ACCESS TO MATHEMATICS VERSUS ACCESS TO THE LANGUAGE OF POWER

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This paper explores how learners position themselves in relation to use of language(s) in multilingual mathematics classrooms. It draws from a study in multilingual mathematics classrooms in South Africa. The analysis presented shows that learners who position themselves in relation to English are concerned with access to social goods and are positioned by the social and economic power of English. They do not focus on epistemological access but argue for English as the language of learning and teaching. In contrast, learners who position themselves in relation to mathematics and so epistemological access, reflect more contradictory discourses, including support for the use of the their home languages as languages of learning and teaching.

INTRODUCTION

Classroom conversations that include the use of […] the [bilingual] students’ first language as legitimate resources can support students in learning to communicate mathematically. (Moschkovich, 2002: 208)

I prefer that they teach us in English so that I can learn English. If you can’t speak English, there will be no job you can get. In an interview you will find a white person not able to speak Sesotho or IsiZulu, you will lose the job because you don’t know English. (Sipho, a Grade 11 mathematics learner, 2004)

Research argues that the learners’ main languages are a resource in the teaching and learning of mathematics while learners argue for the use of English. The quotes above capture the essence and complexity of the arguments. These arguments are equally compelling as they are about access to mathematics and social goods (power and status). In this paper I use data from South Africa is to explore the power dynamics that are evident in the language choices that learners make in relation to their learning of mathematics. Using data from South Africa is convenient but also appropriate: South Africa is an extraordinarily complex multilingual country. While the multilingual nature of South African mathematics classrooms may seem exaggerated, they are not atypical. In South Africa, there is a general view that most parents want their children to be educated in English and that most learners would like to be taught in English. While there is no systematic research evidence, it is also widely held that many schools with an African student body choose to use English as a language of learning and teaching (LoLT) from the first year of schooling (Taylor & Vinjevold, 1999). The TIMSS results in South Africa were very poor. Studies that have emerged from TIMSS argue that the solution to improving African learners’
performance in mathematics is to develop their English language proficiency (e.g. Howie, 2002). What does this recommendation mean for mathematics learning?

The work on language and power is complex, not well developed in mathematics education and often misrepresented. To put this debate in perspective it is important to provide a brief overview on the political role of language.

**LANGUAGE, POWER AND MATHEMATICS LEARNING AND TEACHING**

Previously I have argued that language is always political and therefore decisions about which language to use in multilingual mathematics classrooms, how, and for what, are not only pedagogic but also political (Setati, 2003; 2005a). The political nature of language is not only evident at the macro-level of structures but also at the micro-level of classroom interactions. Language can be used to exclude or include people in conversations and decision-making processes. Zentella (1997) through her work with Puerto Rican children in El Barrio, New York shows how language can bring people together or separate them. Language is one way in which one can define one’s adherence to group values.

In this paper, I use the work of Gee (1996, 1999) to explain the language choices of learners in multilingual mathematics classrooms beyond the pedagogic and cognitive. When people speak or write they create a political perspective; they use language to project themselves as certain kinds of people engaged in certain kinds of activity (Gee 1996; 1999). Language is thus never just a vehicle to express ideas but it is also used to enact a particular ‘who’ (identity) engaged in a particular ‘what’ (situated activity).

Gee uses the theoretical construct of cultural models to explore the identities and activities that people are enacting. Cultural models are shared, conventional ideas about how the world works, which individuals learn by talking and acting with their fellows. They help us explain why people do things in the way that they do and provide a framework for organizing and reconstructing memories of experience (Holland and Quinn, 1987). Cultural models do not reside in people’s heads, but they are embedded in words, in people’s practices and in the context in which they live.

The question that is relevant for this paper is what cultural models do teachers and learners in multilingual mathematics classrooms enact in relation to language and mathematics? In what follows I use the notion of cultural models to explore why learners prefer the language(s) that they choose for learning and teaching mathematics. Thereafter I will look at the implications of such language choices for research and practice.

**LEARNERS’ LANGUAGE CHOICES**

The data used here is drawn from a wider study still in process which involves secondary school learners. I analyse individual interviews with five Grade 11 (16-year-old) learners from Soweto, the largest and most multilingual African township in South Africa with a population of about 3 million people. All of these learners are multilingual (they speak four or more languages) and learn mathematics in English,
which is not their home language. They chose their preferred language for the interview. With the exception of one (Basani), all their schooling has been in Soweto. They all made a choice to do mathematics and indicated that they like doing mathematics. Three indicated that they prefer to be taught mathematics in English while the other two felt that it really does not matter what language mathematics is learned in.

For the learners who preferred to be taught English (Tumi, Sipho and Nhlanhla) the cultural model of *English as an international language*, which positions English as the route to success, emerged as dominant in their discourse. Their preference for English is because of the social goods that come with the ability to communicate in English.

Tumi: English is an international language, just imagine a class doing maths with Setswana for example, I don’t think it’s good.

Researcher: Why?

Tumi: I don’t think it is a good idea. Let’s say she taught us in Setswana, when we meet other students from other schools and we discuss a sum for instance and she is a white person. I only know division in Setswana, so I must divide this by this and don’t know English, then he I going to have problem. So I think we should talk English. English is okay.

Tumi sees English as an obvious language for learning and teaching mathematics. It is unimaginable to him for mathematics to be taught in an African language like Setswana. The use of English as a language of learning and teaching mathematics is common sense to him; he cannot imagine mathematics without English. This resonates with the teachers’ cultural models above, which are exacerbated by the fact that mathematics texts and examinations are in English. Another factor that emerges in Tumi’s views above is the fact that he wants to be taught mathematics in English so that he can be able to talk about mathematics in English with white people.

Sipho: I prefer that ba rute ka English gore ke tlo ithuta ho bua English. If you can’t speak English, there will be no job you can get. In an interview, o thola hore lekgowa ha le kgone ho bua Sesotho or IsiZulu, ha o sa tsebe English o tlo luza job. *(I prefer that they teach us in English so that I can learn English. If you can’t speak English, there will be no job you can get. In an interview you will find a white person not able to speak Sesotho or IsiZulu, you will loose the job because you don’t know English.)*

Sipho’s preference for English is because he sees it as a language that gives access to employment. Sipho also connects employment with white people by arguing that during the interview one must be able to express oneself in English because white people conduct interviews. This connection of jobs to white people and English is as a result of the socio-political history of South Africa in which the economy was and still continues to be in the hands of white people with English as the language of commerce, hence Sipho’s expectation that a job interview will be conducted by a white person in English. Like Gugu, Tumi and Sipho see the mathematics class as an opportunity for them to gain access to English - the language of power.
Unlike Tumi and Sipho, Nhlanhla, who also indicated a preference for English, positioned herself in relation to mathematics. Nhlanhla, however, had conflicting cultural models.

Nhlanhla: …is the way it is supposed to be because English is the standardized and international language.

Researcher: Okay, if you had a choice what language would you choose to learn maths in.

Nhlanhla: For the sake of understanding it, I would choose my language. But I wouldn’t like that [English as language of learning and teaching] to be changed because somewhere somehow you would not understand what the word ‘transpose’ mean, ukhithi uchinchela ngale (that you change to the other side), some people wont understand. They would not understand what it means to change the sign and change the whole equation.

While Nhlanhla recognises the value of learning maths in a language that she understands better, she does not want English as LoLT to change because English is international and the African languages do not have a well-developed mathematics register. There are conflicting cultural models at play here: one that values the use of African languages for mathematical understanding and another that values English because of its international nature.

Researcher: What if there are students who want to learn mathematics in Zulu, what would say to them?

Nhlanhla: I would say its okay to have it but you have to minimize it because these days everything is done in English especially maths, physics and biology.

Researcher: Why does maths, physics and biology have to be done in English?

Nhlanhla: I don’t know, think that’s the way it is.

Nhlanhla’s conflicting cultural models are evident in the above extract. They are indicative of the multiple identities that she is enacting. As a multilingual learner who is not fully proficient in English, she does not want to loose the social goods that come with English. As a mathematics learner it is important for her that she has a good understanding of mathematics and using her language, as she says, facilitates understanding. A recent study shows that while the teachers also experience conflicting cultural models, theirs are about access to social goods and not to mathematics (Setati, 2005b).

Basani and Lehlohonolo are the two learners who felt that it really does not matter what language is used for mathematics. As indicated earlier, Basani is new in the school. Before coming to the school in Soweto, he was a student at a suburban school, which was formerly for whites only. At the time of the study, it was his second year at the Soweto school, which he came to because his mother could no longer afford the fees at the former white school. Basani’s level of English fluency was clearly above all the other learners interviewed. During the interview, he explained that he was doing Grade 11 for the second time because he failed IsiZulu
and Mathematics the previous year. He however insisted that he has no problem with mathematics and that he failed mathematics because he was not as focused as he should have been.

Basani: Maths is also a language on its own, it doesn’t matter what language you teaching it. It depends if the person is willing to do it.

Researcher: What would you say to learners who want to be taught maths in their African languages?

Basani: I would not have problem. If that’s the way they wanna do it, well its their choice. I have a friend here at school he is Sotho, I help him with Maths. Sometimes when I explain in Sesotho he doesn’t understand and when I explain it in English he understands.

Researcher: why is that?

Basani: I don’t know that’s something I cannot answer because, how should I know, I never had a problem with maths before.

As the above extract shows, Basani believes that mathematics is a language and thus it does not make any difference what language it is taught and learned in. Basani is very confident about his mathematical knowledge and seems to be working with a cultural model that says, the key to mathematics learning is the willingness to do it. Lehlohonolo, who is also very confident about his mathematical knowledge, also felt that it does not matter what language is used for mathematics. The class teacher explained that he is the best performing learner in mathematics in his class. Another interesting thing is that when I gave them the information letters and consent forms to participate in the study, Lehlohonolo immediately indicated that I should use his real name because he wants to be famous. During the interview, Lehlohonolo focused more on mathematics rather than language.

Researcher: Does it matter which language you do maths in?

Lehlohonolo: To me it doesn’t matter just as long as I am able to think in all languages and I can speak and write in those languages then I can do maths in those languages.

Lehlohonolo is connecting language to learning in very sophisticated ways. For him fluency in a language (ability to read, speak, write and think) facilitates ability to learn in the language. As he explains below, fluency in a language is not sufficient to make a learner successful in mathematics.

Lehlohonolo: What I have realized is students that are I go with in class fail maths but they do well in English, I don’t think English is the cause of why they failing maths. Some of them they chose maths because of their friends, some of them are in the wrong class. From my past experience they are not good in maths so they shouldn’t have gone with maths. Even if you do it in IsiZulu, things will be the same, the problem is not with the language. They don’t want to think, they don’t want to be active; they don’t interact with the teacher. If the teacher does the exercise and ask them if they are okay with this, they just agree, but when it comes to writing they don’t understand.
For Lehlohonolo, language cannot be blamed for failure or given credit for success in mathematics. He sees the important factor in succeeding in mathematics as being the learners themselves and the choices they make about how they participate in the mathematics class. The above extract suggests that Lehlohonolo enacts a cultural model that mathematics should be taken only by those who are good at it and being good at mathematics is not connected to language.

Researcher: So if you had a group of students who want to do maths in Zulu, what would you say to them?

Lehlohonolo: That’s their own problem because if they out of high school, they cannot expect to find an Indian lecturer teaching maths in Zulu. English is the simplest language that everyone can speak so they will have to get used to English whilst they are still here.

While Lehlohonolo does not connect failure or success in mathematics to language, in the above extract he seems to be suggesting that learners should choose to learn in English because in higher education no lecturer will be able to teach in their languages. This is an emergence of a conflicting cultural model for Lehlohonolo, which says even if there is no causal link between success in mathematics and the language used for learning and teaching, English cannot be ignored.

The above discussion shows that the learners who prefer to be taught in English position themselves in relation to English. Nhlanhla is the only one who preferred English and also positioned herself in relation to mathematics. Tumi and Sipho are more concerned with gaining fluency in English so that they can access social goods such as jobs and higher education. They enact the cultural model that English is international.

A recent analysis of teachers’ language choices shows that they prefer English to be the language of learning and teaching mathematics (Setati, 2005b). Teachers are aware of the linguistic capital of English and the symbolic power it bestows on those who can communicate in it. They see their role as that of preparing their learners for participation in the international world, and teaching mathematics in English is an important part of this preparation. A glaring absence in the teachers’ interviews was any reference to how learning and teaching in English as they prefer, would facilitate the learners’ access to mathematics (epistemological access) for the learners. This absence suggests that the teachers position themselves in relation to English and not mathematics. What is more prevalent in the reasons for preference of English are: economic, political and ideological factors.

The preference for English highlights the belief that the acquisition of the English language constitutes the major content of schooling. This is inconsistent with the content of schooling, which is about giving epistemological access and to research and the Language in Education Policy (LiEP) in South Africa, which promotes multilingualism and encourages use of the learners’ home language. The assumption embedded in this policy is that mathematics teachers and learners in multilingual classrooms together with their parents are somehow free of economic, political and
ideological constraints and pressures when they apparently freely opt for English as LoLT. The LiEP seems to be taking a structuralist and positivist view of language, one that suggests that all languages can be free of cultural and political influences.

As indicated earlier, the learners who position themselves in relation to the mathematics seem to be working with conflicting cultural models – one that is about mathematical understanding and the other that is about English fluency.

**WHAT DOES THIS MEAN FOR RESEARCH AND PRACTICE?**

Research argues that to facilitate multilingual learners’ participation and success in mathematics teachers should recognise their home languages as legitimate languages of mathematical communication (Khisty, 1995; Moschkovich, 1999, 2002; Setati & Adler, 2001). The analysis presented in this paper shows that the language choices of teachers and learners who prefer English are informed by the political nature of language. The challenge is in bringing the two together. Research shows that in bringing the two together, English dominates.

A recent detailed analysis of a lesson taught by primary school teacher suggested a relationship between the language(s) used, mathematics discourses and cultural models that emerged (Setati, 2005a). During the lesson, the teacher switched between English and Setswana. However, her use of English was accompanied by procedural discourse while her use of Setswana was accompanied by conceptual discourse. While it can be argued that the observations made in this teacher’s classroom cannot be generalised to all the teachers in multilingual classrooms, they give us an idea of what the dominance of English in multilingual mathematics classrooms can produce.

Recent research in South Africa points to the fact that procedural teaching is dominant in most multilingual classrooms (Taylor and Vinjevold, 1999). In most cases, this dominance of procedural teaching is seen as being a function of the teachers’ lack of or limited knowledge of mathematics. What the above discussion suggests is that the problem is much more complex.

**CONCLUSION**

The analysis presented in this paper shows that teachers and learners who position themselves in relation to English are concerned with access to social goods and positioned by the social and economic power of English. They argue for English as LoLT. Issues of epistemological access are absent in their discourse. In contrast, learners who position themselves in relation to mathematics and so epistemological access, reflect more contradictory discourses, including support for the use of the learners’ home languages as LoLT. The work presented in this paper provides an important contribution in dealing with the complex issues related to teaching and learning in multilingual classrooms. Much remains to be done.

**References**

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