, Focus instituted the use of bilingual Xhosa-English learning facilitators to assist with the programmes, both in the classrooms and in extra-mural activities. Initially they were present only on holiday programmes, but the intention is for them to become an integral part of all Focus programmes.

One of Focus's programmes in 2011 was a week-long Mathematics, Science and English winter holiday camp for selected Grade 10 and 11 learners from local high schools. The camp consisted of lessons in Mathematics, Science and English as well as leadership training exercises. These classes are supplementary to the teaching in these subjects received at local schools. The Focus teachers revise topics which have ostensibly been taught by the local schools already. In reality, the teachers admit that they aim to teach concepts thoroughly because they cannot be sure that all the learners have encountered the topic before. The classes are resource-intense when compared to the local schools: the learners and teachers have access to worksheets, textbooks and revision examination papers.

There were approximately 15 learners (the number varied from day to day) with one teacher and one learning facilitator in each class. Two of the teachers were Focus staff members and one teacher and the two learning facilitators were volunteers receiving a stipend. The teachers had the traditional role of planning and leading classroom activities, while the purpose of the learning facilitators was to support teaching-and-

learning through various methods using their language skills as bilingual Xhosa-English speakers.

The case and the participants

Within this programme, I selected for my case study the five Grade 11 Mathematics lessons occurring during the camp. In order to assist me with continuity, the Focus Director agreed to assign one learning facilitator to one teacher in this class. There were ten learners who attended each lesson with the other five missing up to three of the five lessons. In this way I was able to focus on a relatively stable set of participants for the case study.

While the Director of Focus Education was interviewed for this study, his contributions function only to shed light on what happens in the mathematics classroom in terms of the broader policy ideals of the organisation. The key participants are: the teacher, the learning facilitator and the learners. A brief description of each party follows.

The teacher (Susan/ Sue) is a White, female, English-speaking South African who is 31 years old and relocated to Sophumelela Village from Cape Town in 2011. The learning facilitator (Athenkosi/ Athi) is a Black, male, Xhosa-English bilingual South African who is 21 years old and lives in Cape Town. The learners are Black, Xhosa-speaking South Africans between the ages of 16 and 21[4].

Before joining this programme, the learners had experienced rural ex-DET[5] classrooms exclusively. The learning facilitator attended an ex-DET primary school until Grade 3 and then an ex-HOR primary school and an ex-Model C high school, all urban. The teacher attended a private school and has taught in ex–model C schools in South Africa, a state school in Britain and a state school in Malawi.

[4] A high rate of learner repetition of years of schooling in rural education results in a 21 year old Grade 11 learner

[5] Under Apartheid the South African education system was divided into Education Departments which catered for different races (Kallaway, 2002): the Department of Education and Training (DET) catered for 'black' students; the House of Representatives (HOR) catered for 'coloured' students. 'Model C' schools were named for one of the three models of state-run schools post-Apartheid. They were the previously 'white' schools which maintained their well-resourced profile due to high school fees.

This particular South African classroom is described as bilingual, not because it comprises all bilingual individuals (although all speakers in the classroom have some competence in more than one language), but because two languages– English and Xhosa – are used proficiently in the classroom for teaching and learning. In fact, only one speaker in the classroom is what Cummins terms a 'balanced bilingual' (Baker, 2006). The learning facilitator, Athenkosi, is able to use both English and Xhosa for a variety of purposes in this classroom. The teacher, Susan, is proficient in English for a variety of purposes, but has limited Basic Interpersonal Communication Skills (BICS) (Cummins, 1984) in Xhosa. The students are proficient in Xhosa and have varying degrees of proficiency in the target language, English.

The designated topic for study during the five Grade 11 lessons was 'Transformations', a brief summary of which is available in the form of a worksheet (Appendix 2) used in the lessons.

Research question

Having explained the background to the case study and the reasons for the selection of this particular mathematics classroom, I now present my research question as follows:

Within the particular discursive space of this classroom, how is mathematical meaning mediated through 'bridging discourses'?

The 'language practices' referred to in my research aim have been further defined as 'bridging discourses' and these, along with 'discursive spaces' and 'mediation' are explicated in the following chapter.

Chapter 2: Conceptual Framework

Introduction to discourse and sociocultural theory

In this chapter, the theoretical underpinnings of this study are presented. I explain my theoretical viewpoint on the nature of language, particularly spoken language, in a classroom; learners who learn through an additional language and not their home language; and the practices of a particular classroom participant (a 'learning facilitator') in some of these classrooms. Key to all of these concerns is the concept of discourse.

Following Fairclough (1992), I conceive of discourse as being both the textual products and the socially situated practices of the classroom. This view of discourse as 'language-in-use' is concerned with the semiotic devices that are used as tools for interaction, for example: utterances, prosody, nonverbal actions, pictures, and the use of artefacts and objects (Bloome et al., 2008). These devices form the fabric of the socially situated practices which produce the textual products of the classroom. I begin with a review of how classrooms function as spaces in which socially situated practices occur and move on to a discussion of how language - and primarily the oral textual products of the classroom - functions as part of learning.

This study proceeds from a sociocultural view of language and learning. This view, stemming from the work of Russian psychologist Lev Vygotsky (1978, 1962), has some key tenets which stand in opposition to the traditional cognitive view of learning and produces different considerations for research into language and learning which have been applied to my study.

A cognitive view of language and learning asserts that learning occurs within the individual mind and therefore research on learning should target the internal mental processes that occur during learning. Language, in this view, is seen as simply a conduit for the transferring of knowledge between minds (Gibbons, 2006) – a theory of transmission. Vygotsky (1978) asserted that individual thought has a social origin. Children's thinking stems from the social processes that they experience and they retain the functions of these social processes which become internalised and construct the

resources for individual thinking (Gibbons, 2006, p. 22). These resources, or 'tools', are the cultural practices and artefacts which enable thinking and communication about thinking. The most important tool for thought and social activity is language. For Vygotsky, then, language mediates these two key human functions. He described language as a 'psychological tool' and also a 'cultural tool' and Mercer explains this as follows:

> Language is therefore not just a means by which individuals can formulate ideas and communicate them, it is also a means for people to think and learn together. (Mercer, 1995, p. 4)

The processes of teaching and learning are so interrelated and interdependent that some theorists believe the two processes cannot be separated. Mercer, who uses a sociocultural lens in his work on talk and learning, uses the hyphenated 'teaching-and-learning' compound to refer to this interrelated process (Mercer, 1995). Experts ('teachers') and novices ('learners') are conceptualised as 'participants' in teaching-and-learning 'practices' in sociocultural research which enables the interrogation of all spoken language in the classroom and how this spoken language is dynamically constructed with the learner and the teacher having the same 'agentive footing' (Hicks, 1996).

Discursive practices in classrooms

A classroom is a dynamically constructed discursive space - a space in which people do or do not say certain things at certain times and in certain ways for certain reasons (Gee, 1999). This space is 'dynamically constructed' in that participants use available discourses in the moment and in a manner which cannot be predicted before a lesson begins. Two characteristics of these discourses are illuminated by the work of Mikhail Bakhtin (1981). Firstly, following Bakhtin's notion of the chain of speech communication, the discourse used by classroom participants is infused with the meanings and intentions of previous utterances made by others. Speakers may draw upon these consciously or unconsciously and their interlocutor will take up their meaning in ways which are also influenced by the chain of speech communication. Secondly, Bakhtin postulated the notion of social heteroglossia in which a social situation consists of many

voices through which meaning is constructed. These Bakhtinian insights into discourse help researchers to view the classroom as a discursive space which, if interrogated, can reveal different ways of speaking through which meaning is constructed.

The discursive practices – or ways of speaking - of individuals within a classroom are closely related to issues of identity (Norton, 2007; Makoe, 2007; Paxton and Tyam, 2010). Classroom participants construct and change their identity positions through their discourse. In a South African example taken from a primary school, Makoe and McKinney (2009) show how a learner appropriates different discourses, including appropriating the discourse of the teacher, and in so doing constructs herself in different subject positions in the classroom. By considering and analysing all the different discourses produced and reproduced within the classroom, a researcher can demonstrate how these discourses form the fabric of classroom life. In this way the discursive space of the classroom is conceived of as 'hybrid' (Gutierrez et al, 1999) in order to indicate that these discourses merge to create a cohesive and dynamic environment which is reconstituted in every lesson. In each classroom in each school this space is different and offers different affordances and constraints for teaching and learning.

A learning facilitator as Mediator and Cultural Broker

Having established a view of classrooms as hybrid, dynamically constructed discursive spaces, I turn now to a discussion of a classroom participant who is a focal point of this study – the learning facilitator. A discussion of the presence of this participant is pertinent as this role is unusual in South African classrooms.

Theories of classroom talk have focused on two speaking parties within the classroom: the teacher and the learners, therefore literature on a third speaking party is rare. The following review is of classrooms in which there is more than one adult present to support teaching and learning. The research sites are similar in some ways to my own, but have one important difference: they all exist in classrooms where the learners who are being supported are in the minority, both in the classroom and in the school as a whole. The dominant school culture in these studies is a White, English-speaking one,

represented by the majority of both the teachers and the learners. In my study, the learning facilitator is present to support all the learners whose language and culture is non-dominant in relation to that of the teacher. This has implications for the kind of interventions that the learning facilitator makes. Whereas the majority of the interventions in the studies discussed below are on a one-to-one basis, Athi intervenes equally in whole-class activities, in groups and one-to-one. Therefore, he has more of an influence on the classroom discourse in general than do the learning facilitators in the studies outlined below.

When considering the role of the learning facilitator in the Focus classroom, two strands of research are illuminating. The first is that of the presence of more than one 'teacher' in a classroom. This additional teacher appears in the research with the following nomenclature: teaching assistant, teaching aide, paraeducator, English Additional Language Teacher (EALT), SEN (Special Educational Needs) teacher and teaching partner. Research in this field focuses on the different roles and statuses of the two adults in the classroom. The research of Angela Creese (Creese, 2006, 2010) carried out in British schools sheds light on the roles of language assistants in secondary classrooms. In an analysis of interview and classroom discourse data, Creese points out how subject teachers and EALTs construct their own roles differently; how when working one-to-one with students their discourse differs and how this echoes the professional pressures that each staff member is under. In Creese's study the subject teacher was driven by a pressure to cover the curriculum timeously, while the EALT felt more freedom to facilitate curriculum access and work on language learning (Creese, 2006). Notable in the EALTs' discourse was the presence of open questions which were more grammatically complex and modal verbs which had the function of detaching the EALTs from the ownership of the task, for example, 'what you must do now…' locates the agency within the task itself rather than with the EALT (Creese, 2006, p. 449). Creese argues that the different interaction patterns of the subject teacher and the EALT complement each other.

A stark difference between Creese's research and mine is that her classroom assistants are English home language speakers and are culturally more aligned to the subject

teacher than to the students. Cable (2004) investigated bilingual teaching assistants' perceived roles in a United Kingdom school and found that they saw their roles as, amongst other things, intermediaries between home and school – they were able to communicate their cultural knowledge of children's home worlds to teachers and to communicate the school's culture to the parents - and mediators of children's learning. These twin roles are salient in my discussion of the learning facilitator in the Focus classroom and are aligned with the notion of a cultural broker in educational settings which is explained below.

The significant difference in cultural backgrounds of the teacher and the learners in Focus classrooms (as discussed in Chapter 1) has motivated the Focus staff to consider the role of the learning facilitator as going beyond that of a language assistant. The Director, John, describes this in his interview:

> (Interview with John, 14/07/11)
>
> There is (a gap) between us, the teachers and the kids, yes, with language but also with relating.

This cultural 'gap' in the Focus classroom is illuminated by the literature on cultural brokers which has its home in anthropology. The concept has been used in education to describe the role a person plays in supporting members of the non-dominant culture/s of an institution in acclimatising to that school's culture, as well as in helping the authorities of that institution understand the needs of that cultural group (Gentemann & Whitehead, 1983; Major, 2006; Morales & Hanson, 2005; Rueda & Genzuk, 2007; Weisskirch & Alva, 2002).

Research on cultural brokers in educational settings has focused on what role they play and what methods they use to carry out that role. In an examination of Black teacher-counsellors as cultural brokers for Black students in predominantly White colleges in the United States, Gentemann and Whitehead (1983) found that the cultural brokers functioned to 'bridge the gap between the mainstream culture and other cultural units' (p. 119). They noted that the broker needed to work in both directions, from the 'mainstream' culture to the 'ethnic' cultures and vice versa. More suitable contemporary terms for 'mainstream' and 'ethnic' are 'dominant' and 'non-dominant' respectively as

these unveil the mechanisms of power which operate within institutions such as schools. The dominant culture in Gentemann and Whitehead's study was White and the particular non-dominant culture which they studied was Black. A further function of the cultural broker was to act as a role model for those in the Black community who wished to participate in dominant cultural activities, such as higher education. In a study of three bilingual teaching assistants in United Kingdom primary schools, Cable (2004) identified the role of intermediary between parents and teachers played by the teaching assistants who were members of the non-dominant culture of the schools.

Cultural brokers use certain tools and practices to perform their intermediary functions. Gentemann and Whitehead (1983) found that it was values that were communicated through manipulation of cultural symbols, information and people. Rueda and Genzuk (2007) found that Latino paraeducators acting as cultural brokers in US primary schools evoked a 'grandmotherly' quality through their use of physical touch, special discourse forms and drawing on belief systems which differ from the teacher's. All of these methods index a familiarity and affection for the students. The strategies they used to engage the students were rooted in the cultural and linguistic shared knowledge they had with their students.

From the discussion of discursive practices in classrooms and the particular practices adopted by a learning facilitator as cultural broker, I now move on to the nature of talk in classrooms.

The nature of talk in classrooms

Joint construction of meaning

This study investigates the way in which language is used to enable people to think and learn together in a particular teaching and learning context. The mode of language which is most readily available and useful for meaning negotiation in a classroom is talk. Far from the transmission theory of language which sees classroom talk as a means by which teachers can transmit knowledge to pupils, sociocultural theorists believe that classroom talk is a process by which all participants use talk to construct particular

kinds of meaning. Gee (1999) asserts that this meaning is 'situated', ie. words have specific meanings in different contexts, and he emphasises how these meanings are 'assembled' in context, rather than incorporated wholesale from an unchanging source. Through discourse analysis of classroom talk, theorists have sought to understand the dynamics of how meaning is jointly constructed (Edwards & Mercer, 1987; Barnes, 1992; Mercer, 1995) or how learning is 'scaffolded' by teachers (Bruner, 1966). Researchers working within a sociocultural framework have therefore explored talk in order to understand the affordances and constraints that it can have for learning in classrooms in the South African context. Brodie (2010) investigated how teachers can work with learners' contributions to teach mathematical reasoning through talk. She argues that high quality teacher initiations and feedback/evaluations can assist learners to develop reasoning abilities. She sees high quality teacher talk as going beyond the notion of error in learner contributions to trying to engage with the reasoning behind the errors (Brodie, 2010, p. 122).

Context determines patterns of talk

As would be expected by any researcher with a sociocultural view of learning, people are observed to engage in teaching-and-learning interactions in patterned ways which are bound up with the culture/s of the participants (Mercer, 1995). Therefore research into classroom discourse needs to pay attention to the cultural context of any teaching-and-learning practice in order to understand the patterns of interaction which are embedded in it. This assertion is underscored by Alexander in his comparative review of primary education in five countries (England, United States of America, France, India and Russia) in the 1990s, when he argues:

> 'Though there are undoubted cross-cultural continuities and indeed universals in educational thinking and practice, no decision or action which one observes in a particular classroom, and no educational policy, can be properly understood except by reference to the web of inherited ideas and values, habits and customs, institutions and world views which make one country, or one region, or one group, distinct from another' (Alexander, 2001, p. 5)

One universal in the practices of education has been shown to be the IRE/F pattern of classroom discourse, first described by Sinclair and Coulthard (1975). The Initiation-

Response- Evaluation/ Feedback triad is repeated during lessons occurring all over the world. The teacher initiates a topic for consideration, usually in the form of a question; one or more students respond to that initiation; then the teacher offers an evaluation or feedback on that response.

In his discussion on the classroom discourse data within his study, Alexander noted differences in practice between countries which he linked to underlying values. It must be stressed that while observations were made about 'Russian' or 'French' classrooms, generalisations about a typically 'Russian' or 'French' classroom discourse style are tenuous when data was collected in only 30 schools across 5 countries. This point is acutely felt in the context of my study where it would be impossible to make generalisations about classrooms discourse which is distinctly 'South African' when South African classrooms vary so dramatically in discourse style. This being said, an example of the differences noted in Alexander's data follows. While Russian and Indian teachers who used predominantly structured whole class interactions 'sought convergence in pupils' understanding and progress, their counterparts in Michigan and England (who used written activities backed by private conversations) encouraged divergence' (Alexander, 2001, p. 428). In India rote learning through initiation and response dyads and direct elicitation (asking a closed question – to which there is only one correct answer) was a feature. In Russia children were expected to stand up to answer and one or two class members were called upon to think aloud and at length. In England many pupils answered a few questions each in one lesson.

I now turn to a discussion of discourse norms within South African schools. South African state schools are particularly diverse due to their history of being segregated and subject to the governance of different education departments. This results in a wide variety of discourse norms observable in different types of schools. These have not been systematically documented, but certain studies have highlighted typical features of classroom discourse in different types of schools. Chick (1996), Hendricks (2003) and (Kapp, 2004) have described learner chorusing in response to teacher initiations as a typical discourse style in ex-DET schools. Chick proposed that this chorusing, often in response to a question about well-rehearsed concepts, served to protect both teacher

and learners from the embarrassment of insufficient understanding of the curriculum. Hendricks found chorusing in one such school was evident even when academic proficiency was present. She suggested that in this environment, mimicry is seen as an important way to learn, or it has the function of maximising learner talk. Discourse norms in suburban or ex-model C schools have been less interrogated, because, as McKinney holds, the schools have been seen as sites of 'best practice' and therefore not in need of critique (McKinney, 2011). McKinney's classroom discourse data, collected at an ex-Model C school in Johannesburg, showed a high incidence of learner questions (11, to the teacher's 4) and learner turns (46 out of 92) in a 15-minute extract from an English lesson. Most of the learners' turns were self-initiated (McKinney, 2011). This reveals learners having a certain amount of agency and control over the discourse.

'Ground rules' of talk

Edwards and Mercer found that there are mutually understood, implicit 'ground rules' for classroom discourse (Edwards & Mercer, 1987) within which all classroom participants operate. Some of the ground rules identified in British schools were: it is the teacher who asks the questions; the teacher knows the answers; repeated questions imply wrong answers. Ground rules are

> 'a set of implicit understandings that participants in conversations need to possess, over and above any strictly linguistic knowledge, in order to make proper sense of what each other is trying to say, or trying to achieve in saying something' (Edwards & Mercer, 1987, p. 42).

These rules of classroom talk are framed by broader educational ground rules about how to behave in school into which new students are initiated as they enter the schooling system. These ground rules are therefore specific to the cultural context of the school and rely on the initiation process and general cultural knowledge of the learners. Edwards and Mercer warn that because of this, as well as the implicit nature of ground rules, pupils whose teachers are from different cultural backgrounds from their own may struggle with discerning these rules. The learners participating in my study are used to a different set of ground rules established in their local schools and therefore

would need to discern and follow the new ground rules within which the Focus teacher operated.

Talk in different teaching-and-learning activities

Within classrooms we might find people talking during whole-class activities, to another individual and in groups. These activities may be dominated by a teacher or a learner or may be quite democratic. I collected data on talk occurring in these different activities in order to build up a full picture of classroom talk relating to the topic. There is little research on talk in one-to-one teacher-learner, learner-learner or teacher-teacher interactions due to the universal predominance of whole-class teaching and difficulty of capturing good data from interactions between individuals in classrooms which are regularly noisy (Alexander, 2001). Data on whole-class teaching predominates, therefore the theory outlined here relates mostly to whole-class teaching. But it should be noted that other teaching-and-learning activities can produce different kinds of discourse. For example, Barnes outlines the differences between 'exploratory' and 'presentational' talk which are both important in learning and holds that, 'learners are unlikely to embark on (exploratory talk) unless they feel relatively at ease, free from the danger of being aggressively contradicted or made fun of' (Barnes, 1992, p. 126). A one-to-one discussion with a peer in one's home language would constitute an activity in which a learner would likely feel 'relatively at ease', and so one would expect that this is an activity which is conducive to exploratory talk. Group or one-to-one interaction produces different 'ground rules', which also change as the participants change. The data extracts from whole class teaching and other classroom activities given in Chapter 5 exemplify these differences.

The literature shows that during whole-class teaching, teachers guide learning through particular practices. Mercer (1995) describes three techniques that teachers use to guide learning in classrooms gleaned from his research in classrooms in the United Kingdom: they elicit relevant knowledge from students, they respond to things that students say and they describe classroom experiences that they share with students. Each of these techniques has a set of practices which teachers engage in in order to

achieve their educational purposes. In other words, the teachers' discourse is patterned in certain ways for each of these functions. For example, teachers often used closed or display questions (ie. questions to which the teacher already knows the answer) or cued elicitation (where hints are provided until the learners respond with the correct answer). In this way the learners' response options are limited and, as David Wood argues, their learning could be constrained (Mercer, 1995, p. 28). There are a number of ways in which teachers respond to what learners say. Mercer describes five: confirmation, rejection, repetition, elaboration and reformulation. Lastly, teachers describe the classroom experiences that they share with students through 'we' statements and recaps which allow them to create continuity in the teaching-and-learning programme and a sense of a shared classroom experience.

Languages and registers used in EAL content-based classrooms

Having reviewed literature relating to the nature of talk in classrooms in general, I now turn to focus on the EAL content-based classroom. I define the EAL content-based classroom as follows: a classroom in which there are English language learners learning a subject which is not the English language (for example Mathematics), the curriculum and assessment of which is in English. In all content-based classrooms concept and language learning are integrated: 'content learning is inseparably bound up with language learning and vice versa' (Barwell, 2005, p. 207) . However, the demands on learners and teachers in EAL classrooms are significantly greater in what Setati et al (2002) call the 'double challenge' of learning and teaching the content of the subject and the English language (p. 129).

The language which needs to be mastered as part of mastering the content of the subject is defined by Cummins (1984) as cognitive academic language proficiency (CALP). The development of CALP may be pursued – or avoided – through a variety of discursive practices in the content-based EAL classroom. Talk may occur in different languages and registers of those languages, either to avoid the difficulties of subject-specific academic English, or to mediate this register. Talk may include explicit language teaching and learning in order to develop CALP. Talk may be more context-

embedded or more context-reduced, according to Cummins' continuum (Cummins, 1984). Context-embedded communication (such as that undertaken by a demonstrator in a chemistry experiment) provides good support for the language learner through the use of gesture, body language and apparatus, but may limit the opportunity for exposure to subject-specific academic language. Context-reduced communication (such as that undertaken in a whole-class reading of a literary essay) relies more on the meaning of words unaccompanied by the other communicative features present in face-to-face context-embedded communication.

Researchers of the role of language in learning have studied the language load inherent in different school subjects and made these explicit. Mathematics, while popularly considered to comprise mostly 'numbers and figures', includes particular linguistic features which a student needs to master. The British Mathematics education researcher, David Pimm (1987), has worked on describing a register called 'Mathematical English' (ME) which is used in the mathematics classrooms he has studied. This, along with Ordinary English (OE), needs to be interpreted and used by students as they talk their way into the subject of school Mathematics. The language of Mathematical symbols also needs to be mastered. We now turn to a consideration of what it means to learn to use these registers.

Pimm has described the register of ME as comprising 'not just the use of technical terms, which can sound like jargon to the non-speaker, but also certain phrases and even characteristic modes of arguing' (Pimm, 1987, p. 76). ME comprises specialist terms which do not have meaning in ordinary language (e.g. 'Cartesian Plane', 'x-axis') as well as borrowings from OE ('reflect', 'transform'). These borrowings may be equally challenging to a learner of OE (for example a Focus learner) who may not know the meaning of the terms in OE and so will not be able to draw upon that meaning when learning the ME meaning. Mastering Mathematical English for school also involves understanding the discourse rules of the register. For example, 'story sums' have been described as having a 'pseudo-narrative' format (Edwards & Mercer, 1987).

Mathematics learners are seen as apprentices in these discourses and registers, with teachers being their guides and mediating between the new discourses and the learner.

Researchers have studied how teachers address the above learning needs of their EAL learners in content-based classrooms. Much research on EAL classrooms in the global North has focused on the discursive practices of teachers which aim to facilitate simultaneous language and content learning (for Australia see Gibbons, 2006; for the United Kingdom see Creese, 2006). These monolingual practices are unpacked further in the next section. The practices of teachers who incorporate learners' other languages in the content-based EAL classroom will be discussed below.

Some researchers, educators, parents and politicians have taken a deficit view of bilinguals as having a diminished capacity in both languages. This was termed the Separate Underlying Proficiency Model of Bilingualism by Cummins (Baker, 2006). Rejecting the deficit view of bilinguals, Lo Bianco (1996) points out that bilinguals bring a collection of language resources to bear on their learning. One of the key ways that teachers have incorporated these resources in classrooms is through the practice of code-switching ie. the alternation of languages within one speech event. Code-switching can be broadly categorised by structure into intersentential (between sentences) and intrasentential code-switching (Myers-Scotton, 1993). Most classroom code-switching research has been on one speaker who switches between languages, however code-switching can occur in a speech event where different speakers use different languages. This has produced evidence of intrasentential switching. Ferguson (2003) outlines three functions of code-switching which occur in post-colonial contexts: code-switching for classroom management, interpersonal relating and curriculum access. Code-switching practices of South African teachers have been documented by Adendorff (1996), Adler (1998), Probyn (2006, 2009), Setati (2008) and others who reveal how it is used to fulfil the functions detailed by Ferguson. South African teachers have expressed varying attitudes towards code-switching in their classrooms, with many regarding it as a necessary evil (Probyn, 2009).

Another method for utilising the bilingual learner's language resources is to translate concepts from English into the learners' home language. Paxton and Tyam (2010) in their study of a Xhosa-language Economics tutorial in an English-dominant university assert that there exists a potential for deepening understanding when technical terms are contested through translation into other languages.

Mediation in the EAL classroom

Having reviewed literature on language and learning, particularly in an EAL classroom, I now move to the specifics of how teachers mediate learning through the use of different languages, modes and registers.

Pauline Gibbons (2006) studied classroom discourse in two Australian ESL classrooms and used the metaphor of 'bridging' to describe what the teachers were doing to enable concept and language learning in the Science classrooms. The analysis of movement between the spoken and written modes of English was a key part of her study. Martin (1984) suggests that spoken and written language occurs along a continuum with different forms of language taking on more spoken-like qualities or more written-like qualities. Gibbons focused on evidence of mode-shifting work done by the teachers in order to move their students from more spoken-like language towards more written-like language. She describes shifts 'from experiential to expository learning', 'from practical to theoretical learning', 'the use of increasingly more written-like language' (p. 124) which highlights a similar uni-directional move along the mode continuum. 'Experiential' and 'practical' learning is often practised in Science classrooms through teaching-and-learning activities such as experiments. Hence, it is to be expected that learners' language skills may be developed from more spoken-like to more written-like.

As discussed in Chapter 1, in many South African classrooms learners and teachers use their home languages as well as the LoLT (mostly English). This adds a further dimension to the language shifting that can occur. In a study on language practices in Mathematics, Science and English language classrooms in South Africa, Setati et al (2002) use the metaphor of a journey to describe how it is possible for teachers to move their EAL learners from more exploratory talk in their home language to written,

discourse-specific language in English. These categories represent binaries of mode (speech vs. writing), language (home language vs. English) and register (formal discourse-specific vs. informal exploratory). The following diagram illustrates how Setati et al envisage possible routes from informal, exploratory talk in the home language to formal, discourse-specific writing in English.

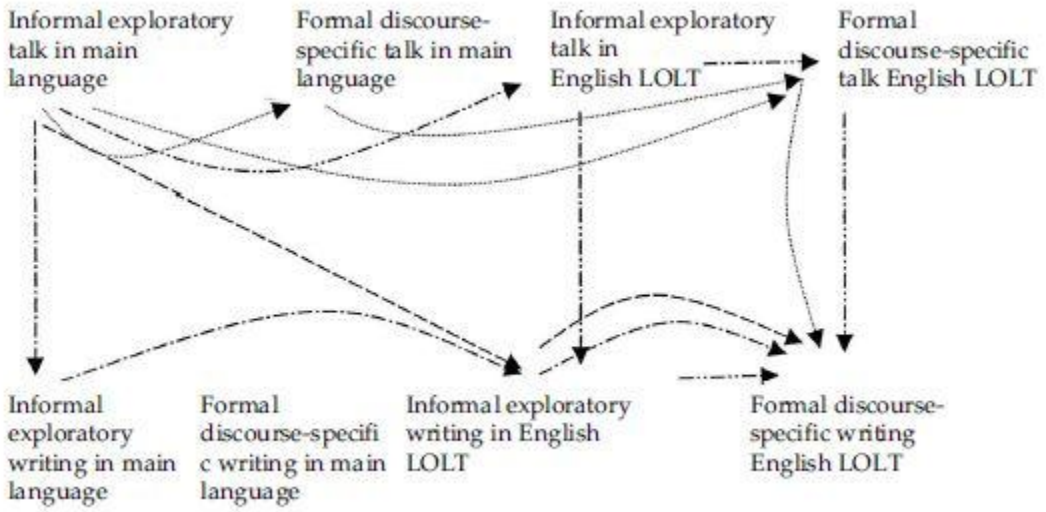


Figure 1: Possible journeys from informal exploratory talk in the main language to discourse-specific talk in English (Setati & Adler, 2000)

While there are different routes allowed by this diagram, each move is always in the direction of more formal, discourse-specific, written English. These are hypothetical journeys since the study was not a close analysis of classroom discourse, but they raise the question of whether journeys should or do always take place in this direction in classrooms.

Both Gibbons' and Setati et al's work are helpful in providing metaphors for the work that teachers and learners do in shifting classroom discourse through different modes, language and registers. As my data is analysed, I will question whether the model of uni-directional moves along the mode continuum describes my data adequately.

As Gibbons' study was based on classroom discourse analysis, I turn now to a summary of the categories she used to analyse the 'bridging discourses' which she discovered in her data. She defines 'bridging discourses' as the process of how 'in their

co-constructed discourse, the talk of teachers and students draws together – or bridges – the "everyday" language of students learning through English as a second language, and the language associated with the academic registers of school which they must learn to control' (Gibbons, 2006, p. 1). Gibbons' students (from migrant families living in a low socio-economic suburban area in Australia) have a good grasp of 'everyday' English. The Focus learners largely do not. The 'everyday' language which they have as a tool for learning Mathematics is their home language, Xhosa. In her analysis, Gibbons aims to focus on 'those features of this "bridging discourse" which appear to be enabling of second language development and of ESL learners' participation in the activities of the classroom' (p. 1). Gibbons' units of analysis, from which she distils these features, she calls 'episodes' which occur within a series of lessons on the topic of magnetism. An episode is 'a bonded unit which roughly correlates with a single teaching activity' (p. 95). She then traces the features of the bridging discourse across all episodes ('macro-discourse') and within episodes ('micro-discourse'). She found that the use of the academic register of school science became more prevalent in the macro-discourse over time as the students became more familiar with these new words. Another difference between Gibbons' research setting and mine was that she studied a primary Science classroom in which it was possible for the teacher to engage the students in practical experiments so that they could experience for themselves the properties of magnets and begin with discussion in everyday language at a context-embedded level and then move to a context-reduced discussion based on generalisations. The nature of Mathematics is such that abstract concepts are considered without initially engaging in a concrete experience and so the early context-embedded language that occurs in Gibbons' classroom is absent in mine.

The features of Gibbons' micro-discourse which she analyses are instances of mode-shifting between 'everyday' and academic language which she categorises according to function. She lists four functions of this mode-shifting: recasting by the teacher, talking about the talk, reminding and handing over, unpacking written language (Gibbons, 2006, p. 125). Recasting occurs during a teaching-and-learning activity which Gibbons' calls 'teacher-guided reporting'. In the plenary, children make sense of what they have observed in their group activities. The teacher then recasts what they say into a more

scientific register. ‘Talking about the talk’ involves the teacher using metalanguage to draw attention to aspects of language use in the classroom. An undirected form of mode-shifting was initiated by the teacher when she asked learners to reformulate their contributions using more scientific language (‘reminding and handing over’). Lastly, the teacher functioned as an interpreter of written language, working towards the informal spoken register of the learners from the discourse-specific register of written instructions in a textbook. These four functions influenced the formation of my own categories in my data analysis. This is elaborated upon in Chapter 3.

Conclusion

This theory chapter has moved from a broad sketch of the sociocultural view of language and learning and classroom talk which underpins it to focus on the theoretical tools which can shed light on the more particular aspects of the research setting ie. a learning facilitator working with a teacher and the use of more than one language and multiple registers in a mathematics classroom.

Chapter 3: Methodology

> A methodology represents the interface between theory and particular research questions and the use of particular methods and procedures in an investigation represents a methodology in action. It determines not only how data is analysed, but what kind of data is gathered (Mercer, 2004, p. 138)

Having outlined my research aim and question in Chapter 1 and my theoretical framework in Chapter 2, I now turn to a discussion of my 'methodology in action'. This chapter moves from a description of the general research design to an explanation of how this informed which data was gathered, how it was gathered and how it was analysed.

Research design

Given my research aim of investigating a localised intervention which responds to the challenges of educating the majority of South Africans in a language which is not their home language, I chose to embark on a small-scale case study located in the Focus Education programme. A case study is an examination of a contemporary set of events over which the investigator has little or no control and about which a 'how' or 'why' question is being asked. It investigates a phenomenon in depth and within its real-life context and relies on multiple sources of evidence (Yin, 2009, p. 18). This methodology would, I hoped, give me a detailed insight into a particular classroom in which language is used innovatively in order that I might study the affordances and/or constraints of that language environment for learning.

Given my available resources, both technical and human, I chose to study one class of Grade 11 Mathematics and its teacher and learning facilitator over the course of the week-long holiday programme during July 2011. This provided me with a bounded contemporary phenomenon, which defines a case study (Knobel & Lankshear, 1999). My research question, therefore, applies to the five Grade 11 Mathematics lessons (each lesson approximately an hour in length) of this holiday programme.

Chapter 2 outlined the affordances and constraints for learning that the language environments of classrooms offer. These affordances and constraints may be accessed

through different lenses within a case study such as mine. The main focus of my study was on the discourse of the classroom – in particular, the bridging discourses of the teacher and learning facilitator. Bridging discourses in the context of the Focus classroom were defined as the processes by which the discourse of the teacher, learners and learning facilitator drew together the 'everyday' language of the learners, in English and Xhosa, and the academic registers of the classroom; as well as how the learning facilitator mediated between the learners and the teacher. These discourses are formed from a variety of semiotic devices such as utterances, prosody, nonverbal actions, pictures, and the use of artefacts and objects (Bloome, et al., 2008). Sociocultural discourse analysis is a methodology used to research how spoken language is used as a tool for thinking collectively (Mercer , 2004, p. 138). This is an appropriate methodology to use in my study where the focus is on meaning mediation through bridging discourses. An analysis of these bridging discourses may produce insights into how they facilitate collective meaning mediation. Sociocultural discourse analysis can adopt quantitative or qualitative methods, or a combination of both. My methodology is qualitative and interpretive in that instead of using pre-designed categories for analysis, my categories were generated through analysis. The small scale of this case study limits the generalisability of the results.

The contextualised nature of talk is a key tenet of sociocultural discourse analysis (Mercer, 2004). In order to get an appreciation for the context of the bridging discourses ('primary focus' in Table 1), I also studied the broad interactional patterns of participants in the classroom, language history of the participants, their views on language in education (in particular in this classroom), their perceptions of the discourse of this classroom and the aims of the Focus programme, particularly in relation to the use of learning facilitators. These foci ('secondary foci' in Table 1) constitute what Gee calls the 'whole picture' which forms the background to discourse analysis (Gee, 1999).

Table 1: Primary and secondary research foci

Primary focus	**Secondary foci**
Bridging discourses of the teacher and learning facilitator	**Broad interactional patterns** of participants in the classroom
	Language history of participants
	Participants' **views on language in education**, particularly in the Focus classroom
	Participants' **perceptions of the discourse** of the classroom
	Aims of the Focus programme, particularly in relation to the use of learning facilitators

Data collection

A pilot study was conducted in 2010. Video data was collected by a visitor to the Focus programme and comprised 2 hours of video data of Grade 10 and Grade 11 Mathematics lessons in classrooms where a teacher and a learning facilitator were present. This video data along with the meetings described below served to inform my research design and my interview questions and to uncover any problems with using recording equipment in the Focus classroom.

In Cape Town, I had two meetings with the Director of Focus Education and one with the rest of the Focus staff who would be working on the 2011 holiday programme. I received their consent to be part of the study both informally through discussion and formally through consent forms. The Director was an integral part of planning the data collection in terms of decisions about which class to study and the planned content of the lessons. I then travelled to the Eastern Cape and collected the data myself. At the first and second lessons I introduced myself to the learners who were participating in the study and discussed issues of confidentiality and explained the study to them. They were all over the age of 16 and signed my consent forms before I started collecting

data. I was initially undecided about which class to research – the Grade 10s or Grade 11s who were studying the same topic – and so I recorded video and audio data for both classes, but did not use the Grade 10 data in my analysis. The Grade 11 learners contributed more to class discussion than the Grade 10s, which was one reason for choosing this class. Their contributions yielded more data relating to bridging discourses.

Sources of evidence

Given the foci of my research outlined in Table 1, three sources of evidence were the most appropriate in collecting this data: direct observation, interviews and physical artefacts (Yin, 2009). The data that was collected from these sources comprised:

Direct observation:

- a video recording of each of the five Grade 11 lessons
- a separate audio recording of the teacher's and learning facilitator's voice for each lesson
- field notes taken during interviews and lessons

Interviews:

- audio recordings of interviews with the director of Focus Education, the mathematics teacher, the learning facilitator (in English) and one Grade 11 learner and two Grade 10 learners (in Xhosa). The Grade 10s were interviewed before I decided to focus on the Grade 11 class. (See Appendix 4 for the interview questions.)

Physical artefacts:

- worksheets used in the Grade 11 lessons

Rationale for types of data collected

Recordings were necessary due to the depth of discourse analysis that was required to answer my question. All discourse needed to be recorded for later categorisation into units for analysis, to enable transcription and translation, and so that the data could be revisited a number of times for detailed analysis.

Focused interviews in which a participant is interviewed for a short period of time (between thirty minutes and an hour in my case) were undertaken. Yin (2009) states that focused interviews can serve to corroborate certain facts that the researcher believes are already established. In this case, the focused interviews served to help explain the classroom behaviour of the participants, but also to gain evidence of underlying opinions or attitudes which would influence such behaviour. At times my interviews served to expose how perceptions of classroom behaviour differed from what was observed by the researcher. The interviews were informal and the interview questions served as a guide. The aims of the interviews were drawn from the secondary research foci (see Table 1) and were: to record the language history of participants; to gain an understanding of participants' views on language in education, particularly in the Focus classroom; to probe the participants' perceptions of the discourse of the classroom and to record the aims of the Focus programme, particularly in relation to the use of learning facilitators.

Challenges in data collection

Collecting classroom data in the form of video and audio-recordings poses many challenges. The first of these is the inevitable background noise present within and in the vicinity of classrooms (Gibbons, 2006). This impedes audibility on the video recording. The use of an inbuilt microphone with the video recorder also posed a challenge to audibility as only the loudest speech in the classroom was captured audibly. For this reason, I introduced two digital audio recorders which were pinned to the clothing of the teacher and learning facilitator. This enabled me to gain high quality audio recordings of their speech. As can been seen from the transcriptions, the speech of the learners is often inaudible due to their distance from a microphone. However, I decided that due to my focus on the discourse of the teacher and learning facilitator, as

well as the increased obtrusiveness of more microphones, I would limit the microphones to two.

The second challenge is the influence of the presence of the recording equipment on the discourse data. A common consequence of the presence of a video recorder in a setting such as a classroom is that the participants become self-conscious and respond unnaturally. Researchers try to mitigate this by explaining their research at the outset and assuring confidentiality. Despite the best attempts to do this, communication depends equally on the receiver as on the sender of the message. Some of the learners in this classroom clearly had a skewed understanding of what the video was to be used for, as this extract from the classroom discourse on the third day of recording reveals. A group of learners were examining the video camera while it was unattended and having fun posing in front of it when one learner remarked:

> (Extract 1, Lesson 3, 13/07/11)
>
> L: **Kanti senzwa lento? Sizakuvela ezindabeni** (Is this what they've been doing to us? We're gonna be on the news)

The learners' previous experiences of video cameras must be strongly related to their use in filming television news. This moment served as a sobering reminder to me that in a classroom containing participants and a researcher from such different backgrounds, interpretations of what is said often diverges dramatically from the intended message.

My positioning of the video recorder at the back of the classroom was intended to minimise its intrusive effect. This also served to allow me to capture footage of writing which appeared on the blackboard and to gain a wide-angle view of the classroom to capture as much action as possible.

Transcription

The learning facilitator's microphone provided the most comprehensive recording of classroom discourse. This was due to the fact that most of the teacher's discourse occurred in whole-class teaching and was projected well around the classroom; hence her discourse was picked up clearly by the learning facilitator's microphone. This

recording served as the basis for transcription with the teacher's audio and the video recording serving to supplement it. The transcription was done jointly by myself and a Xhosa-English bilingual research assistant. I transcribed sections of English discourse and she worked on both English and Xhosa discourse.

The Xhosa discourse was transcribed clause by clause with the addition of an English translation after each clause. I checked all transcriptions, employing my limited knowledge of Xhosa to look for inconsistencies. I also enlisted two Xhosa-speaking friends to help me with queries where my Xhosa was insufficient. A greater proficiency in Xhosa would have been of tremendous assistance to me in the transcription of classroom discourse data. This is due to my belief that the best transcriber of discourse data is the data analyst him/herself. As Gee asserts, 'discourse analysis is based on the details of speech… that are arguably deemed relevant in the situation and that are relevant to arguments the analysis is trying to make' (Gee, 1999, p. 106). The transcripts became my primary sources of data for analysis with the audio and video recordings being used in analysis when additional information about the activity surrounding the discourse was needed. Details such as pauses and intonation were only rarely noted when they seemed especially relevant. (See Appendix 1 for transcription conventions used.)

Methods of data analysis

As stated at the beginning of this chapter, my overarching methodology for studying the discourse of this classroom was sociocultural discourse analysis. This involved analysing episodes of talk within their social context (Mercer, 2004). The division of discourse data into episodes was also undertaken by Gibbons in her study. She defines an episode as a 'bonded unit roughly correlating with a single teaching activity with certain linguistic and non-linguistic features' (Gibbons, 2006, p. 95). While Gibbons divided all her data into episodes, I focused instead on bridging discourses which appeared in the data and analysed them within the context of the episode in which they were found as well as the context of the classroom discourse data as a whole. I did not consider episodes which were in the field of classroom management or interpersonal

relating, focusing only on those in the field of the mathematical topic being studied. I took Gibbons' categories of mode-shifting in her data as a starting point for my categories. As I was examining the data for evidence of bridging discourses, I began formulating categories of bridging discourses and fitting further examples into these categories or forming new categories. In this way there was constant dialogue between my data and the categories, which has been described as a feature of qualitative sociocultural discourse analysis (Mercer, 2004). The categories upon which I decided in my final analysis appear in Chapter 5: Xhosa-for-Mathematics, message abundancy, uptake of learner contributions, talk about language, unpacking written Mathematical English. Four of the five categories relate specifically to teacher and learning facilitator talk. The fifth 'uptake of learner contributions' considers those instances where the teacher or learning facilitator engages learner contributions in some way.

The reports of sociocultural discourse analysis are usually illustrated by selected extracts of transcribed talk with an accompanying commentary (Mercer, 2004). My extracts are either whole episodes, or relevant parts of an episode, and are followed by a commentary. The commentary of sociocultural discourse analysis reveals a concern with lexical content and the cohesive structure of talk as these features of discourse can represent ways that knowledge is being jointly constructed (Mercer, 2004). My discourse analysis deals with particular lexical content and demonstrates the cohesive structure of the talk through, along with prose commentary, the use of flow diagrams and tables.

Conclusion

My data analysis is presented in two chapters. Chapter 4, 'The discursive space of the Focus classroom', aims to give an overview of the 'whole picture' (Gee, 1999) of the classroom and is constituted from the secondary foci of my research. In it I discuss the prominent discursive practices of the teacher, learning facilitator and learners in order to provide the background to the more detailed discourse analysis which occurs in Chapter 5. Chapter 5, 'Bridging discourses for Mathematics', demonstrates how, within the broad

interactional patterns outlined in Chapter 4, participants create bridging discourses in order to allow learners to access the Mathematics curriculum.

Chapter 4: The discursive space of the Focus classroom

Introduction

The Focus classroom is a new and experimental space. The participants are diverse in their identities and backgrounds and this lesson series begins with some participants meeting each other for the first time. Each participant has been steeped in the discursive practices of the vastly different classrooms of their educational experience in ex-Model-C, ex-DET and ex-HOR schools in South Africa, and in the teacher's case of a Malawian and British school. Each participant associates different discursive practices with the teaching-and-learning of mathematics and will have to adjust to the ground rules (Edwards & Mercer, 1987) of this classroom. These ground rules will not be totally unfamiliar to the learners, however, as the Focus classroom has been established over the course of eighteen months and all the learners have some prior experience with the discursive practices of the teacher.

Through analysing the interview data and the classroom discourse, I aim to describe the discursive space of this classroom in order to reveal the affordances that are offered in terms of bridging discourses. I will discuss the prominent discursive practices of each of the participating parties as well as their beliefs which underlie these practices, insofar as they were expressed in the interviews.

Driving the discourse in English– the Teacher

The teacher initiates the discourse in each lesson and drives it along its course according to her plan for the lesson. Her discourse is predominantly in English, with occasional code-switching into Xhosa.

The series of lessons is framed by a conceptual introduction to the topic, Transformations, (Lesson 1) and a conclusion in the form of a review of the concepts (Lesson 5). In between, Susan presents a number of mathematical problems and sub-problems which need to be solved through calculations. These are either attempted as a whole class (guided by Susan), for homework, or by the learners in class (co-

operatively or individually, according to learners' preference). In the whole class method of problem-solving, Susan will present a problem verbally or by writing it on the board. She will then use closed questions to elicit a response to the problem and provide feedback on it, constituting the IRF sequence (Sinclair & Coulthard, 1975).The responses from the learners, when forthcoming, are typically very short and in English. Once a correct response has been given, Susan will explain the correct mathematical reasoning. She undertakes this mostly by providing her own reasoning, sometimes eliciting the reasoning of learners, sometimes attempting to elicit learners' reasoning without success and sometimes enlisting Athi for help in explaining reasoning. In the fourth lesson of five in the series, Susan moves from checking learners' homework into a 'recap' of the previous days' work on Translation and Reflection.

(Extract 2: Lesson 4, 14/07/11)

(1) T: Okay guys, how many people had problems with the first question? Put your hand up. Be honest. Who found it **'nzima**? (difficult)… one, two, three. Who found it **'lula**? (easy)… Hey? **Lula?** Okay.

(2) Ls: *(chatting)*

(3) T: So let's just quickly do a recap. Okay? So that Lillian can have a little bit of an idea of what we've done. Okay? The first type of transformation that we did was, what?

(4) L: (inaudible)

(5) T: Translation. What's the easy word for translation? *(writing 'translation' on the board)* What does… *(chalk breaks)*. 'Kay, what does translation mean?

(6) L: Shift.

(7) T: Shift, move. Okay? *(writes on board)*. Okay, so this is <u>easy</u>. Very easy. If it tells us to shift something right, we just take the whole thing and we shift it right. If it tells us to shift it up, we shift it up. We change our x and our y depending. Our x and our y co-ordinates. What was the second one that we did?

(8) L: Reflection.

(9) T: Reflection. Okay, and yesterday we learnt some rules about reflection. Can anyone remind me what they were? *(writing on the board)* So if we reflect in…uh…in the x-axis, what happens?

(10) L: Uh…we swop.

(11) T: What do we, ha?

(12) L: **Itshintsha** (it changes)

(13) T: Which one changes? If we ro-, if we slip, sorry, if we flip it in the x-axis, if we fold it in the x-axis. Okay? What's gonna change, x or y?

(14) Ls: y

(15) T: Okay, so y's gonna change. X is //gonnu stay the same//

(16) L: //stay the same//

(17) T: What's gonna happen to y?

(18) L: It's gonna be negative.

(19) T: It's gonna be negative. Okay?

(20) Ls: Yes.

(21) T: Everyone with me?

(22) Ls: Yes.

This extract provides a typical example of how the teacher drives the discourse in the lessons. The lesson series has been designed and is led by the teacher. She speaks the most in every lesson; opens and closes each lesson and takes responsibility for the management of the classroom, as can be seen in her use of signal words (Lemke, 1990) such as 'okay, guys' (1). She abides by one of Edwards and Mercer's common classroom ground rules: it is the teacher who asks the questions (Edwards & Mercer, 1987). In the above extract she asks fourteen questions (not including tag questions) in three minutes. She also sets the pace of the lesson, often referring to the amount of content that still needs to be covered and describing the work pace as fast – as evidenced in (3) 'let's just quickly do a recap'.

The teacher controls the turn-taking in the lessons, as is the norm in classrooms. When she is leading the discourse, the learners only contribute in response to her initiations and do not initiate themselves. At times she initiates by asking a question, but does not allow time for a response. In (9) she follows her question with a further initiation

expressed as writing on the board and another question which narrows the range of possible answers to her original question. She also determines when the learning facilitator and the learners speak publicly by inviting their contributions or responding to their requests to speak. When she wants to regain control over the discourse, she may draw a conversation that the learning facilitator is having in Xhosa with the learners to a close by offering her reflection on it, whether she has understood it completely or not. At one point she takes back the floor from Athi after offering it to him without him having spoken.

(Extract 3: Lesson 4, 14/07/11)

T: Athi, step in please.

LF: Mm?

T: Step in. I don't think they understand what I'm asking. (*to learners*) Okay? So we need to make sure that from our fold we've got the same distance between this point and between our new point, hey?

L: Yes.

T: Okay, so that's the most important/

That the dominant discourse occurs in English is significant in this context for a number of reasons. The teacher can only speak English and very little Xhosa, and there is a strong focus on the learning of English through the content subjects in the Focus programme as a whole. The learning of English is seen as important both for accessing the school curriculum and for life after school, as can be seen by the following comments made by the teacher, learning facilitator and a learner:

(Interview with teacher, 12/07/11)

I: Now why do you want them to speak English (in your classroom)?

T: Because they write all their exams in English, umm they do all of the exams for maths and science in English so we feel its super important, we also feel it's crucial 'cos we want these guys to go to university, we've picked the ones that we feel are ambitious enough to do it, and if they can't understand me in the classroom then they are never going to succeed at university.

(Interview with learning facilitator, 14/07/11)

LF: They are going to go out into the world, the world is mostly English-speaking if they intend on going to varsity or wherever meaning tertiary then medium of instruction is going to be in English.

(Interview with Thando (a learner), 14/07/11)

Thando: Kulungile ukuba sifundiswe nge English ngoba isinceda xa kufuneka si thethe nomntu onga sivayo isi Xhosa.(I think it's better for us to be taught in English because sometimes we're gonna have to speak to people who don't understand Xhosa.)

These three comments focus on the value of learning English for the imagined life outside the classroom in a world dominated by English. This life includes 'the exams', 'university' and 'the world'. The learning facilitator's incorrect assessment that 'the world is mostly English-speaking' emphasises the symbolic power (Bourdieu, 1991) that English has in his ideology. In his estimation, the world that counts is the English-speaking world.

Supporting the teaching in Xhosa – the Learning Facilitator

The learning facilitator supports the teaching in whole-class activities by listening to the teacher and offering his contributions when asked, or by volunteering. These contributions are always in Xhosa and range from close translations of what the teacher has said to interpretations of a mathematical concept using apparatus. In group and one-to-one work, he supports the learners by circulating in the class and asking and answering questions in Xhosa.

The role and value of Xhosa in the classroom is not made explicit in the data and the comments below reveal blurred and at times conflicted understandings in this regard. Here are three comments made by Athi in his interview:

(Interview with learning facilitator, 14/07/11)

LF: Their final exams are in English so I don't wanna branch too much off that

(Interview with learning facilitator, 14/07/11)

LF: I don't wanna confuse them too much by telling them these (Mathematical) terms in Xhosa, whereas when I'm not here Sue is going to give it to them in English

(Interview with learning facilitator, 14/07/11)

LF: I speak as little English as possible, because if I'd get up there and say exactly what Susan was saying I really wouldn't be achieving anything

These comments by Athi appear contradictory. He does not 'wanna branch too much off' English, but he speaks 'as little English as possible'. This contradiction comes about because the complexity of 'speaking English' and 'speaking Xhosa' is masked by these comments. For example, the 'English' that he reports using in his first comment probably refers to the Mathematical English (ME) which he borrows and inserts into his Xhosa-for-Mathematics register.

John and Susan's comments reveal an ambivalence associated with the use of Xhosa in the classroom:

(Interview with Focus Director, John, 14/07/11)

J: A scenario should be, teach the concept, get the meaning in Xhosa, fine, but then be able to turn that back into English again and to be able to speak it or write it really clearly.

(Interview with teacher, 12/07/11)

T: I don't want them to come up with a Xhosa word for the word 'transformation', they must use the word 'transformation', because that will be the question and if they get a question that says 'factorize' when they don't know what the word 'factorize' means because they've used the Xhosa words, then they are not going to be able to answer the question.

(Interview with teacher, 12/07/11)

T: I also encourage Xhosa in the classroom to make sure that the weaker students are getting it, that they can hear it.

(Interview with teacher, 12/07/11)

T: I certainly haven't asked him to translate everything and always be there with an example / (a) as we said at the beginning just to have someone else explain to them in a different way and (b) to explain that in a way that they can kind of relax not concentrate in the language and focus on what's being taught rather than hold on I missed that word.

John's concession, 'get the meaning in Xhosa, fine' and Susan's explanation that Xhosa is useful for 'the weaker students' demonstrates their view of Xhosa in the classroom as a necessary crutch to be used on the way to becoming proficient in Mathematical

English. Elsewhere in her interview, Susan refers to the learners listening to Athi's Xhosa explanations as 'an easy way out' and she tells the learners that they have 'got no excuses' (Lesson 2, 12/07/11) when Athi is available to help them in the classroom. In this way she frames their difficulty with English as an excuse for not understanding the mathematics. The participants' comments on the use of Xhosa reveal educators grappling with the tensions of giving learners access to the language of power, English, while still ensuring that learning is meaningful. This is a dilemma well described in South Africa (see Setati, 2008; Probyn, 2009).

While Athi speaks using a variety of discursive practices, he also supports the teaching through silent observation. He explains in his interview that this silence is not passive: 'I look for blank faces'. Through this practice he is able to glean information about the learning taking place. With the freedom of not having to drive the discourse of the lesson, he can be attuned to the body language of the learners and pick up signals about their level of understanding and communicate these to the teacher.

When Athi is explaining a calculation for the first time in whole-class teaching, the discourse follows the IRE/F pattern of discourse similar to that of the teacher (indicated by I, R and F in the transcript below).

(Extract 4: Lesson 2, 12/07/11)

LF: **Kaloku uba masiqale apha ku-one siyofika ku-one sihambe kangaphi**? (If we start from one going to minus one, how many times did we move?)	I
Ls: **Kayi- two** (Twice)	R
LF: **Kayi two. Ne?** (Twice, hey?) **Uba sihambe kayi-two lonto ithetha uba nangapha masihambekangaphi?** (So if we went two spaces this side that means this side we must also go how many times?)	F, I
Ls: **Two**.	R

LF: **Kayi-two**. (Twice)	F

When reformulating an explanation the teacher has given, Athi's discourse is monologic with the occasional question to the learner about their understanding. He does not always wait for an answer to these, nor is an answer always given. In this way his questions serve a similar function to the teacher's questions about understanding – they control the pace and direction of the discourse rather than assessing understanding.

(Extract 5: Lesson 2, 12/07/11)

LF: **Kaloku nithi niyayiguqula kaloku** (Well, you said that you will flip it), **ngubani ebesithi ico-ordinates ngu-nought nobani? Ngu-nought no-two?** (Who was saying the co-ordinates are nought and? It's nought and two?) **Kaloku sithi siyayiguqula kaloku siy'sa ngapha, siyayiguqula** (We said we were flipping to the other side, flipping) **now, asin'o' yiguqula siyise ngapha siphinde sifune u'yibuyisela ngapha. 'Yayibona le nto ndiyithethayo?** (now, we can't shift it this side and then want to bring it this side again, do you get what I'm saying?) **ngoba kuthwa sifuneka siyi-reflect-e ngo-negative one i-x - x co-ordinate** (because we have to reflect it with negative one, the x-co-ordinate)

In one-on-one work, however, much of Athi's discourse is dialogic:

(Extract 6: Lesson 3, 13/07/11)

(1) LF**: 'Khona ingxaki?** (Is there a problem?)

(2) L**: Xa si-reflect-we zonke ezi , zibe-negative -** (If we have reflected all of these so that there are negative -)

(3) LF: **Andiva?** (Pardon?)

(4) L**: Xa si-reflect-we ii-Y axis ziye zilantuke, ii-Y axis zethu - Ngoku xa silantuka, si - Xa sithatha le triangle, neh, siyizisa kweli 'cala** (If we reflect the y axis', our y axis' – now when they become - If we take this triangle and

bring it this side**) sitshintsha iico-ordinates sizenze** (we change our co-ordinates) **zibe-negative zonke** (they all become negative.)

(5) LF: **Uyandibuza okanye uyandixelela?** (Are you asking me or telling me?) (*Laughing)* **E-e?** (Yes?)

(6) Ls: **Siyabuza ukuba kuza'ba-right na xa zi-negative zonke** (we are asking if it will be correct if they are all negative)

(7) LF: **Sundibuz 'ba izoba right na**. (Don't ask me if it will be correct or not) **Sukubuza izo'ba-right na. Wena ucinga njani? Yintoni le o'cingayo?** (Don't ask where it will be correct. How do you think? What are you thinking?)

(8) Ls: (*inaudible*)

This extract reveals how Athi encourages learners to articulate their thinking ['how you do think?' 'what are you thinking?' (7)] – an important practice when teaching mathematical reasoning (Brodie, 2010).

These extracts show how Athi's discursive styles are varied. He appropriates some ways of speaking that are 'teacherly', but at other times speaks in a more conversational manner. In this way he enacts different identities (Makoe, 2007) ranging from 'the teacher' to 'the companion-helper'.

Building rapport with learners - the Teacher

Susan's identity positioning as a White, female, English-speaking adult constrains and enables her discursive practices in certain ways. South Africa's social and political history of segregation of racial groups through the policies of Apartheid has left a legacy of power inequalities between citizens which plays itself out in the education sector as much as any other arena of South African life. This is particularly stark in the rural areas where integration among races is slow and mutual lack of understanding between racial groups serves to perpetuate old Apartheid power relations which favour White as dominant and the ensuing contradictory responses of deference and resentment from the non-dominant Black community. This contributes to the 'gap in relating' which John referred to in his interview (see Chapter 2).

Susan and John recognise the social distance between themselves and the learners and have sought to address it through the use of the learning facilitators, but also through building rapport with the learners themselves. Susan works towards this through her use of the casual terms of address 'guys' which is usually reserved for peers. Her use of this term is telling of her age – while she is distinctly their elder, and an adult, she is still young enough to use informal terms to address them. On other occasions she pronounces the learners' names in the voice of a sports announcer (ie. elongating the final vowel in their names), makes reference to popular culture (a current television programme) and code-switches into Xhosa. An example follows:

(Extract 7: Lesson 4, 14/07/11)

T: Then I reflect in the line y equals x… **jigga** (sic, change direction)

Ls: **Jika majika** (to dance/ the name of a television programme) (*laughing*)

Here, the teacher has code-switched into Xhosa to explain that they need to swap the co-ordinates around when they reflect in the line y=x. She has learnt the word 'ukujika' from the learners in an earlier lesson where they used it in reference to the popular television show 'Jika Majika' which loosely means 'to dance'. By incorporating this Xhosa word into the chain of speech communication of the lesson series (Bakhtin, 1981), the teacher has positioned herself as a knower of popular Xhosa culture and wins approval from the learners as indexed by their warm laughter.

The teacher is aware of the value of code-switching in her teaching as she expresses in her interview:

(Interview with teacher, 12/07/11)

T: I need to have a little more Xhosa to throw out there. Every now and then even little things like '**niyeva'** (do you understand) they answer if I say '**niyeva'** (do you understand), but if I say 'do you understand', they'll sit there, little sentences and basics, just jolt them into action a little bit more, so I've learnt small little phrases like 'hurry up'

The effect of her code-switching glossed as 'jolt(ing) them into action' demonstrates the classroom management function. While expressing the importance of her use of Xhosa

('I need to have a little more'), she simultaneously minimises the role that Xhosa plays in her discursive repertoire to a rather ephemeral one with phrases such as 'throw out there', 'little things' and 'small little phrases'. These phrases have the effect of evoking a sprinkling of words used in passing with the hope of a positive effect.

Susan sees the learning of the learners' home language, Xhosa, as an important step in building rapport. This is a vexed issue, however, as Susan does not want her learning of Xhosa to detract from the opportunity for the learners to learn English as these opportunities are so few in their community. In her interview she says:

> (Interview with teacher, 12/07/11)
>
> T: We said to these kids in the beginning, yes we do wanna learn Xhosa, but it's not gonna be (in the Focus classroom), we want you guys to speak English.

The value of her project of learning Xhosa should not be under-estimated as it sends a signal of solidarity with the learners. One learner voiced the unfairness of having to use English in the classroom, when the teacher is not under the same obligation to use a language she is still learning. Athi reports this conversation that the learner had with Susan:

> (Interview with learning facilitator, 14/07/11)
>
> LF: He said, 'she doesn't speak much isiXhosa so why should he speak English'.

Building rapport with learners and the teacher – the learning facilitator

As a young (21 years old) bilingual Xhosa-English speaker, the learning facilitator's role is chiefly to act as a mediator between the teacher and the learners and also between the curriculum and the learners. The role grew out of a need that the Focus teachers perceived for them to bridge the language and culture gap between themselves and the learners on the programme.

> (Interview with Focus Director, 14/07/11)

J: (the learning facilitator) not only relates well to the kids 'cos they're a bit younger, but also speaks their language.

(Interview with teacher, 12/07/11)

T: They are going to relate to him, he's younger, he's funny, you know he talks the talk

Athi's characteristics identified by John and Susan as making him a suitable mediator and broker are personal qualities ('young', 'funny') and discursive practices ('talks the talk', 'speaks their language').

Acting as a cultural broker means winning trust on both sides of the cultural, racial and age divides. Athi builds rapport with both the teacher and the learners using different practices. Most importantly, he does this through speaking to each party in the language with which they are most comfortable: Xhosa with the learners and English with the teacher. His rapport with the teacher is evident in his collegial interactions with her in discussing lesson activities and teasing her when she misspells something on the board or calls him by the incorrect name. He has already been accepted by the teacher as a colleague; his real work in these lessons is to build rapport with the learners in order for them to accept him as being 'on their side' and 'one of them'.

During his introduction to the class, he creates an inside joke with the learners about the teacher, speaking in Xhosa which she cannot understand and not translating for her:

(Extract 8: Lesson 2, 12/07/11)

LF: **As ebetshilo uSusan, igama lam ndinguAthenkosi**. (As Susan just said, my name is Athenkosi**). Ndizoncedisa apha kwi-Focus, njeba ethetha, njeba ekhumshayena, Bayakhumsha kaloku abelungu, so** (*Learners laughing)* **Ndizo thetha, ndizothetha isiXhosa ke mna ke**. (I'm here to help at Focus, as she speaks, as she speaks English because you all know that White people speak English. I'm here to speak isiXhosa.)

Ls: (*Laughing*)

T: *(smiling)* Eh, what did he just say?

'White people speak English' is a reference to the reputation of monolingualism that White South Africans have. He incorporates the learners into his teasing of the teacher through his use of 'you all know', using the exclusion of the teacher caused by his

choice of language to upset the language hierarchy of the classroom momentarily. He creates an 'us and them' binary through his use of 'they', in this way emphasising his identity position (Norton, 1997) as aligned with the learners through his discourse. The response of the learners to this joke is good-humoured laughter – they do not seem to be shocked, but rather affirmed by the gentle teasing of the teacher. The teacher's tone is scolding, but she is also amused. It seems that she knows she has been excluded, but appreciates the purpose – to forge a bond between Athi and the learners – and she suffers the exclusion good-naturedly.

When speaking to the learners, Athi uses an informal register of Xhosa. This is indexed by the Xhosalising[6] of English words (**'ndive rongo'** – I heard wrong; **'yonk'into iright?'** – is everything alright?) and the inclusion of Tsotsitaal (**'ek sê** – I say), which is a language variety with a nonstandard version of Afrikaans as its matrix language, spoken predominantly by males in the Black urban townships of South Africa (Slabbert & Myers-Scotton, 1996, p. 317). The inclusion of Tsotsitaal marks Athi's language as a distinctly urban variety of Xhosa which would not be used in rural areas.

This mismatch between Athi's urban world and the rural world of the learners is further illustrated when Athi uses a reference to a popular film, *Transformers,* in order to help the learners understand the mathematical concept of transformation. His reference is met with blank stares, revealing that the learners do not know the film. Watching films is an inaccessible activity for rural youth and so the learners cannot access this instantiation of Athi's urban culture.

Athi sees evidence of the rapport he has with the learners during the lessons:

> (Interview with learning facilitator, 14/07/11)
>
> LF: I think they feel more comfortable asking questions whether they didn't understand it. I think it's going to take time because I think they still find it difficult to ask Susan, because of the language barrier and the cultural barrier as well. So in time maybe they'll grow into it, but I think it's still difficult for them to, 'cos I mean they ask me basic questions. You know even if I'm roaming around the

[6] Xhosalising is a type of borrowing where borrowed English words are given Xhosa morphemes (Paxton & Tyam, 2010)

> class they will ask me basic questions which they could have easily asked Susan, but they just don't.

In contrast to other cultural brokers who interact with parents as an integral part of their role (Rueda & Genzuk, 2007; Cable, 2004), Athi does not interact with the learners' parents and the only times he mixes with the learners outside the classroom is in an informal soccer game after the holiday programme and in other playground games in-between lessons. While Gentemann and Whitehead's (1983) role of a cultural broker being a role model for the minority community for participation in the mainstream culture did not appear in the data, it was referred to by Susan in casual conversation about previous Focus programmes. She mentioned that learners had approached the learning facilitator to ask how they could 'get to Cape Town' – in other words, how does one access the mainstream culture. Also, there was no evidence in the data of Athi mediating the culture of the learners for the teacher, although this may very well have occurred outside of class time.

Learner taciturnity with the teacher

When the teacher is speaking in a whole-class activity, learners are routinely silent and respond predominantly in short English phrases. The most common response is 'yes' or 'no' or a mathematical term such as a number. There are only two examples in the data of a learner making an initiation during whole-class teaching. The first was when a learner asked Athi a question during a whole-class activity he was leading. The second was in the form of a question by one learner, in Xhosa, directed at another learner who had been writing a calculation on the board. There was no evidence of the learners asking a question of the teacher in a whole-class activity. The possible reasons for this described taciturnity are, firstly, that learners in mathematics classrooms are universally taciturn due to the nature of the subject. Pimm (1987) asserts that 'for many pupils, mathematics is predominantly passive and aural' (p. 43). Secondly, the students' proficiency in OE is low. Or to put it in Cummins' terms, they lack proficiency in English BICS (basic interpersonal communication skills) (Cummins, 1984). They are familiar with the Mathematical English terms used in this section and so are more likely to provide an answer consisting of such a term, than an answer explaining why a certain procedure is incorrect, which would involve using more Ordinary English. However, the learners' taciturnity cannot be unequivocally associated with lack of English proficiency. When sensing the opportunity to make a joke in English, one learner did not hesitate to draw upon his knowledge of English puns:

(Extract 10: Lesson 5, 15/07/11)

T: Boring it's so easy (*stage yawn*), okay.

LF: Too easy, huh?

L: Not too easy, three easy.

His pun on the word 'too' allows the learner to construct his identity (Norton, 1997) as a competent user of English. Therefore lack of proficiency in English is only a partial explanation for the learners' taciturnity. A third possible reason is a lack of familiarity

with the teacher's expectation that they should contribute and the concomitant lack of experience in contributing. This particular ground rule from which the teacher is operating is not made explicit to the learners and it is different from the ground rules in their local classrooms. They may not understand when, how and why they are supposed to talk.

Fourthly, taciturnity could be attributed to the predominance of closed questions within a cued-elicitation sequence (Edwards & Mercer, 1987). Cued-elicitation is a kind of teacher-led discourse in which 'the teacher asks questions while simultaneously providing heavy clues to the information required' (p. 142). A cued-elicitation sequence is exemplified by the extract below. The question asked by the teacher is underlined at the beginning of the extract and the correct answer, provided by some learners, is underlined at the end of the extract.

(Extract 11: Lesson 2, 12/07/11)

T: <u>now what is my new set of co-ordinates</u>?	initiation
L: Minus one to two.	incorrect response
T: Sorry, say it again.	
L: Minus one, two.	incorrect response
T: Minus one and two, who thinks it's minus one and two? Yes? No?	
L: Think so.	incorrect response
T: Okay so the boys who didn't do their homework think it's minus	

one, two. So what about the girls, what do you think guys? Unathi what did you get?	
L: Zero and two.	incorrect response
T: Zero and two. Zero and two. Okay. Zero and two is going to be over here, hey?	visual cue
L: Yes.	
T: Okay so now that we see that we folding it there, it's gonna, we know that our point is going to be over there, what do we think the co-ordinates are going to be? Okay the thing that you got to remember when you doing this, is that you must always have the same distance between your point and your fold and your fold and your new point. Okay so between my point and my fold okay this is minus-one, this is one it's not really accurate but that's fine, so I've got one, two points, two spaces between my points from one to zero and to minus-one. So now I must make sure that I have one, two spaces on the other side of the fold, so what does that get me to? I've got minus-one?	elaborated initiation with visual and oral cues
L: <u>Minus-three</u>.	correct response
T: Minus-two, minus-three so <u>my x becomes minus-three and my y?</u>	confirmed, initiation reformulated
L: One	incorrect response
Ls: <u>Two</u>	correct response
T: <u>Two</u>, okay my y is the same, my y stays the same, 'cos I'm folding it on the line, on the vertical line.	correct response confirmed

In the teacher's discourse the cues given after a correct answer is not forth-coming from the learners are provided in the form of reformulated and elaborated initiations and visual cues which guide the learners towards the correct answer. Added to this, closed questions could be threatening as the answer is judged as either correct or incorrect.

The value placed on learner talk in the classroom, and the associated frustration that its occurrence is so low is a concern for the Focus Director, the teacher and the learning facilitator. There is a consensus that the use of Xhosa by the learning facilitator will encourage the learners to participate by expressing their contributions in Xhosa.

> (Interview with Focus Director, 14/07/11)
>
> J: This is something we've been hitting our heads against the wall again a little bit with in that/ because students just have such low confidence levels with English they're reluctant to speak in class.
>
> (Interview with teacher, 12/07/11)
>
> T: I want them to speak, so I don't want them not to participate because the language is stopping them, a lot of them will not answer if I told them to speak in English.
>
> (Interview with teacher, 12/07/11)
>
> T: it's been good to see them saying more with Athi like speaking their own language.
>
> (Interview with learning facilitator, 14/07/11)
>
> LF: I'll ask them and I tell them they must tell me, so in a way they are sort of teaching me what to do.

However, in whole-class teaching the learners remain taciturn. Susan employs the following practices to coax the learners to speak. As was discussed at the beginning of this chapter, she asks many questions, often in the form of a closed question to the learners enquiring whether they understand the calculation or not (e.g. 'happy?', 'okay?', 'does everyone understand this notation?' 'thumbs up?'). Her aim in asking these questions is to allow learners to articulate their thoughts, or to articulate a lack of understanding. The final question, 'thumbs up?' is accompanied by the gesture of holding both thumbs up. This references a system which Focus instituted to allow learners to alert teachers to their lack of understanding without using language. They

also used a system of red and green cards: red = 'I don't understand', green = 'I understand'. The gesture and card systems have not been fully taken up by the learners, however. The learners may respond to Susan 'thumbs up' gesture by copying it, but this does not necessarily denote that they have understood what she has presented. Another system of gesture employed by the teacher is a show of hands; however, this system also did not result in learner participation, as this extract shows:

> (Extract 12: Lesson 2, 12/07/11)
>
> T: Who thinks three? (*no hands are raised*) Eh, no-one thinks anything. Hey, Grade 11, you normally think nicely, who thinks quadrant four? (*again, no hands are raised),* **eish** (oh dear), who doesn't think?

Susan's evaluation, 'you normally think nicely', demonstrates the value she places on learner participation through talk or other semiotic systems in the classroom and her frustration with learner taciturnity.

Edwards and Mercer (1987) argue that in fact teacher questions serve other purposes and are not successful in getting learners to talk. These purposes have to do with assessment of learners and control of the discourse. Silences in the classroom, Edwards and Mercer assert, are more effective in getting learners to talk. In her interview Susan expresses her belief that she keeps silence 'a lot' in order to stimulate thinking:

> (Interview with teacher, 12/07/11)
>
> T: We really kind of focus on how to get an understanding of things and kind of investigate things for themselves. I find that I do a lot of silence and waiting either for one answer or for someone to volunteer

This perception of 'a lot of silence and waiting' is, however, not supported by the data. More common is her posing of an elaboration or reformulation of her question after allowing a few seconds of silence to pass.

Another approach by the teacher to combat taciturnity in the whole-class teaching is made in offering learners the option of speaking in 'any language', but there are few instances of them using Xhosa in response to her questions. This only occurs on a few occasions when a learner volunteers, in which case the stakes are not as high as when

they are called upon by name to answer. Makoe (2007) analysed a similar exhortation made of a learner by a monolingual English teacher in a primary school classroom. She noted that the learner will be aware that not only is English the language that 'gets you the prize in the classroom' (Makoe, 2007, p. 64), but also that the teacher will not be able to understand what is said in a language other than English. These are both plausible reasons for the Focus learners choosing not to respond to the teacher in Xhosa, either in whole-class teaching or in one-to-one work with the teacher.

Learner talk with the learning facilitator and each other

As has been shown above, different ground rules apply in discourse between different classroom participants. The learners' taciturnity is transformed in certain instances of Athi's whole-class teaching as well as when they work one-to-one with Athi or with each other.

While Athi's whole-class teaching is marked by the IRE/F discourse style, the learners' responses are louder, in Xhosa and more likely to be in a chorus. This style of learner talk is in line with the 'chorusing' described in ex-DET schools by Chick (1996) and Hendricks (2003). While this kind of learner talk reveals little about learners' reasoning (Brodie, 2010), it promotes greater learner participation (Hendricks, 2003) in a style with which they are probably comfortable given their educational background.

In one-to-one work with Athi, learners are voluble in Xhosa, asking him procedural questions as they work through problems. Due to the lack of data collection of learner-to-learner talk, all that can be commented on is the volubility of this Xhosa discourse which was evident from the video recordings.

One notable exception to the general pattern of learner talk in this classroom was a discussion held among a few learners, the learning facilitator and the teacher in a whole-class activity. This discussion revealed more about learner thinking in whole-class activities than anything else in the data. It is discussed in Chapter 5.

Learners as teachers

A discursive practice of the learners which differed from what has been discussed above occurred when they made and explained their calculations on the board in a whole-class activity. Typically one or two learners would approach the board at the request of the teacher and use chalk to demonstrate their calculations and in some cases explain verbally the procedures they undertook. Their confidence with using the board for their calculations in symbolic mathematics varied from learner to learner. It seemed to be an activity with which they were reasonably comfortable as there were only a few learners who did not attempt a calculation on the board during the week of lessons.

There were twelve episodes in which learners participated in this activity. On ten of these occasions learners spoke exclusively in Xhosa and on two occasions English was used either exclusively or with Xhosa. It is difficult to explain this variation without interviewing each learner, but examining the kind of English used on the two occasions it was used gives some insight into why learners might choose this language. The use of English was associated with other features of the discourse of the teacher, such as the use of 'my' when speaking about mathematical objects in the case of one of the learners who used English ('my-y never change'). This indicates that when using English the learner is appropriating the discourse of the teacher and perhaps speaking with her in mind as an audience. In a heteroglossic space such as this classroom, there are many voices available to participants to appropriate (Bakhtin, 1981).The other learner who used English (Ezekial) received a chorus of 'yes, sir' in response to his question 'you understand, hey?' (Lesson 3, 13/07/11).This again supports the notion that by using English, the learners take on the identity of 'teacher'. It is in instances such as this that learners construct different identity positions for themselves through their discourse and construct a hybrid discursive space (Guteirrez et al, 1999).

Conclusion

The discursive practices described in this chapter comprise the most prominent of all the practices in the data. They are prominent either due to their ubiquity (the teacher driving the discourse in English, for example) or due to the significant deviation from the dominant practices (learners appropriating the teacher's discourse, for example).

Having described the discursive space of the Focus classroom, I now move on to a discussion of the bridging discourses employed by the teacher and learning facilitator.

Chapter 5: Bridging discourses for Mathematics

Introduction

In this chapter, the functions of the teacher and learning facilitator as mediators of learning are discussed. As has been outlined in Chapter 2, a Vygotskian perspective on teaching and learning holds central the notion of mediation that more expert knowers of a subject practise between the subject matter and less expert knowers of that subject. In Gibbons' study, discussed in Chapter 2, one expert knower of the subject (the teacher) practised mediation by constructing with the learners what she describes as 'bridging discourses' between the learners' current scientific and linguistic knowledge and the scientific and linguistic demands of the curriculum (Gibbons, 2006). Gibbons' definition of 'bridging discourses' focuses on how the 'everyday' language of EAL students and the academic registers of the school are drawn together through the classroom discourse of the teacher and the students. In the Focus classroom, this definition is extended to include the learning facilitator who becomes a third party in the bridging discourses and the 'everyday' language of the learners extends to both English and Xhosa talk. Added to this, because the Focus model is one of collaborative, bilingual teaching, it opens up the possibility of another level of mediation. This occurs when the learning facilitator employs bridging discourses to mediate between the learners and the teacher, who are not only separated by their differing levels of expertise, but also by their age and home language. An analysis of the bridging discourses found in my data which exist on both of these levels is the subject of this fifth chapter.

The bridging discourses discussed below form links between the two languages used in the classroom as well as the different registers used by and familiar to the classroom participants. The target registers of the classroom are Mathematical English (Pimm, 1987) in spoken form in formal, academic tenor and written symbolic mathematics. There are, however, a myriad other registers which are drawn upon in building these bridging discourses.

Through the discourse analysis which follows, my purpose is to give a description of the variety of bridging discourses found in my data by grouping them into the categories described in Chapter 3: Xhosa-for-Mathematics, message abundancy, uptake of learner contributions, talk about language and unpacking written Mathematical English.

Xhosa-for-Mathematics – the learning facilitator

The most common bridging discourse used in the classroom is the variety of Xhosa used by the learning facilitator and the learners which I will call 'Xhosa-for-Mathematics'. In seeking to understand the functioning of this language variety which includes Xhosa and English words, I argue that the model of code-switching which describes switches occurring from one bounded phenomenon ('Xhosa') to another ('English') and back again is unhelpful here. More productive is the notion of language users having repertoires of language (Blommaert & Backus, 2011) which suit different speech events. In this case a language variety has been formed from a matrix of Xhosa, with some English words being included in a patterned way. This patterning involves the incorporation of ME terms which are Xhosalised, for example 'i-x-co-ordinate' and 'i-y-axis'. The Xhosalisation of subject-specific terms has been documented as a discourse feature in ex-DET content-based classrooms (Probyn, 2009). Xhosalisation of terms has been postulated as a means of negotiating meaning, identity and status (Paxton & Tyam, 2010). I argue, along with Probyn (2009), that the use of Xhosalised ME terms in Xhosa-for-Mathematics, allows speakers to appropriate the terminology and identify more easily with the concepts. While some work has begun on providing Xhosa equivalents for ME (see Young, van der Vlugt, & Qanya, 2005 as an example) the norm in Xhosa-for-Mathematics is Xhosalisation of ME words. Because of the predictable nature of the use of these Xhosalised ME terms, and the lack of a Xhosa equivalent at the disposal of the speaker, I argue that the use of these terms constitutes borrowing and not code-switching. A new mixed code, Xhosa-for-Mathematics, is formed. This is supported by Athi's explanation of the learners' proficiency in Xhosa-for-Mathematics: 'they will know what a hypotenuse is whatever language you speak it in' (Interview with learning facilitator, 14/07/11). 'Hypotenuse', or more accurately, 'i-hypotenuse', can be considered part of the Xhosa-for-Mathematics lexicon.

Xhosalisation of ME terms is rather unproblematic for an interpreter such as Athi; it is the translation of the mathematical concepts verbalised in OE which is more challenging. Athi studied most of his school mathematics through the medium of English and so this kind of translation is difficult for him:

> (Interview with learning facilitator, 14/07/11)
>
> LF: I mean (teaching in) English should be easier to be honest. (The other facilitator and I) think in English and we have to translate it in our minds in that split second into Xhosa

The reason for the difficulty in translating 'the language around those mathematical terms' (Athi interview) is partly due to the highly metaphorical nature of the OE used in mathematics teaching (Pimm, 1987). When metaphor is at work in the mathematical register, more work is required to interpret this for a learner of both OE and ME. For example, in teaching the mathematical concept of reflection of a point in a line on the Cartesian plane, the teacher uses the ME term 'reflection' and offers a metaphorical translation of this term in OE, 'flip', as it applies to the mathematical procedure. The literal meaning of the term in OE is 'to give back or exhibit as an image, likeness, or outline' (Merriam-Webster online, 2012). Without an understanding of the OE meaning (as is plausible with English as a foreign language), the learners need extra help in interpreting the ME concept. Athi uses the Xhosalised version of the ME term 'reflect' ('i-reflecte') and when negotiating the concept with the learners uses a variety of mediational techniques described further on in this chapter.

Message abundancy

The Teacher

Building on Wong-Fillmore's concept of 'message redundancy' (Wong-Fillmore, 1985 in Gibbons), Gibbons uses the term 'message abundancy' (Gibbons, 2003) to describe the use of different semiotic systems – such as natural languages, gesture, prosody and object manipulation - and registers in ESL classrooms in order to mediate the subject-specific language for the learners. This presentation of the content of the lesson through

different semiotic systems and registers of these systems is used by Susan in the following ways.

The series of lessons begins with an overview of the topic, Transformations. The teacher is aware that the topic has been covered, to some extent, by the local schools which the learners attend. From the assumption that some of the terminology relating to this topic will be familiar to the learners, she proceeds in the first lesson with what she describes as a 'recap'. This recap follows a methodology which is typical of all the conceptual teaching[7] in the lesson series.

Her focus is on the subject-specific language of the topic. In an informal conversation with me, she explained that she chose this topic because it is language-saturated and therefore more difficult for the EAL learners and requires extra mediation. The multimodal nature of her discourse is apparent from the start. She has written the word 'transformations' on the board from right to left, manipulating the font of some letters. Some are written back-to-front, some are enlarged, as shown in the video still below:

(Video still from Lesson 1, 11/07/11)

Her introduction to the topic begins, not through an utterance, but through a visual representation of the concept of 'transformation'. Next she begins her recap with an elicitation (Edwards & Mercer, 1987) in the form of a set of closed questions:

(Extract 13: Lesson 1, 11/07/11)

T: What does it mean to trans', what does a transformation mean? What does the word tell us? What does it mean to transform something? …. Hey? …..somebody? …what does it mean to transform? …..no-one knows? ….. somebody try. To transform something…. Unathi? Take a guess.

[7] I use the term 'conceptual teaching' in contrast to 'procedural teaching' to distinguish between teaching the meaning of a concept and teaching the procedure by which one carries out a calculation, as used by Rittle-Johnson & Star (2007)

She elaborates her initial question ('what does a transformation mean?') in three ways. Firstly, she offers an alternative meaning of the verb 'to mean' (ie. 'tell us') and secondly, she uses the verb form of the nominalisation 'transformation'. This form she repeats twice. Thirdly, she extends the discussion to all fields where one might 'transform' through her use of the word 'something'. In this way she has achieved 'message abundancy' in that she references more than one register, more than one word class and uses synonyms in order to make her question more comprehensible (Krashen, 1985) to the learners.

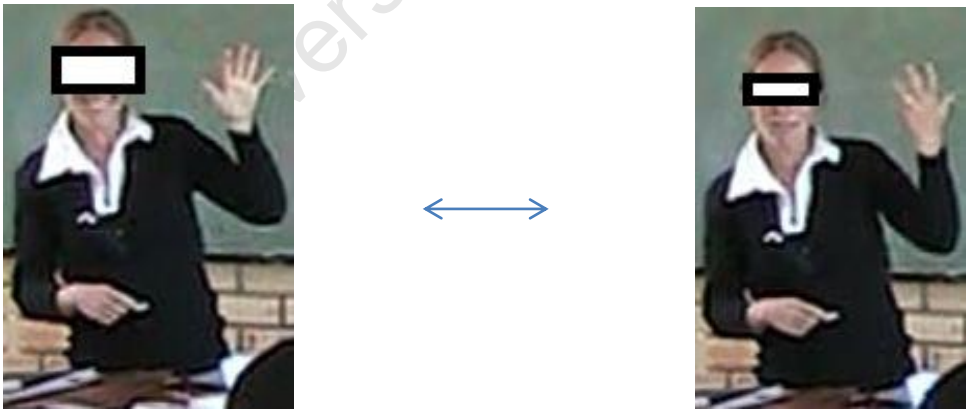
In a later initiation, where the teacher is explaining the concept of 'reflection', she switches frequently between registers. In this extract the registers include gesture and Xhosa.

(Extract 14, Lesson 1, 11/07/11)

T: *(pointing to the top of the board where 'Transformations' has been written using different fonts)* What have I done differently up there?

L: *(twists wrists from front to back in a turning gesture)*

T: Someone's doing this to me (*copies the gesture of the learner as in still below)*



(Video stills from Lesson 1, 11/07/11)

What's the word for this (*continues copying the gesture*)?

L: Reflection.

T: Ja. Okay. So, um, Ezekial says reflection. Okay, so the first thing. I've done lots of different things to this but the first thing is that I've taken my word and I've flipped it, okay I've reflected it. Okay. So this whole thing has been (*writing 'reflected' on the board*) ja, re..flected. Okay? Flipped. (*To LF*) What was the word that you said?

LF: **Guquka** (turn over/turn around). (*spells out the word while T writes on board*) **G.U…K.A, guquka.**

Here the teacher switches between registers in a seamless way ('I've flipped it, okay I've reflected it') to such an extent that a hybrid register is formed. Gibbons uses the term 'register-meshing' to describe this intense switching between registers (Gibbons, 2006, p. 131). She argues that this achieves comprehensible input for ESL learners while at the same time modelling new language. The learners in this class, however, may not be sufficiently comfortable with the OE term 'flipped' to make the input comprehensible. I argue that by incorporating the discourse of gesture, as the teacher does, she adds another quiver to her bow in her quest to make the content comprehensible.

The different registers used by the teacher and learners once the initial question has been posed are represented below:

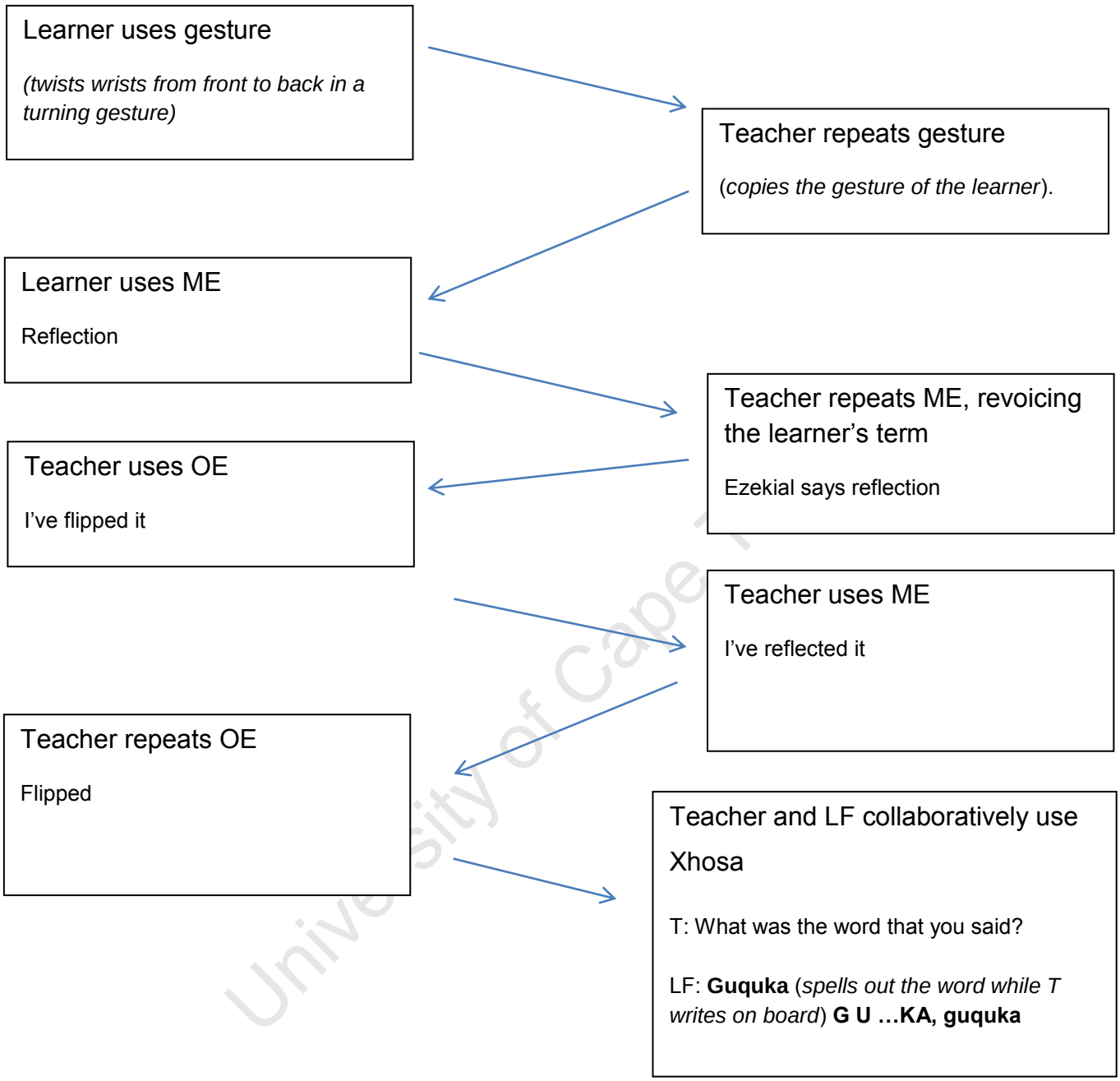


Figure 2: Bridging discourses constructed in Extract 14

What is notable in this example is that the movement between registers is 'back-and-forth' in nature and not simply in a linear fashion from everyday language towards the target register of ME, as suggested by Gibbons (2006) and Setati et al (2002) (see Chapter 2). This pattern is common in the lesson series. The teacher appears to be

foregrounding all kinds of registers for the learners, encouraging them to bring along their everyday English and Xhosa language on the journey to understanding this topic in Mathematics.

The teacher is comfortable using a Xhosa word which has been used by the learning facilitator in a previous Grade 10 class. It has authority in the classroom. A brief discussion of the meaning of this word sheds lights on how Xhosa words are used in the classroom in a similar way to OE words ie. as metaphors for the mathematical concept being taught. As indicated, the word '-**guquka'** means 'turn, come back; change form or place' (Tshabe & Shoba, 2006). The second of these meanings is general enough to be applied to any of the four sub-topics of Transformations. However, when I interviewed two Xhosa speakers known to me about the use of **'-guquka'** they both argued that it is used to talk about someone turning over in bed, or turning back from their path to walk in the opposite direction. Also, another word was used later in the lessons in reference to the concept of reflection: **'guqula'** which means 'turn something over to face in another direction; turn over' (Tshabe & Shoba, 2006). These meanings are equivalent to the ordinary English words 'turn' or 'flip' which are used as metaphors by the teacher for the mathematical concepts of reflection.

Terms used in the mathematical topic, 'Transformation', appear in a textbook developed by multilingual teachers to promote understanding of key mathematical and scientific concepts in English, Xhosa, Zulu and Afrikaans. The translation and explanation of the concept of transformation in Xhosa is as follows:

> **Uguqu-guqulo: ukuguqu-guqula isazobe kukuguqula ubungakanani baso, ukutshintsha indawo okanye ukujongeka kwaso ungatshintshanga kumila kwaso.** (Transformation: Transforming a figure is changing its size, location or orientation without changing its shape.) (Young, van der Vlugt, & Qanya, 2005, p. 45)

In the note on reflection, the translation of 'reflection' is given as '**isazobe-sithunzi'**, next to which appears a picture of two birds facing one another, the one a mirror-image of the other. Next to this is a further English explanation of reflection: 'Producing a mirror image of the figure. This is also called flipping the figure'. (Young, van der Vlugt, & Qanya, 2005, p. 45). The Xhosa translation is not used in the Focus classroom, but

rather the more general term '**guqula**' which more closely approximates 'transform' than 'reflect'. This could cause confusion for the learners and makes a case for further negotiation of the terms used in the lessons. Indeed, in one instance a learner confuses the term 'transformation' and 'translation' and is put right by the teacher.

The teacher uses metaphors from everyday experience as a bridging discourse throughout the lesson series, but most often when teaching reflection. As pointed out above, teaching mathematics using metaphor is common (Pimm, 1987). The dominant metaphor used by Susan in this series of lessons is of folding materials. The line of reflection is likened to a fold in a piece of paper and the original point or shape is given marking qualities so that when the 'paper' is 'folded' the original point/shape marks the paper with the new point/shape and it appears as a reflection.

The metaphor is explained using words and gesture.

(Extract 15: Lesson 2, 12/07/11)

> T: Here's my piece of paper, like this, I'm folding it like *this (gestures using arms to represent edges of the paper being folded*), just picture this as a big thing of mud, when you fold it it's gonna leave a mark on the other side of the fold, okay, so it's gonna be about here.

(Extract 16: Lesson 4, 14/07/11)

> T: You just need to use your imagination a little bit, picture this as your fold, okay, if this is my piece of paper (*gesture 1*), and I want to find out where the new 'b' is gonna, uh, where the, this is 'b', I wanna find out where it's gonna be, and here's my fold, so I fold (*gesture 2*) and it's gonna make a mark there, tsh (*gestures on the board with finger*).

Gesture 1 Gesture 2

(video stills, Lesson 4, 14/07/11)

A verbal and gestural metaphor is created here. The process by which a reflection of a shape is achieved is compared to the process of folding a piece of paper with a marking substance on it which makes a mark on the opposite side of the paper. This is explained in words and enacted with gesture. Later in the series during the teaching of rotation, apparatus is used to create the metaphor. An A3 piece of paper with a shape drawn on it is held against the board and turned to indicate how a shape is rotated. This metaphor is tenuous in that the paper which represents the axes is turned, but it is conceptually incorrect to imagine the axes turning. In fact the shape is turned on the stationary axes.

Further comment shall be made on the effectiveness of using apparatus in mathematics education when the learning facilitator's use of apparatus is discussed below.

The learning facilitator

Athi's use of message abundancy is more limited than Susan's, perhaps as a consequence of him not being a trained teacher, but also due to the fact that he has less control over the teaching discourse of the classroom. One of the key aspects of Athi's message abundancy is the use of apparatus as a metaphorical language. Everyday objects – a scarf and then matches and a piece of paper – are used as metaphors for the Cartesian Plane and the points and shapes on it. Athi combines the use of these everyday objects with demonstrations of the everyday uses that they have. The scarf is folded before being worn; the paper is folded and burned by the match. In

this way, he goes further than the teacher in his use of metaphor as a bridge between the mathematical concepts and the learners' everyday experience. Whereas the teacher uses gesture and word-metaphors and occasionally an object largely associated with school culture (a piece of paper), the learning facilitator uses an everyday item of clothing and a common tool for making fire. In this way, he more closely aligns himself with the everyday world of the learners than the teacher does.

Added to his use of apparatus is the commentary which Athi gives in Xhosa. The result of everyday objects with everyday uses being used with everyday language in Xhosa is an example in a discourse with which the learners are very comfortable. This is evident in their responses to questions which Athi asks. They answer readily, even laughing on one occasion. In this extract, Athi is folding his scarf while talking to the class.

(Extract 17: Lesson 2, 12/07/11)

(1) LF: **U'ba singaka ke ngoku niyasibona singaka, xa ndifuna us'nxiba ndizokwenza kanjani?** (You can see how big it is now, if I want to wear it what should I do?)

(2) Ls: **Uzasigoba** (You are going to fold it)

(3) LF: **Ndiza s'goba ne?** (I'm going to fold it, hey?)

(4) Ls: Yes.

(5) LF: **Nasi** (here it is) *(folds scarf)* **Ndiphinde ndithini? Sisende nangoku. Ndizawuthini?** (Okay now what must I do because it is still long, what must I do?)

(6) Ls: **Phinda usigobe** (Fold it again)

(7) LF: **Ndiza kuphinda ndisigobe?** (I'm gonna fold it again?)

(8) Ls: Yes.

(9) LF: **Ndiza'phinda ndis'gobe** (I'm gonna fold it again), **so** (like this). **Niyayibona ke ngoku ifana njani nale nto** (do you see that is the same as this thing?) (*gesturing towards calculation on the blackboard*)

(10) L: Ja

(11) LF: **Andinokwazi us'goba su ndiphinde ndithi su, ndizakwazi?** (I can't fold this way and then fold the other way, can I?)

(12) Ls: No *(laughing)*

(13) LF: **Andizukwazi, kutsho nani mos. Nitsho**, (I can't, you said so yourself) **Nithi ndiza'sisonga su, sibenje, sibengake. Ndiphinde ndithini?** (You're saying I must fold it like this so that it can look like that – that it's this size. Then, what must I do next?)

(14) Ls: **'Songe** (fold it)

(15) LF: **N'phinde ndisisonge**. (I must fold it again.) **Now, ndiza'- ndiza'uya njani ngapha, nithini ndisuke ku-one, ndiye ku-four-** (Now, how will I – how will I get there? You're saying I go from one to four.)

(16) L: **Uyagqitha** (You pass that)

(17) LF: **Ndiphinde ndiye ngapha?** (Then I go over there?)

(18) Ls: (*answering simultaneously with laughter*) //**Hawu*//*** (no)// **eh*// //okay//***

(19) LF: **Niyayibona?** (do you see?)

(20) Ls: Yes.

(21) LF: **Ndizakwazi?** (Will I be able to do this?)

(22) Ls: No

(23) LF: **'Ndizukwazi. Ndisuka ngapha, ndiye ngapha** (I can't do this, I've come from here, I'm going to here)

(24) Ls: *(inaudible)*

(25) LF: **Nithi, masiyisonge okanye siyigobe, sithini ke ngoku** (You're saying, we must fold or bend it. And then what do we do?)

(26) Ls: *(inaudible)*

(27) LF: **Siyaqubekeka kwela cala kaloku, Anitsho?** (We continue on that side. Isn't that what you're saying?)

(28) Ls: **Sitsho** (That's what we're saying)

(29) LF: **Siyavana?** (do we agree?)

(30) Ls: Yes.

The learning facilitator's diction here adds to the message abundancy which begins with his use of Xhosa and apparatus. He uses two words to indicate his folding of the scarf: **'-goba'** which means 'bend, bend down, bow, stoop' or 'hem as a dressmaker hems a garment' (Tshabe & Shoba, 2006) and earlier '**-songa**' which means 'fold (a garment, cloth, blanket, etc.) (Ibid.).

While this analysis is not focused on learners' responses, it is important to note what effect Athi's discourse has on the learners' responses. This is typical classroom discourse following the IRF pattern. The responses required from the learners are simple and they answer his questions mostly in unison. Their chorusing is facilitated by Athi's frequent questions invoking the whole class through his use of **'si**-' ('we'). It is evident that some learners who do not otherwise participate in the public space join in with this chorusing, hence ensuring learner participation (Hendricks, 2003). The question-and-chorus-answer style is reminiscent also of discourse practices of some preachers, motivational speakers and speakers at political rallies, where the aim is to generate enthusiasm for a particular idea or perspective. This discourse practice has a unifying effect on the respondents.

Chorusing like this is typical of discourse in classrooms of 'Black' learners under Apartheid (Chick, 1996) and would still be typical in the classrooms from which these learners come, as attested to by Susan in her interview. Chick suggests that

> chorusing gives the students opportunities to participate in ways that reduce the possibility of the loss of face associated with providing incorrect responses to teacher elicitations, or not being able to provide responses at all (p. 29)

The chorusing in evidence here demonstrates how the discursive practices of the previous classrooms of the learning facilitator and the learners have been incorporated into the practices of the Focus classroom (Bakhtin, 1981).

Despite the enthusiastic involvement by all participants in the scarf demonstration, there is a feature of the scarf metaphor which is immediately confusing. In the concrete example, the scarf can be folded multiple times, but the abstract concept of ascertaining the position of a point on the Cartesian Place involves only one move. In the following lesson the learning facilitator burns a hole through a folded piece of paper to illustrate

the mirror-image which is create by reflection. Two different pieces of apparatus with different qualities are used to explain the same concept, which could increase the confusion. However, Pimm (1987) argues for the merits of using metaphor in mathematics teaching as follows:

> (Images allow pupils to discover the) rich inner mental realms in which mathematics properly takes place… Whether or not a particular offered image is successful in illuminating a concept, it at least serves the purpose of indicating that image-making is an appropriate activity for pupils to be engaged in, and that the teacher has personal images of the mathematics in question (p. 97)

The positive effects of a physical metaphor such as this is felt by the learner who was interviewed:

> (Interview with learner, 14/07/11)
>
> I: **So, uyasebenza umzimba wakhe** – (So, does he use his body when -)
>
> Thando: **Usebenzisa umzimba wakhe ukucacisa**. (He uses his body to explain)
>
> I: **But iyanceda ukukhumbula**. (But does it help you to remember?)
>
> Thando: **Ja, iyanceda. (**Yes, it does)

The 'image-making' which Athi engages in through his scarf metaphor certainly appeals to Thando and thereby fulfils the function outlined by Pimm above. There are no guarantees, however, that Thando has correctly understood the concept of reflection because of this metaphor.

In drawing to a close this discussion of the message abundancy present in the teacher and learning facilitator's discourse, Table 2 serves as a summary of the different ways that the teacher and learning facilitator represent the concept of reflection in mathematics during this lesson series:

Table 2: Registers for representing 'reflection' in the Focus classroom

ME concept	OE term	Xhosa term	Apparatus as metaphor	English metaphor	Xhosa metaphor
reflect	flip	-guquka, -guqula	folding scarf, lighting folded paper	fold	-songa, -goba

Having discussed how message-abundancy in the teacher and learning facilitator's initiations constitutes different bridging discourses, I now move on to a discussion of how both the teacher and the learning facilitator work with learner contributions in the lessons.

Uptake of learner contributions

While learner contributions in the lessons are few, both the teacher and learning facilitator work with the learner contributions in ways which create bridging discourses.

The Teacher

Gibbons (2006) found that the teachers in her study re-cast learner contributions, taking their everyday language and transforming it into more academic discourse. Due to the few English learner contributions of any length in the lessons I observed, the teacher did not have the opportunity to recast any learner talk. However, in Extract 14 above, we saw an example of the teacher asking learners to recast their peer's gesture into Mathematical English:

> (Extract 14, Lesson 1, 11/07/11)
>
> T: Someone's doing this to me (*copies the gesture of the learner*). What's the word for this (*continues copying the gesture*)?
>
> L: Reflection.

In this way, the teacher and two learners jointly construct the target register.

Learners' written contributions are made public by asking them to demonstrate their calculations on the board. The teacher's motivations for doing this were expressed in her interview:

> (Interview with teacher, 12/07/11)
>
> T: the more participation the more I feel that they learn, we've got this whole like 'teaching is learning' thing and so the more they are trying to teach each other or communicate it to each other the more it sinks in for themselves. At the same time we're really trying to encourage these kids to go back and tutor their classes

Her understanding of learners' board work as teaching is expressed when she calls those writing on the board 'my teachers' (Lesson 3, 13/07/11). She expects the 'teachers' to explain the procedure they are following. The teacher questions the learner who is writing on the board and the class about what has been written, these closed questions require a short 'yes' or 'no' answer: 'Does everyone agree? Are we all happy?' (Lesson 4, 14/07/11) These questions are followed by a further explanation by the teacher of what has been written.

In Lesson 3 (13/07/11) the learners' contributions via board work and associated explanations are quite substantial. The teacher has asked the learners to explain, using the examples they have practised, how a generalisation can be made in the form of a rule. She expresses the instructions for the activity as 'You must prepare a two-minutes lesson teaching this rule'. The interpretation of what 'a lesson' is is left up to the learners themselves. It becomes clear during the activity that the teacher expects a verbal expression of the rule from the learners. While only one student moves from the specific example to a verbal expression of the rule, the teacher works with the other students' written symbolic mathematical contributions on the board to arrive at the verbal expression of the rule.

The following table tracks the movement through different registers in the learning of three rules which can be applied to certain reflection calculations with the greyed column being the target register for this episode. The written expression of the rule appears on a worksheet in a later lesson.

Table 3: Bridging discourses used in 'Teach the rule' (Lesson 3, 13/07/11)

Rule	Written expression of specific calculation	Verbal expression of calculation	Written Symbolic Maths expression of rule	Verbal expression of the rule	Written expression of rule on worksheet
1	Learner uses symbolic Maths	L: (inaudible Xhosa)	Jointly constructed by teacher and learner: T: P (a; b) → P' L: (b; a)	T: When you reflect in the line y=x, so all you do is swap, jika (turn), a,b becomes b, a.	'Reflection over the line y=x: (x;y) → (y;x)'
2	Learner uses symbolic Maths,	Learner speaks in Xhosa: **Apha into eyenzekayo u2 akatshintshi kutshintsha u4** (what happens here is that 2 does not change, only 4 changes)	Jointly constructed by teacher and learner: T: (reminds L to draw a function arrow) L: P = (a; b) → P' (a; -b)	T: When we are reflecting…our x value stays the same and our y value becomes negative	'Reflection over the x-axis: (x;y) → (x; -y)'
3	Learner uses symbolic maths	Learner speaks in Xhosa and English: **Khuthwa masi-reflect-e i-diagram kwi-y-axis** (we are reflecting the diagram in the y-axis), so my y never change, it's only x-axis change/'	Jointly constructed by teacher and learner: T: P (a; b) → P' L: (-a; b)	L: **'x' is negative mos. Negative. So/ i-y-axis ayitshintshe neh, kuba-negative** ('x' is negative, right? Negative. So/ the 'y' axis does not change to being negative, right?)	'Reflection over the y-axis: (x;y) → (-x;y)'

The questions and instructions that the teacher uses to move the students towards the verbal expression of the rule are not revealed by this table. Each of the first two groups require the teacher's statement, 'now we need a rule' to move them beyond the written and verbal expression of the specific calculation which has been used as the basis for deducing the rule. (For the full transcript of 'Teach this rule', see Addendum 3). The teacher then scaffolds their learning by initiating the symbolic mathematics expression of the rule and letting them complete it.

The verbal expression of ME is elusive for these learners. All three groups manage to express the calculation correctly in symbolic mathematics (with scaffolding from the teacher), but none of them articulate the rule in ME. We cannot judge whether or not they are able to express their understanding in this register as the teacher does not press them to do it. The last learner is the only one to achieve a verbal expression of the rule. The progression through the three groups towards verbal expression of the rule is noteworthy. As the teacher takes up the contributions of each previous group, the later groups observe a model for how the teaching activity should be performed. The first four students (rules 1 and 2) choose to speak to their peers in Xhosa, the last student uses both Xhosa and English. Her use of English allows her to mimic the teacher's well-used phrase, 'are we all together?, causing laughter from the class and the teacher. The use of 'we' and 'my-y' are also hallmarks of the teacher's discourse, which demonstrates that she is joining in with the teacher's game when she refers to the learners who are working at the board as 'my teachers'.

The Learning Facilitator

As was described in Chapter 4, one of the roles of the learning facilitator is to take note of learner responses which may reveal understanding or lack of understanding. These include expression and body language as well as Xhosa responses which the teacher cannot understand. In the extract below, Unathi has written a calculation on the board which at least one other learner does not understand. Athi picks up that Luyanda wants to ask a question of Unathi and so is able to negotiate a public speaking opportunity for

Luyanda which results in lively dialogue between Luyanda, Athi and other learners to clarify understanding.

(Extract 18: Lesson 2, 12/07/11)

(1) Luyanda: (inaudible)

(2) LF: **Uthini?** (What are you saying?)

(Luyanda approaches board)

(3) T: Are you coming to…?

(4) LF: He's asking Unathi a question.

(5) T: Asking a question?

(6) LF: Ja, from Unathi.

(7) Luyanda: **Unathi, kuthwa i-cut yakhe izaba ngunantsika izaba ngu-three, ne? U-three ulapha mos, ngu-two ngapha, ngu-three apha. So sizobala ke ngoku ukusuka apha ukuza apha ukuba how many times then mhlawumbi sibale kengoku uba kuzakufuneka sibize into but andiyazi kengoku (inaudible) emva ko-three ngu-four mos, injalo mos lanto?** (Unathi, you said that the cut is going to be three. And it is here, two is here, three is here. So we're going to count from here to here how many times then maybe count and give a term I'm not sure what it is (inaudible) that's how it goes isn't it?)

(8) Ls: Uhmhm… (*urging him to continue explaining)*

(9) Luyanda: **So ke ngoku ndisuke ndinga yazi kengoku apha. Ngula-three, akazujika mos la-three then ngo-four lowa? Indbhidile ke ngoku**. (So now I get confused here and I don't know. It's that three and the three does not change then is that four? It's confounded me now?)

(10) Ls: (*laughing*)

(11) LF: **Yima ubhidekaphi?** (Wait, where did you say you don't understand?)

(12) Luyanda: **Kwi co-ordinates,** (at the co-ordinates) **from there, eish…** (from there, oh dear)

(13) LF: **I-co-ordinates?** (The co-ordinates?) *(To Susan)* – you see he understands the jump that you have to make from the fold, but he gets lost with the co-ordinates.

(14) T: Oh, okay.

(15) Luyanda: (still explaining to other learners) **ngu-three lowa akajiki**. (That is three it does not change) (inaudible)

(16) L: **u-x akajiki kujiki-y yodwa**. (X does not change only Y changes)

(17) LF: **Khawu mcacisele Unathi?** (Unathi, can you please explain to him?)

(18) T: Luyanda, so if we look here this is our point, you happy that there is 1,1 okay so this is our new one, we are still on the same line here x is staying the same. So our first co-ordinate x stays the same, now we are here at two, you told me that one space gets me to three so one space gets me to four, okay.

(19) LF: Sue, do you mind having Unathi come and explain to him quickly?

Athi does a lot of work here as a facilitator. He is a mediator between the learners and the teacher fulfilling two purposes. As he understands the language the learners are using, he is able to give the teacher a clearer idea of what it is that the learners do and do not understand so that she can teach more effectively (13). He is also able to negotiate speaking rights for the learners as he has more power than they do in the classroom due to his role and he can use the language which Susan understands effectively. His interpretation [in (4)] legitimises Luyanda's presence at the board and his question (19) gives authority to Unathi's position as teacher and knower of Mathematics.

Athi's facilitation here enables a more natural discourse to develop between the learners and himself. The learners discuss the Mathematics in more detail in the public space than they do at any other time in the lesson series. Luyanda takes the lead in the conversation. He uses the colloquial expression 'mos' [roughly translated as 'isn't that so' (7)] which is part of his informal register. This, and his volubility, indicates that he is comfortable negotiating the concepts with his peers and Athi.

Athi highlights learner needs on other occasions. In Lesson 4, when the teacher is about to move on with the lesson, Athi interrupts her to point out that one learner does not understand and would like a further explanation.

Talk about language – the teacher

Gibbons (2006) discusses instances in her data where the teacher makes the scientific language of the curriculum explicit to the learners by using metalanguage to describe it. This is talk which is about how language is used in the classroom. The teacher uses phrases such as 'proper scientific words' (p. 132) to make the learners aware that the language she is using is the target register in the classroom and that she is moving them from the language with which they are familiar to this target register. Susan employs similar metalanguage to demystify ME and symbolic mathematics for her learners. Adler (1999) found that South African teachers who used 'explicit Mathematics language teaching' felt that it benefitted both English language learners and those learners whose home language was English.

In the Focus classroom, demystifying the ME term takes the form of drawing attention to the term, mentioning the difficulty or ambiguity of the term or providing an explanation of the meaning of the term. In the example that follows, the teacher does all three.

> (Extract 19: Lesson 1, 11/07/11)
>
> L: Shifted.
>
> T: It has shifted, okay? So, these two and my 's' they have shifted. They have moved. Or the fancy mathematical word, they have translated. Okay, this word's a little bit weird because translate we think of language.
>
> LF: Mm.
>
> T: Okay? But if it's translated it means it's shifted or it's moved. Either sideways, up, diagonal, okay? -

The teacher draws attention to the different register into which she moves by referring to the word 'translated' as 'the fancy Mathematical word'. She also casts the word as problematic through the adjective 'weird' and provides a brief allusion to the Ordinary English meaning of 'translate' ('we think of language'). In this way she empathises with

any confusion her learners may experience with the terminology and makes the reason for this confusion explicit. The learning facilitator affirms her explanation and that the word may indeed cause confusion by his hum of agreement. The teacher then shifts back into the register of OE and uses two OE words for 'translated': 'shifted' and 'moved'. This forms her explanation of the meaning of the ME term.

In a similar way to mediating ME, the teacher draws attention to the conventions of mathematical symbols and how they should be used. She uses mathematical symbols without commenting on them if they are familiar to the learners (such as: =, x,y,1,2,3, Δ), but the symbols which are new to this section ($\rightarrow$,') are explained in a similar fashion to the new terms in ME. In the following extract, the teacher draws on gesture as well as OE to explicate the symbolic mathematics involved in representing a transformation calculation.

(Extract 20: Lesson 1, 11/07/11)

T: Now when you doing transformations it's very important that you write it correctly. Okay? You cannot call the new points 'a' as well. The new point must have a new name. Okay? And you must also show that there's a change happening. So for example if I have my point a is 1, 2. Okay? To show the change, to show that there is a transformation, a change, I must *(writes on the board)* do an arrow. Okay? So I show an arrow, then I must give it a new name. I cannot just call it 'a', I cannot call it 'q', because it's just a change of 'a', so I can call it 'a … with a little *(Gesture 1)*

(Gesture 1, Video still, Lesson 1, 11/07/11)

In this example, the teacher draws attention to the register of symbolic mathematics, 'it's very important that you write it correctly'. 'Correctly' functions as a marker of the target register of the classroom, ie. there may be other ways of expressing this, but this method will get you the marks in the examination. She then uses an OE term 'arrow' for the symbol which in ME is called a 'function arrow'; and a gesture for the symbol which has an ME equivalent called 'prime' (Wikipedia, 2012). Once the teacher has made the

gesture, one learner utters the word ‘prime’. This partially supports Athi’s assertion in his interview that the learners are familiar with the mathematical terms:

> (Interview with learning facilitator, 14/07/11)
>
> LF: In terms of mathematical terms those don’t need much translation it’s the language around those mathematical terms that require the most translation.

In this case, at least one learner is familiar with the mathematical term.

Unpacking written Mathematical English

The teacher

Gibbons (2006, p. 141) discusses the work that the teacher in her study does in decoding the written language of instructions. The bridge that the teacher creates here is from the academic register of the written instructions in a Science textbook to the everyday, context-embedded register of the students. She points to objects held in her hands and indicates what the students should do with these. A similar discourse is used by the Focus teacher and learning facilitator in my study as they mediate between the learners and the language in which the set tasks are written on class worksheets or on the board. In the following example, the teacher mediates the instruction she has written on the board, ‘Enlarge ABCD through the origin by a factor of 2’:

> (Extract 21: Lesson 5, 15/07/11)
>
> (1) T: *(writes on board next to a diagram: ‘Enlarge ABCD through the origin by a factor of 2’*) Okay so I’ve written it in this fancy language because this is how it might be in your exam, okay, you will see this (*reading*) ‘through the origin’, what do you think that means?
>
> (2) L: zero, zero
>
> (3) T: Ja, okay so the origin is zero, zero hey, okay so in this one (*points to previous diagram*) we also did through the origin but we didn’t have to say it because it actually started at the origin. zero, zero is a point so it was easy for us, okay, it didn’t come into it, but with this one (*points to current diagram*) because how do you know, here our point zero, zero stays the same, hey? and we just

made it bigger from there, okay if it is not on the point zero, okay, it will always be, you will always be told through the origin, okay, it just means the origin is what's staying the same, so when you do your enlargement you will see that your new point is gonna end up somewhere on that line (*drawing in a dotted line*), the new point for b will be somewhere on that line, etcetera, etcetera, okay so you don't need to worry about the (*gestures as below*) language but you must recognise it.

(Video still, Lesson 5, 15/07/11) (Video still, Lesson 5, 15/07/11)

Again, the teacher begins by drawing attention to the 'fancy language' of 'the exam', giving prominence to the register of ME. She then goes on to unpack the instruction 'enlarge through the origin' with the help of some contribution by a learner. The learner's contribution is terse ('zero, zero'), referring only to the co-ordinates of the origin and not to the meaning of 'enlarge through the origin'. The teacher does the more involved work of explicating the instruction using two diagrams which have been drawn on the board in (3). Her language is embedded in the context of these diagrams through deixis with many demonstrative pronouns being used such as 'this one', 'this line'. Her language is context-embedded as while speaking she points to her diagrams and draws on them with chalk.

The teacher ends this explanation with words to diminish the anxiety that could surround this new language: 'you don't need to worry about the (*gestures*) language but you must recognise it' (3). Her gesture, representing a churning motion inside the head, indicates that what she does not want the learners to worry about is the concept of 'through the origin'. She wants the language to be a trigger ('recognise') for following a

certain procedure. This 'fancy language' could be worrying to the learners because of the density of ME terms, its formal grammar, as well as the cognitive challenge of the concept.

The learning facilitator

The learning facilitator interprets written ME for the learners while they work in groups or individually. In this extract, he is interpreting the written instruction:

> (Text from Focus Education Transformations Investigation Worksheet)
>
> 'Write down the co-ordinates of the three vertices of Δ A'B'C' in the spaces provided below':
>
> A(1 ; -1) $\rightarrow$ A' (;)
> B(4 ; -1) $\rightarrow$ B' (;)
> C(4 ; -3) $\rightarrow$ C' (;)
>
> (Extract 22: Lesson 3, 13/07/11)
>
> LF: **Okay uyabona into abayifunayo neh** (Okay, you see what they want is) **Uyayibona le-point** (*points to the point on the worksheet*) **if ubeke le-point kwi-graph neh** (Do you see this point if you put this point on the graph) **Into abafun'uyazi if uyayi reflect-a le-point kwi-y axis** (If you reflect this point in the the y-axis) **Zizothini ii-co-ordinates zakho ezintsha kengoku** (What are your new co-ordinates gonna be?) **Yilento bayibuzayo** (That's what they are asking)

Gibbons found that the teacher recoded the written instructions by changing the lexical items and the grammar of the instruction as well as visual demonstration (p. 141). Athi's recoding is similar here. He interprets the ME ('vertices') using Xhosa-for-Mathematics ('le-point') and the grammar is also changed. The written instructions are in the form of procedures without human participants ('write down the co-ordinates'), whereas the human participants are foregrounded in Athi's recoding ('if you reflect this point in the y-axis'). His recoding is also embedded in the immediate context through 'this point' being accompanied by gesture, so his discourse becomes more spoken-like on the mode continuum.

In Creese's study of EALTs in the United Kingdom, she found that their use of modal verbs (e.g. 'must', 'should') and lack of 'I' or 'you' to direct the learners with written-instruction tasks, gave the task its own agency (Creese, 2006). Athi gives agency to an unspecified author of the task ('they') and directs the learners through the limited modality of the conditional 'if' ('if you put this point'). This locates the agency of the task away from himself and helps to align himself with the learners. In short, he communicates to the learners that he is working with them to help them access the subject-knowledge owned by the unnamed authorities ('they').

Conclusion

The bridging discourses of the learning facilitator and teacher develop within the discursive space of the classroom and are various and prolific. Some comments have been made in this chapter about the educational appropriateness of these discourses in this context; further comment follows in Chapter 6.

Chapter 6: Conclusion

Overview of the study

This small-scale case study focused on a particular kind of bilingual classroom and examined the bridging discourses that it produced. In the Focus Education classroom, bridging discourses were defined as the processes by which the discourse of the teacher, learners and learning facilitator drew together the 'everyday' language of the learners, in English and Xhosa, and the academic registers of the classroom; as well as how the learning facilitator mediated between the learners and the teacher. Five Grade 11 Mathematics lessons were studied as part of a week-long holiday programme operating in the rural Eastern Cape. The classroom participants were: an English-speaking teacher, a bilingual Xhosa-English learning facilitator and up to 15 Xhosa-speaking learners on any day. Five hours of classroom discourse data in the form of audio and video recordings was collected and interviews were conducted with the Director of Focus Education, the teacher, the learning facilitator and one learner. Field notes and class worksheets also formed part of the data set.

Adopting a sociocultural lens in examining the data allowed me to look for evidence of how the participants 'think and learn together' (Mercer, 1995) through talk. Sociocultural discourse analysis performed on the discourse data revealed certain discursive practices of the teacher and learning facilitator, on which the interview data shed further light. The prominent practices identified were: the driving of the classroom discourse by the teacher through English; the teaching support offered by the learning facilitator through Xhosa; the building of rapport with the learners by the teacher and learning facilitator; and learner taciturnity and talk in different classroom activities. Bridging discourses were identified in the data and categorised and analysed to gain an understanding of their functioning. The categories were identified as: Xhosa-for-Mathematics, message abundancy, uptake of learner contributions, talk about language and unpacking written mathematical English.

Reflections on the findings

Both the interview and classroom discourse data point towards an enthusiasm on behalf of the Focus Education staff to enlist the linguistic repertoires (Blommaert and Backus, 2011) of the learners in the project of teaching-and-learning Mathematics. While the data reveals multiple languages, semiotic systems and registers being used in the bridging discourses of the classroom, certain typical classroom discursive practices are dominant. The language-in-education policies of the local schools and the demands of a final examination written in English have a role to play in constraining these practices, as do the language ideologies held by the participants.

The importance of English both for school and the imagined world beyond school was a key component of the language ideologies of all participants. They did not challenge the status quo of English as the dominant language of education, nor were the ill-effects of the dominance of English on rural learners commented on (Department of Education, 2005) – notable exceptions being the frustrated cry of one learner, 'why should (I) speak English' (Interview with learning facilitator, 14/07/11) and the joke made by the learning facilitator that 'you all know that White people speak English' (Extract 8). The place of Xhosa in the classroom was less confidently expressed in the interviews. The use of the learners' home language in the classroom occurred on an *ad hoc* and experimental basis – an expected practice, perhaps, given the lack of guidance offered by official policies such as the Language-in-Education-Policy (Department of Education, 1997) on how to use learners' home language effectively in learning when it is not the LoLT and due to the experimental nature of the use of learning facilitators. The use of Xhosa caused ambivalence in the Focus staff as they experienced it as being at odds with their mandate of improving the English language skills of their learners. Also, the teacher and Focus Director reduced the importance of Xhosa through glossing the use of Xhosa as phrases to 'throw out there' for 'the weaker students' (Interview with teacher, 12/07/11) and that learners should 'get the meaning in Xhosa, fine, but then be able to turn that back into English again' (Interview with Focus Director, 14/07/11).

The power of the language ideologies operating in the classroom restricted the extent to which the classroom discursive practices, to which all participants have been accustomed in other classrooms, can be transformed in this particular setting. Hence, the classroom discourse data reveals prominent discursive practices which are unsurprising: the English-speaking teacher, holding the most powerful position in the classroom (Makoe, 2007), drives the discourse in English and is the most voluble participant; the Xhosa-speaking learners are mostly taciturn in whole-class activities and speak Xhosa to each other and the learning facilitiator in individual and group work; the learning facilitator employs Xhosa-for-Mathematics and adopts the traditional IRE/F structure of a teacher.

Some of the bridging discourses found in the Focus classroom have been documented in other contexts and their affordances outlined. These are: Xhosalisation (Paxton and Tyam, 2010) in Xhosa-for-Mathematics; code-switching by the teacher for interpersonal and classroom management reasons (Probyn, 2009; Ferguson, 2003); message abundancy through register-meshing; talk about language and unpacking written language (all Gibbons, 2006). However, due to the particular linguistic make-up of this classroom, the bridging discourses were realised in particular ways.The most salient aspect of the bridging discourses of this classroom was that due to the presence of a bilingual learning facilitator they were realised in more diverse ways than EAL classrooms such as Gibbons' (2006) where only one language was used for learning-and-teaching and only one adult was working with the learners. The practices of the learning facilitator were pivotal in extending the bridging discourses of the classroom. He was able to work with learner contributions more fully than the teacher and he operated as a cultural broker in the classroom. The bridging discourses instantiated in the use of these different languages and registers did not operate purely to mediate meaning, but also functioned to build rapport between the teacher, learning facilitator and learners. This point is underscored by the use of different languages and registers for purely interpersonal uses in the classroom. This function of the bridging discourses is significant due to the importance of identity in learning (Norton, 2007) and the gaps in life experience between the learners and the teacher.

In addition to the variety of the bridging discourses in the Focus classroom, a remarkable characteristic of these discourses was their multi-directionality. Gibbons (2006) noted that the mode-shifting in her data worked from more spoken-like to more written-like modes. Setati et al (2002) presented possible journeys from informal, exploratory, main language talk to formal, subject-specific, English writing. In the Focus classroom the bridging discourses moved the learners both towards the formal, English language of Mathematics (ME) and from this language towards other registers, modes and languages. I argue that this is both appropriate in school Mathematics education and helpful for EAL learners. Abstract concepts and theoretical models are core to the subject of Mathematics and so much Mathematics teaching involves presenting these new concepts without any experiential learning taking place. Therefore, metaphors from everyday life and language are often invoked to help learners understand the concepts (Pimm, 1987). These metaphors sometimes take the form of demonstration using apparatus, translation of ME into OE, gesture, translation of ME into Xhosa-for-Mathematics etc. The number of registers used in the bridging discourses of the Focus classroom help to build the message abundancy which aids the EAL learner (Gibbons, 2006). However, due to the high metaphorical load of the OE which is employed in Mathematics (Pimm, 1987) the use of this register is only beneficial if the OE terms (such as 'fold', 'flip') are sufficiently meaningful to the learners. The terms in Xhosa-for-Mathematics, such as 'guquka' will be more familiar to the EFL learners, however the teacher does not have such easy access to these terms. While the learning facilitator notes that 'it's the language around those mathematical terms that require the most translation' (Interview with learning facilitator, 14/07/11), this translation work is valuable as it involves negotiating meaning in which the learners must actively engage.

In the Focus classroom context, I argue that the use of OE and Xhosa-for-Mathematics as registers for message abundancy are beneficial, but that more explicit negotiation of the meanings of terms in each register (Adler, 1999) is important. This happens chiefly in working with learners' thinking (Brodie, 2010) which was not prevalent in the data. This occurred for two reasons: learners did not contribute substantially to whole-class activities and when they did their contributions were not probed to allow a fuller picture of their thinking to be revealed. The possible reasons for the lack of substantial learner

contributions have been stated to be: Mathematics learners are universally taciturn, the learners' proficiency in English (the dominant language in the classroom) was low, the learners' lack of familiarity with the teacher's expectation that they should contribute and the lack of opportunity to contribute due to the discursive style of the teacher in which closed-questions in cued-elicitation sequences predominate. There was only one striking example of a learner unpacking his thinking in a whole-class activity where he questioned another learner about her calculation with the help of the learning facilitator (Extract 17). This instance also highlighted the educational possibilities brought about by the presence of a third adult party in the room who observed learners closely in order to identify opportunities for meaning negotiation and offered an alternative to the usual discursive practices of the teacher and the learners (Creese, 2006). The data did reveal evidence of the learners being pressed to make their thinking explicit in one-to-one conversation with the learning facilitator.

An area in which bridging discourses were not seen was the unpacking of discursive practices in which learners were expected to participate. One such practice was the 'Teach this rule' episode in which groups of learners were asked to 'teach the class the answer' (Appendix 3). The amount of facilitation required by the teacher in order to move the learners to an articulation of the general rules for reflection (Table 3) demonstrated that this practice was not clearly understood by the learners. This echoes Edwards and Mercer's caveat that in culturally-diverse settings, the implicit ground-rules of the classroom can easily be misunderstood by participants (Edwards & Mercer, 1987).

Recommendations

Further research is required into educational interventions which address the Language-in-Education challenges of South Africa. This includes research into language policy, language teaching-and-learning and non-language subject teaching-and-learning (including the use of learning facilitators in these classrooms). The findings of this research have included the wide use of different registers for meaning-making in this Mathematics classroom, including 'Xhosa-for-Mathematics'. As long as English

dominates as the LoLT in South African schools, more research is required into how African languages can best be enlisted to support teaching-and-learning. Resource books such a 'Understanding concepts in Mathematics and Science: a multilingual learning and teaching resource book in English, isiXhosa, isiZulu and Afrikaans' (Young, van der Vlugt, & Qanya, 2005) are helpful in this regard and need to find their way into schools and teacher training facilities. In combination with this, research should explore the best ways of using classroom talk for learning in all the diverse EAL classrooms to be found in South Africa. This research should be used to train all South African teachers. Included in this training should be teaching skills which enable teachers to make the discursive practices and ground rules of the classroom explicit (Edwards & Mercer, 1987) so that learners may get on with learning and be less focused on trying to understand the game that the teacher wants them to play. In addition to this, training should include methods of integrating language instruction and curriculum content (Cummins, 2000; Adler, 1999).

Making language ideologies explicit and critiquing these in classrooms is also important. Educators should discuss with their learners the status of languages in society and how languages can be used in learning. This will have the effect of allowing learners to draw on their own language resources (Lo Bianco, 1996) while also addressing the democratic goals of education. Equally, teachers' language use in the classroom should be seen as the powerful tool for rapport-building that it is. South African teachers should be incentivised to become multilingual in order to relate more effectively with their multilingual learners.

NGOs are an important component of the education sector in South Africa and the experience of NGO educators needs to be shared with other parties such as state-employed and SGB-employed educators, researchers and administrators. The experience of using a learning facilitator is valuable for all educators working with multilingual children. A learning facilitator is an under-utilised resource in South African education. The roles of learning facilitator and cultural broker that Athi enacted on the Focus programme required a variety of skills. Some of these skills, such as the rapport which comes from being a member of the same racial and cultural group as the

learners, are inherent in the identity of a learning facilitator, but other skills in meaning mediation in the classroom can be taught. Athi had received little training in his role, apart from conversations with the Focus teachers. The recruitment, role-definition and training of the learning facilitators need to be developed through further research.

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Appendix 1: Transcription conventions

…	a pause, each dot indicating a second
(inaudible)	the speech following is inaudible
{}	the speech between brace brackets is the most likely speech heard by the transcriber, although she cannot be certain
(moves forward)	explanations of movement, gesture or expression are given in italics and brackets
(turn around)	English translations of Xhosa are given in brackets after the clause
/	speech has been omitted, next relevant clause continues after the /
L	learner
L1	specific learner
Ls	More than one learner speaking simultaneously
T	Teacher
LF	Learning facilitator
J	John, Focus Education Director
I	interviewer
bold	speech in Xhosa
<u>underlined speech</u>	speech is given emphasis
//	overlapping speech occurs between the double backslashes
(1)	number given to a speaking turn in a long extract

Appendix 2: Overview of mathematical topic covered in lessons

Gr 11 TRANSFORMATIONS: a summary...

Translations

- Shift / move / translate / slide / glide

e.g. Translate point A by by 3 units to the left and by 4 units up. This could be written as: $(x\,;y) \rightarrow (x-3\,;y+7)$

Reflection (fold)

- Reflection over the x axis: $(x\,;y) \rightarrow (x\,;-y)$
- Reflection over the y axis: $(x\,;y) \rightarrow (-x\,;y)$
- Reflection over the line $y=x$: $(x\,;y) \rightarrow (y\,;x)$
- Reflection over the line $y=-x$: $(x\,;y) \rightarrow (-y\,;-x)$
- For all other reflections: use your imagination!

e.g. Reflect B over the y axis and reflect C over the line $y=x$

Enlargements

- By a factor of k (through the origin)
- $(x\,;y) \rightarrow (kx\,;ky)$

e.g enlarge Triangle ABC by a factor of 2

e.g. enlarge D by a factor of ½

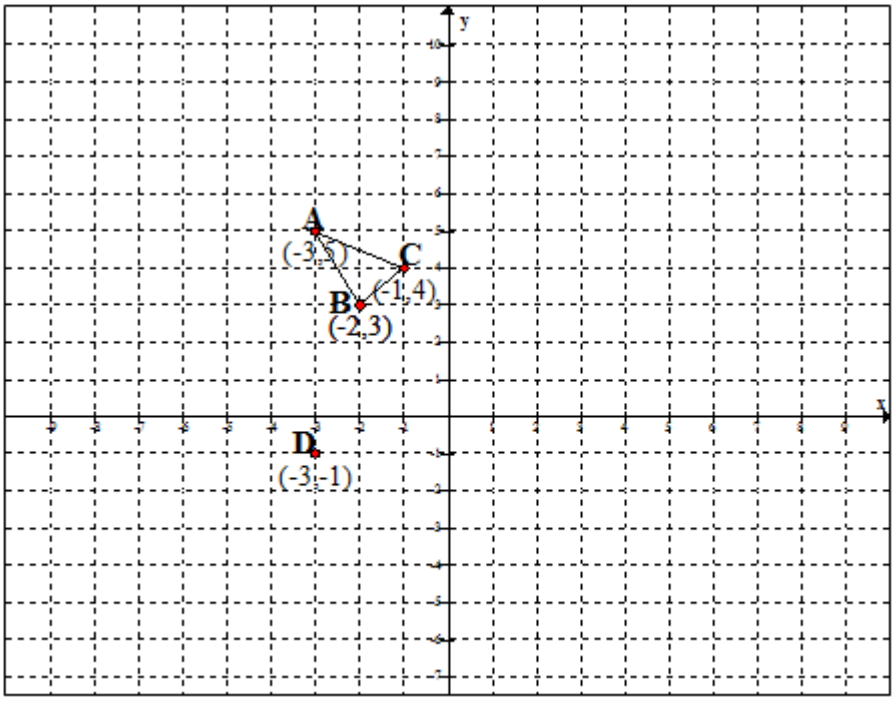
Rotation by 90° or 180°

Clockwise:  Anti-clockwise: 

METHOD

- 1st choose new quadrant
- Rotation of 180° : x and y do not swop places
- Rotation of 90° : x and y swop places
- Make sure that the signs are correct for the new quadrant.

eg rotate triangle ABC by 180°
eg rotate D by 90° clockwise



(Focus Education Worksheet, 2011)

Appendix 3: 'Teach this rule' transcript (Lesson 3, 13/07/11)

T: Okay before we do the reflection one - it looks like there are still some questions on reflection. So what I wanna do is I want to get you into groups of either three or four - or two, it's fine. Two, three or four, okay?

Learners forming groups and moving chairs

T: (*to groups of learners*) Okay you guys are three, you are gonna just do task three. At the end of task three you are gonna teach the class your answer for the last one. Okay?

Ls: Yes.

T: Okay there's another group. Task three - Okay you guys, you are gonna work in four okay? You gonna do task four and at the end, once you've finished, you are gonna get up and you're gonna teach the class the answer for the last one. You're gonna explain it. Okay, so you guys are doing task four together.

Ls: (*Speaking over one another*)

T: Okay you four, you four guys, you gonna do task five and at the end you gonna get up and teach the class the answer for the end, this last one. Okay, so you're doing task five and we'll see whether you can teach the class something. Okay. Okay you guys do the same thing: check with them, make sure they're doing alright in task three. You guys can do that together.

Ls: (*Speak among themselves*)

T: And you guys do task four and you can check whether the girls have done it right for me. Okay? So task four, this is an important part that you're gonna teach the class. Okay? You'll do task four together, okay? (*to whole class*) Remember guys, these are all questions on reflection. What does reflection mean? What are the words we think of?

L: **Guqula** (flip)

T: Two important words, okay?

LF: (*Laughs*)

T: The one that I cannot pronounce so well, okay. '**guqula**' (flip).

LF: You will learn it by the end of the week. *(laughs)*

T: **Guqula**, okay? And, what's the other word? So, that means you 'flip' and the other word we think of is 'fold'. Okay, so, each of these, just pay attention to, where you have to fold, okay. That's the important part.

Ls: (*Discussing with each other*)

T: **Iphi i-fold**? (where is the fold?)

LF: Mh? *(laughs)*

T: Okay.

LF: **Iphi i-fold**? (where is the fold?)

T: (*Addressing one group*) Okay, so you guys wanna use this one just so you can all see it/

(*Learners discussing the assigned tasks for 20 minutes within their various groups with T and LF assisting them. Then learners approach the board in groups and begin calculations)*

T: We're gonna have class lesson now. Ssh. **Mamelani** (listen). We have these four guys, okay, these two guys/ we have these two guys who are gonna teach us one of the rules/ but what they're gonna teach you is important, you mustn't think that because they are teaching you it is not important, 'cos I am not gonna teach it

(*Learners calculating on the board*)

T: You don't have to do the same example, you just have to make sure they understand the rule/ Okay, you can't do any more without teaching it, Ezekial, you must start telling them what you gonna do/

L1: (*inaudible*)

T: Don't forget your little mark.

L1: (*inaudible*)

T: Okay so far everybody happy?

Ls: Yeees.

T: Okay now we need a rule please. Mandla's turn.

(Learner writes on board)

T: What's the rule? Tell us. Okay we want a rule. All of these things that you've done is to get rules. So if we see it in a test, we don't have to think, okay. I like you to think but I know sometimes it's easier to have a rule, it makes it easier. Mandla don't go away. Tell us what the rule is. Okay if I have p (a, b) what's it gonna become?

L1: b, a

T: Okay. Any questions for teacher? My chalk please, Mandla.

LF: **S'ukuhamba ne-chalk kaloku.** *(*Don't go with the chalk*)* (*laughs*)

L1: (*Inaudible*)

LF: **O, uyabuyela e-board-ini?** (Are you going back to the board?)

T: Okay so we did this briefly yesterday. We did look at it yesterday. So these guys got an easy one. When you reflect in the line "y=x", okay, all you do is you swap **- jika** (turn)okay.

Ls: **Jika** (turn)

T: So a,b becomes b,a. So let's just think very quickly a couple examples (*writing on board*)- becomes what?

Ls: (*Inaudible*)

T: Okay? So if we get it in a test we don't have to try and draw and figure out and fold our pages, we can just know automatically. What about: (*Writing on board*) –what's it gonna become?

Ls: Eight, minus three.

T: What about this one?

Ls: Eight, minus five.

T: Yes?

Ls: Yeees.

T: Okay. So this one is easy. We had to give them the easy one because we didn't know if they could do it.

Ls: (*laugh)*

T: Okay. Happy?

Ls: Yeees

T: So rule number one: when we fold on the line 'y=x' all we do is we –

L: Swap.

T: Swap, we **jika** (turn). What is **jika majika**?

Ls: (*Laughing*).

T: Apart from being a TV program, okay so we jika, um these things. So that's rule number one. I think we all wrote it down yesterday. Make sure it's in your head. Rule number two – come, gentlemen! Come and teach us!

T: Come on boys. Can some of you guys help there? Are you finished? Can some of you help them? Did you come up with your rule?

L: *(to another learner)* **IsiXhosa side**. (IsiXhosa is long)

T: Okay.

Ls: (*Speaking over one another*)

T: **Mamelani** (listen) okay rule number two - this is important.

(Two learners writing on the board)

T: (*to learner*) Why don't you on the other side start writing the co-ordinates? Did someone else steal my chalk? Ezekial where did your piece of chalk go? Ah. … You guys wanna come and start preparing, okay we are ready to learn…first tell us where you are doing the reflection.

Ls: (*Speaking over one another*)

T: Okay tell the class where you are reflecting. Okay guys are you listening? Where are you reflecting? You ladies wanna help?

L2: **Okay…Uzo'tshinstha apha. Uzo'tshintsha le prime u-reflect-a apha ezantsi. Kuthiwe - Ithi i-question apha –** (Okay…you will change this over here. You will change this prime to reflect here at the bottom. They're saying – the questions here says -)

Ls: (*Talking over one another and over the demonstrating learners)*

T: Ssh! Guys.

L2: *(reading)* 'Draw the image of i – eh, triangle A, B and C (*Inaudible*)

T: So reflecting //in the x-axis

L2: //So there's a prime and b prime and c prime. **So, siza'kwenze – sizo'ku-reflect-a le triangle. Izo'za apha kule ndawo. Izo'za apha.** (So, we will – we will reflect the triangle. It will land up over here. It will come here.)

T: Where's your fold?

L2: **So sizo'yi – Sizo'yi –** (So, we will – we will -) **Guqula'** (Flip) **Sizo'yiguqula apha ku-X, nguX loo.** (We will flip it here at 'x'. this is 'x')

T: Good.

L2: **Then – U-'c' uzakubalapha, u- one no-two. Then –** (Then 'c' will be over here, by one and two. Then…)

L3: **Uyiguqule**. (You flip it)

L2: **Yi-board le. Ayizo'guquka.** (This is a board. You don't flip it)

Ls: *(laughs)*

L2: **Eh, U-'a' uzo'ba ku-negative four. No-two ku-positive two, ku-x axis. So, u-'b' – ja, uzo'ba ku-four.** (Uh, 'a' will become negative four. And two will become positive two on the 'x' axis. So 'b'…ja, it will become four.)(*inaudible*)

T: Label?

LF: Mhm.

L: (*Learner adds labels to diagram*) (*inaudible*)

T: Good. Okay is everybody happy so far?

Ls: Yeees.

T: We are just folding in the x axis like this? Okay. So now we need a rule please. Tell us what the rule is?

L2: **Apha into etshintshayo – u-two akatshintshi. Kuzo'tshintsha u…Kuzo'tshintsha u-four. Njengo'ba u-four – u-'y' uzo'tshintsha...kutshintsha u-'y' kuphela**. (What happens here is that two does not change only four changes. Because four changes, 'y' is the only one that changes) **So u-four uzo'ba negative** (four will become negative) **Then u 'b' kwakhona…nalapho kuzo'phinde kutshintshe u-'y'…unantiska, u-'x' akatshintshi. So unantsika – u…u-'y' uzo'ba ngu-negative four. Then kuphinde u-two angetshintshi ku-'x'. Kutshintsha eh u-'y'**

abe ngu-negative one. (The 'b'…here as well, only 'y' will change. 'X' does not change. So…'y' will become negative four. Then two won't change on 'x'. Only 'y' changes and becomes negative four.)

Ls: (*Laugh)*

T: Good. Okay your teaching assistant says 'good'.

(*Laughter*)

T: Okay, so what's my rule? This rule, here.

L: *(Inaudible)*

T: No just this one

(Learners speaking over one another)

T: Okay, ssh, guys.

L: *(inaudible)*

T: Don't forget your arrow. The arrow in between.

T: Ja, ja,

L: *(inaudible)*

T: Okay! '**nkosi kakhulu** (thank you very much) (*clapping*) Thank you. Okay, do you guys agree?

Ls: Yeees.

T: Happy? Okay here you go guys, this is rule number two, okay, when we are reflecting we flip, we fold on the x axis, okay. Our x value stays the same and our y value becomes negative.

Ls: Yes.

T: Okay, if it is negative it becomes positive. So let's quickly do two examples. Let's say 's' eight, minus five, will become what?

Ls: eight, five

T: 's' prime eight to five. Yes? What happens if we have 't' minus eight, 11?

L: Minus eight, minus 11.

T: Okay, ‘t’ prime minus eight, minus 11, okay easy, everyone happy?

Ls: Yeees.

T: Everyone happy? Everyone happy? Okay, ladies you’re up, The third rule, let’s go.

L: **Okay, into masiyenze apha, khuthwa masi-reflect-e idiagram kwi-y-axis. Siyayiguqula neh. Plus**…(Okay, what we have to do here, is that we have to reflect the diagram on the y axis. We flip, okay. Plus…)

Ls: (*Inaudible*)

L: Huh?

Ls: (*Inaudible*)

L: *(laughs)* So my ‘y’ axis never change. It’s only x axis is going to change. Uh, the co-ordinates of this diagram is this one, it’s negative one, (*inaudible*) so my y axis never change and this one is, here, it’s negative four, negative one. Negative four, negative one. Are we together?

LF: *(laughs)*

Ls: Yes. (*laugh*)

T: Are we together?

Ls: yeees

L: We are together there. (*inaudible*)

(*Class applauds*)

T: Thank you. So what is my rule? If I have p(a,b) what happens?

L: **Eh, into eyenzekayo apha, u-‘a’ uzo – okay, okay, ‘x’ is negative mos, negative. So, i…i…i-‘y’ axis ayitshintshe neh kuba-negative.** (Eh, what’s happening here, ‘a’ will – okay, okay, ‘x’ negative, right? Negative. So the…the…the ‘y’ axis does not change to being negative, right?)

T: Okay.

(*Class applauds*)

T: Okay, thank you all my teachers/

Appendix 4: Interview questions

Teacher:

1. Biographical details: age, teaching history, schooling history

2. What are your memories of learning Maths?

3. What are the influences on your teaching method in the Focus classroom?

4. What, in your opinion, is the best way to use English and Xhosa in the Focus classroom? Why?

5. Describe the experience of having a learning facilitator working with you in the classroom. Can you think of anything that you would value a learning facilitator doing that they are not doing now?

6. What do you know about how local schools are using language in the Maths classroom?

John:

1. Biographical details: age, length of time in current position as Focus Director

2. What are your reasons for including Maths lessons such as these in your holiday programme?

3. What is the history of the learning facilitators? What is the imagined future of the learning facilitators?

4. Have you tried to influence what the learning facilitators do in the classroom?

5. What do you know about how local schools are using language in the Maths classroom?

6. What, in your opinion, is the best way to use English and Xhosa in the Focus classroom? Why?

Learning facilitator:

1. Biographical details: name, age, schooling history, tertiary education history, language history

2. In which languages were you taught Maths? Which languages did you use socially at school?

3. What are the influences on your language use in the Focus classroom?

4. Describe the language variety you are using in the classroom.

- (probe: does it differ from Cape Town Xhosa?

-(probe: how do you choose when to use English and when Xhosa?)

- (probe: how would your language use differ if you were teaching in your old high school?)

5. How do you decide when to interrupt the lesson to contribute?

6. What, in your opinion, is the best way to use English and Xhosa in the Focus classroom? Why?

7. Have you enjoyed your experience as a learning facilitator?

Learner:

1. Biographical details: name, age, school

2. Which language/s does your local school teacher use to teach Maths?

- (unpack this for different teaching activities)

3. How does the learning facilitator's language use differ?

- (prompt for examples)

4. Is it helpful having the learning facilitator in class? If so, why?

5. Do you prefer to be taught in English or Xhosa? Why?

- (prompt for nuances of 'English' and 'Xhosa')