Code-switching in a Senior Primary Class of Second-language Mathematics Learners

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Linguistic diversity is an important feature of the South African nation. This diversity creates a variety of educational challenges, especially when it comes to the use of languages in multilingual classrooms. Recently, there has been a lot of debate about this issue in the South African media. There are at the moment two opposing common-sense views, both of which are about identity and access to economic and political power.

One view is that in a multilingual country like South Africa, English is a viable language of wider communication (Makua, 1997). This view maintains that English is increasingly the language of international communication and commerce and therefore speaking it opens doors which are closed to vernacular speakers (Friedman, 1997). Proponents of this view encourage use of English as the language of learning in schools and maintain that vernacular education is a passport to another generation of poverty. It is supported by the reality that in most African schools (particularly in urban areas) in South Africa pupils do not necessarily share the same first language. Separating learners according to their first languages may be perceived as bringing apartheid back, whilst choosing one of the languages as medium and not the others may also be interpreted as favouring one group over the others. As Makua puts it: "English can be a unifying factor" (p. 23).

The other view is that there is a need to develop and promote African languages and one way of doing this is to encourage their use in schools. Supporters of this view maintain that rather than promoting English as the language of international communication, other languages should be given more prominence to ensure that they do not fade away (Mda, 1997; Friedman, 1997; Heugh, 1997). The view suggests multilingualism as a viable way to facilitate meaningful access both to the learners' home language and to a language of wider communication – English (Heugh, 1997, p. 71). This is also consistent with evidence which concludes that there are cognitive advantages to early learning in a main language and to acquiring proficiency in two or more languages – that these impact favourably on the development of scientific and mathematical thought (Heugh, 1997, p. 71).

This is an interesting debate which cannot only be resolved by policy but by engaging with the practicalities of the policies. As Kennedy has noted:

> The close relationship between use of a language and political power, socio-economic development, national and local identity and cultural values has led to the increasing realisation of the importance of language policies and planning in the life of a nation. Nowhere is this planning more crucial than in education, univer-

> sally recognised as a powerful instrument of change. (cited in Reagan and Ntshoe, 1992, p. 247)

In the past, language policies in this country emphasised initial mother-tongue learning with an eventual shift in language of learning to English. [1] As a rule, the African child began his or her schooling in the mother tongue which remained the language of learning through the fourth year of schooling (Standard 2). During these first four years, both English and Afrikaans were studied as school subjects. Beginning in the fifth year of schooling there was a shift in language of learning either to English or to Afrikaans. It was believed that at this stage pupils had reached a state of readiness which would enable them to cope with English as language of learning. Research has challenged this. Macdonald (1986, p. 2) argued that at senior primary level pupils are far less capable of handling content subjects through English than through their mother tongue.

Roughly, code-switching is the use of more than one language in a single speech act. From my experience, both as a mathematics teacher and a teacher-educator, code-switching has become common practice in most South African classrooms, particularly during mathematics lessons. Code-switching does not occur only as a result of children not being able to handle content subjects in English. And as van Rooyen (1990, p. 1) points out, the language transition is not only the pupils' problem. It affects teachers and their methods, orientations and resources.

Although teachers knew that the official language of learning was English, code-switching occurred in most classrooms. As a result of this, teachers have been the ones to decide when and how it should occur. As Ndayip-fukamiye (1994, p. 91) points out, it is the teachers who have the option of code-switching to meet the communicative demands of different types of teaching/learning events. According to the new national language policy:

> each school and educational institution must state explicitly its programme for promoting multilingualism, including its institutional language policy. (Government Gazette, 9/05/97)

This gives the schools the right to choose their language of learning. It can, however, be predicted that most schools will not opt for mother-tongue learning, since among speakers of African languages, mother-tongue policy has a bad image. It is associated with inferior education.

> Parents' memories of Bantu Education, combined with their perception of English as a gateway to better education, are making the majority of black parents favour English as a medium of instruction from the beginning of school, even if their children do

not know the language before they go to school (NEPI, 1992, p. 13)

In addition, Brodie (1989, p. 34) points out that there are also pragmatic reasons for education in English: for instance, a lack of materials in the vernacular languages. It is evident, therefore, that there is no simple, apparent or short-cut solution to the language problem in South Africa. It can also be assumed, however, that code-switching will continue to occur in most South African classrooms.

This article investigates the different ways in which a multilingual [2] senior primary mathematics teacher uses code-switching when teaching mathematics to second-language learners who share a first language with her.

What exactly is code-switching?

Codeswitching is when an individual (more or less deliberately) alternates between two or more languages. [...] Codeswitches have purposes. [...There] are important social and power aspects of switching between languages, as there are between switching between dialects and registers (Baker, 1993, pp. 76-77).

Code-switching can involve a word, a phrase or a sentence. It can also involve several sentences. Code-switching therefore cannot occur between monolinguals; it will occur only when a multilingual is addressing another multilingual.

Code-switching has been regarded by many people as a grammarless mixture of two languages (Grosjean, 1982, p. 147). Monolinguals may see it as an insult to their own rule-governed language. It is generally believed that people who switch codes know neither language well enough to converse in either one alone. Grosjean points out that it is because of these attitudes that some bilinguals prefer not to switch, while others restrict switching to situations in which they will not be stigmatised for doing so. For instance, some bilinguals will avoid switching codes with those who have very strict norms concerning language use, such as teachers, reserving it for those who also switch codes. This can be observed in a mathematics class – pupils feel free to switch if they are taught by a teacher who switches.

Even if code-switching has received criticism, there are researchers who see it as a valuable communication resource. On the basis of their ethnographic observation of classroom interaction in three primary schools in Kenya, Merritt et al. (1992, p. 118) argue that code-switching provides an additional resource for meeting classroom needs. Poplack (cited in Grosjean, 1982, p. 148) argues that code-switching is a verbal skill requiring a large degree of competence in more than one language, rather than a defect arising from insufficient knowledge of one or the other.

In most classrooms, code-switching seems most often motivated by cognitive and classroom management factors (Merritt, 1992, p. 118; Adendorff, 1993, p. 149). Usually, it serves a need to focus or regain pupils' attention, or a need to clarify, enhance or reinforce lesson material. Determinants of code-switching in the classroom are only partially dictated by formal language policy. Even if an official policy exists, teachers make individual moment-to-moment decisions about language choice that are mostly dictated by the need to communicate effectively.

The source of the data
In this article, data collected in one Grade 5 (11-15 years [3]) class in South Africa is analysed to explore the types and purposes of the switches.

The school and the class
This study was undertaken at a farm school west of Johannesburg in a Grade 5 class. This class was chosen because it is at this level that the teachers and second-language learners face more acute communication problems. Historically, switching to English as language of learning in South Africa occurred in Grade 5. As mentioned earlier, it has been argued by other researchers (Macdonald, 1986) that children at this level are not ready to handle content subjects in English. This is still the situation in many senior primary schools in South Africa, since new policies and practices are not yet in place.

In this class, pupils do not have their own textbooks, they have exercise books in which they do their written work. There is a blackboard, chalk and enough tables and chairs. There are 33 pupils in the class, all of them are second-language English speakers. All the pupils are first-language Tswana speakers [4] with the exception of one who is first-language Afrikaans, but can understand Tswana. The pupils are sitting in groups. There are six groups in all, four groups with six members each, one group with five and the other with four.

It is October and the teacher has covered most of the work in the syllabus and is presently doing measurement which she says is the last section before the final exams.

The teacher
The teacher chosen, Thato, is multilingual and shares the first language with the pupils. She switches codes when teaching mathematics. Thato possesses a recognised teacher's qualification and had been teaching for fifteen years at the time of the study. For the past two years, Thato has been attending in-service training courses offered by a mathematics organisation working in her school. She is aware of the new approaches to teaching mathematics in which pupils are encouraged to construct their own mathematical understanding during interactions with both the other pupils and the teacher (Yackel et al., 1990, p. 35). It is in this kind of a learning situation that the communication difficulties faced by second-language learners and teachers are experienced and mechanisms like code-switching are used in greater and more diverse ways.

The lessons
Groups were given different activities to do. The group that I observed was supposed to find out how many 125ml there are in one litre. They were provided with a 125ml measuring cup, a one-litre bottle, a 1500ml measuring jug, a flannel and a bucket full of water. The teacher pointed out during the interview that the 125ml measuring cup that was given to the group had 'a deliberately-made' spout in it. This made the exercise difficult for the pupils.

Even though what the pupils had to do was a simple division problem, all the members of the group, with the exception of one (Solly), never tried to do the simple calculation. They all wanted to do it practically and ignored Solly

when he tried to show them the solution. After thirty minutes of the group struggling to measure how many 125ml there are in one litre with a measuring cup that has 'an artificial spout' in it, they decided they were going to use the 250ml measuring jug and everytime they poured they counted it as two. They finally found that 250ml goes four times into a litre and therefore 125ml must go eight times. However, the teacher insisted that they use the 125ml and this was her rationale:

> T: So *la dablapa yaanong le mpha* two hundred and fifty *Nna ga ke batle* two hundred and fifty ml, *ke batla go itse ka* one hundred and twenty-five *Ke eng go dakiwa* one hundred and twenty-five. [You are taking short cuts, you are giving me two hundred and fifty I do not want two hundred and fifty ml, I want to know about one hundred and twenty-five Why are you dodging it?]

Why, one might wonder, does the teacher insist on them using the 125ml? This was not clear to me until the teacher explained that the 125ml measuring cup had 'a deliberately-made' spout. She wanted them to solve the problem of using a leaking measuring jug as well.

The pupils realised that there was something wrong with the spout in the measuring cup only after 40 minutes. They used a finger to stop the leak and found that there are eight 125ml in a litre. Although there was excitement in the group about this discovery, one member of the group was not satisfied with the fact that they used a finger. At the end of the lesson, the teacher gave pupils an opportunity to share what they had learned from the activities with the other pupils.

The lesson on Day 2 was a follow-up to the previous day's lesson. The teacher posed questions to the class orally and pupils were allowed to confer with their group members. The questions focused on 'fractions of a given quantity'. Most of these questions were followed by 'Why?', 'How did you find it?', 'Can you explain to us?' (S = Solly)

Example

> T: What fraction is two hundred and fifty ml of a litre?
> S: Two-eighths
> T: Two-eighths, okay Solly *a re* two-eighths [Solly says two eighths] Can you explain that Solomon?
> S: Yes. *Ke tsere di* one hundred and twenty-five *tse* two *ke be ke di* etsa. *Akere ke di* one hundred and twenty-five *di tsena ga* eight *ene di* two hundred and fifty *di tsena ga* two. [One hundred and twenty-five goes eight times and two hundred and fifty goes two times.] *Ga mam a re o batla* two parts *e be ke re* two over eight … two-eighths [When mam said she wants two parts I said two over eight.]

All the pupils were encouraged to participate; those who could not give answers were given an opportunity to find the answer practically. At the end of the lesson the pupils were requested to share what they had learned.

How often and why did code-switching occur?

The following table shows how often each of the languages was used during the lessons.

D1 – Day 1
L1 – First language (Tswana)

D2 – Day 2
L2 – Second language (English)

	Teacher		Pupil	
	Day 1	Day 2	Day 1	Day 2
L1	46	61	137	30
L2	17	15	2	24

Transcripts of lessons were made. Each paragraph in the transcript was counted as an utterance. If within a paragraph the speaker used both English and Tswana then that paragraph was counted as both an English and Tswana utterance. Instances where a pupil just said a number and nothing else were not counted as utterances.

What the table shows is that on Day 2 the teacher made fewer English utterances than the pupils, whilst on Day 1 she made more English utterances. What the table does not show, however, is the quality of the pupils' English utterances. [5] There were only two English utterances by the pupils on Day 1. Thato was aware of this and attributed it to the fact that the lesson was still new on Day 1 and therefore a need existed to explain and clarify concepts in mother tongue. (R = Researcher, T = Teacher)

> R: There was more communication in English on Friday than on Thursday. Can you talk to me about this?
> T: If the lesson is new then we are new to everything, the lesson is new and the language becomes new. Then as time goes by it is then that they start off working on their own because if you start off you don't just tell them what we are going to do. So they are just wondering where are we really leading to. So that is why I use a lot of Tswana when introducing the lesson to try and drive them into the lesson.

Thato sees code-switching as a resource for meeting classroom needs (Merritt *et al*, 1992, p. 118). She uses Tswana when the lesson is new to ensure that the pupils understand the new section of work. She makes a conscious effort to ensure conceptual understanding by using code-switching in an effective way. Thato is also very conscious of when and how she switches during the mathematics lesson.

> R: Can you give me an example of when and how switching occurs in your class?
> T: In this cassette, there's a time when I said to a child "How many halves do we get out of a litre?" Then the answer was wrong, but I did not say it is wrong, I repeated the question in their language "*Dihalf di kae?*" At times, it is a misinterpretation of what you said and at times it is just a case of language because that is not their first language.

She also uses code-switching for affective reasons. During the interview she pointed out that she switches codes while teaching, especially when the children become too silent. She uses code-switching to get the pupils' attention and to reformulate questions that have been asked in English.

> T: As I said earlier on, children become too silent, then you can recognise that they seem not to understand maybe you posed a question then they become silent for some time then I switch over and repeat the same question. Then at times after you have repeated the question in their own language they ask you what was the question again then it means you have to say it again in English. That's how they learn.

Thato allows her pupils to use whatever language they feel comfortable with. In her class, switching is not a resource

for the teacher alone but for the pupils as well.

> R: Can you give me an example of when the child switches, sort of indicating when and how they switch?
> T: I ask a question in English and the child says can I answer that in Tswana. The child has an answer but maybe he has a problem with sentence construction and I allow him to do it.
> R: Do they always ask to answer the question Tswana?
> T: They do and at times after doing that then the other one will translate that into English and whereby there is a mistake I always rectify it at that point in time.

The different ways in which Thato uses code-switching creates dilemmas for her. Although she allows pupils to use any language they are comfortable with, the above extract shows that she is also concerned about pupils improving their English communication skills. This is also evident in the following extract.

> T: They've got to know that in English. What they said in Tswana they have to know it in English. So that next time if he or she wants to pose a question then she will know that the other day the teacher said this. But I don't have a real formal way of saying 'you've got to say it this way'

This practice did not occur during the lessons observed; however, throughout the interview the teacher repeatedly said this is how she does it.

> T: There are cases whereby other children catch up very easily so if you do not switch over the others become withdrawn as I said. Some of them think you are talking to these other groups and not them so at times you need to switch over for those slow ones. At least for a day he or she has said something then the next time you ask her in English then when she answers in Tswana translate that into English. Basically language is the most important thing in maths. You can make switch-overs but I think they may give you problems as time goes or if the children do not practise

It is clear in the above extract that the teacher believes that code-switching can be a problem if the children do not practice the language of learning (English). Although she sees code-switching as important, she views it as a temporary measure which should be used with the aim of getting children to practice the language of learning. This confirms observations made by Adler (1996) and myself (Setati, 1996).

Another concern for Thato is that exams are in English and therefore even if she switches from one language to the other she always makes it a point that she repeats the questions in English. This is an implicit acceptance by her that English is a language of power. It is also an acceptance of her powerlessness as a teacher to challenge the evaluation system to allow learners to have the examinations also given in the learners' main language.

The following extracts show an instance during Lesson 1 and 2 when the teacher switched to English to ask a question.

Lesson 1

> T: Anyway *o o batlang go e traya ka one e siame* [Anyway you want to try it is okay], but mind my question is how many one hundred and twenty-five ml are there in a litre?

In this case, she was encouraging the pupils to use any method they like to solve the problem and then switched to English to remind them what the question is.

Lesson 2

> T: *A re o lemogile gore* two hundred and fifty ml goes two times into five hundred ml. [He has learned that two hundred and fifty goes two times into five hundred ml.] So what fraction is two hundred and fifty to five hundred ml?

Here she starts by reformulating an input given by another learner and then switches to English to ask a follow-up question. Thato pointed out that it is important to do this, so that the learners get used to the way questions are asked in English. This is how she responded to a question during the interview:

> R: This is one section when you repeated a question in English. Any specific reasons for this?
> T: They have to get used to this because when setting questions I only set in English not unless when I need them to take an instruction at times I write the sentence in Tswana.

It is clear, from the data analysed so far, that code-switching in Thato's class is used for three different reasons: to facilitate learners' understanding of concepts, to encourage participation and to familiarise learners with the language of evaluation (English). Code-switching creates a dilemma for Thato: while she sees it as a valuable resource, she is also faced with a challenge of making sure that her pupils understand English because it is the language of evaluation.

Types of switching

The transcript of the lessons observed indicates that the teacher switches in three different ways: for reformulation, for content of activity and for translation (Merritt et al., 1992). There are reasons for the teacher to switch in these particular ways. In this section, these three different observed types of switching will be explored. The table below shows the frequency of each of the types during the lessons.

D1 – Day 1   T1 – Type 1 reformulation
D2 – Day 2   T2 – Type 2 content of activity
                  T3 – Type 3 translation

	Teacher	
	Day 1	Day 2
T1	2	4
T2	29	29
T3	0	2

Reformulation is when the teacher paraphrases what has been said and does not add any new information or new instructions. All the switches in which the teacher reformulated her own or the pupils' utterances into a different language were counted as Type 1 switches. For content of activity, all the utterances in which the teacher used Tswana and was not necessarily reformulating or translating what she had just said, but instead progressed with the discourse were counted as Type 2 switches. All the switches in which the teacher translated directly her own utterance or one of the pupils' as is into a different language were counted as Type 3 switches.

The table shows that there were 31 switches on Day 1 by the teacher and 34 on Day 2. It also shows that switching for content of activity is the type of switch that was used the most and direct translation used the least during the lessons.

Type 1: Reformulation

During the lessons, Thato uses this type of switching to clarify instructions and to model appropriate mathematical language use. As a result of this, I have differentiated reformulation into two kinds: viz. (1) the reformulation of instructions by the teacher and (2) the reformulation of pupil utterances by the teacher. Although Merritt *et al.* (1992) did not make this distinction, I see it as crucial since it reveals the different ways in which reformulation can be used to meet different kinds of needs in class. I will now look at the two kinds of reformulations in detail.

Reformulation of an instruction by the teacher

Thato reformulates instructions *only* after they have been said in English and pupils do not act accordingly (P = Pupil)

> T: We are going to be making different measurements in different groups It means that we won't be doing the same measurement all of us Every group is going to get its own different measurement and we've got to make records of that. So in each and every group there has to be one person who will be doing the measurements the other four helps him out and the other one makes the record Is that okay? *Ya utlwalega*? [Is it clear?]
>
> Ps: Yes
>
> T: *Neh? Ya utlwalega* [Is it clear?] Jacob, *hoo, ka re* everybody *a tlo etsa mo groupung ya gage* [Jacob, wait, I said everyone should work in their groups] *O* one *o batla a* clean page *o etsa* record *ya se se diragalang* [One of you should look for a clean page and make a record of what is happening] *Wa bobedi wa tshela ba bang ba mo thusa go counta akere* [The second one will pour while the others count] I will give you an instruction per group If the first group *e etsa* something then *ba bangwe ke tla tla ke ntse ke le fa yalo yalo* [If the first group is doing something then I will come to the other groups just like that] So I am going to start off with the first group

It is clear in this case that Jacob did not observe the instructions after they were given in English, and as a result Thato interpreted this action as a lack of understanding and reformulated it into Tswana. This kind of reformulation is important in the sense that for learners to get involved in an activity they need to understand what they are supposed to do On the other hand, the teacher's actions are shaped by an awareness of the learners' language/communication problems As a bilingual herself, teaching mathematics in a second language, Thato is more attuned to the learners' actions, especially after she has said something in English.

Reformulation of pupil utterances by the teacher

During reflection time at the end of the lesson, some pupils respond in English and Thato reformulates whatever they say into Tswana and/or English.

1. P: Two hundred and fifty goes four times in a litre
2. T: *Ena a re o lemoga gore* two hundred and fifty goes four times into a litre. [She has learned that two hundred and

fifty goes four times into a litre] Meaning that she agrees with what Mmutla has been saying that two hundred and fifty is a quarter of a litre
3. P: Two hundred and fifty goes two times into five hundred
4. T: *A re o lemogile gore* two hundred and fifty ml goes two times into five hundred ml [He has learned that two hundred and fifty ml goes two times into five hundred ml] So what fraction is two hundred and fifty to five hundred ml?
5. P: Half.
6. T: It's a half *ka gonne* it goes into five hundred two times. *O mongwe a re o lemogile eng*? [What about the others?]
7. S: *Ke lemogile gore ntho enngwe le enngwe e nang le di* measurement *e na le* half *ya teng*. [I have realised that every measurement has a half]
8. T: Anything that has a half in whatever way *e na le half. Ba bang ba lemoga eng*? [The others?]
9. P: Five hundred ml and half a litre are the same
10. T: *Ke gore ga ke tshwere* five hundred ml *o mongwe a tshwere* half litre *go a tshwana.* [If I have five hundred ml and the the other one has half a litre they are the same]

What stands out in the above extract is the greater prominence of switches into Tswana by the teacher even when the pupils respond in English It should be noted, however, that the teacher does not only repeat what the pupils said. The substance of the switch, for example in line 10, is a reformulation of what the pupils expressed in English, except that the Tswana is more explicit (or explanatory). The teacher contextualises what the pupil has just said.

In line 2, the teacher paraphrases what the pupil has said into Tswana and then continues to explain in English how that relates to what Mmutla has just said. By doing that the teacher is saying if it goes four times then it is a quarter. In this way, Thato is modelling appropriate mathematical language while reformulating what the pupil has just said. She demonstrates to the learners the mathematical way of saying "two hundred and fifty goes four times into a litre" which is "two hundred and fifty is a quarter of a litre" It is also clear in the above extract that the teacher's concern is that pupils should have access to the meaning of the concepts and is therefore not very concerned about which language is used.

Type 2: Switching for content of activity

In Thato's class, this type of switching served three different functions, viz. explanatory, informatory and regulatory (Ndayipfukamiye, 1994; Arthur, 1994).

Explanatory

On Day 1, the lesson was conducted predominantly in Tswana; in fact, as the table shows there were only two instances when pupils responded in English This is most probably because the lesson was still new and new concepts in measurement (e g. conversion from litres to millilitres) were being introduced. This involved a great deal of demonstration and explanation by the teacher. It was therefore practically impossible for the teacher to handle all the activities without resorting to Tswana It was clear that the use of Tswana in this case facilitated the pupils' understanding of the new concepts that the teacher was presenting

The teacher used this kind of switching for explanatory purposes As Ndayipfukamiye (1994, p 89) describes it, this

is when the teacher illustrates facts, exemplifies them, elaborates them, relates them to learner's experience and seeks their involvement. The following are examples of extracts from the class:

> I: *O batla go nthaa o re ga nka tshela metsi a ka mo litreng a tlo felella?* [Do you want to tell me that this water will fill a one-litre bottle?]

The teacher uses Tswana in the above example to challenge the pupils' response. She avoids saying to them they are wrong; however, she uses Tswana in a provocative manner. She also succeeds in initiating a discussion between them in the sense that those who did not agree with the other members of the group feel comfortable to communicate their views. For example, after this intervention by the teacher, Mmutla (M) felt comfortable to raise his concerns:

> I: *Di* one *di etsang* Mmutla? [What does the one make, Mmutla?]
>
> M: *Di* one *di etsa* a thousand, *ene di* twenty-five *tse* ten [Ones make a thousand, and twenty-five tens ...]
>
> I: So *di* twenty-five *tse* ten *di tlo etsa bokae?* [So how much will twenty-five tens make?]
>
> M: *Di etsa* two hundred and fifty. [They make two hundred and fifty.]
>
> I: *Di etsa* two hundred and fifty? *So kante litre ke dimillilitres tse kae?* [They make two hundred and fifty? How many millilitres are there in a litre?]
>
> M: *Ke dimillilitres tse* thousand. [It is a thousand ml.]
>
> I: So *ba provele gee* Mmutla *gore go na le phoso* somewhere. [So prove to them then Mmutla that there is a mistake somewhere.] Let's see one hundred and twenty-five ml into a litre. Let's see how many one hundred and twenty-five ml will we get.

Mmutla's contribution was very important, because it made other members of the group realise that there was an error. It is possible that this kind of contribution would not have happened if the teacher had not switched to Tswana.

By switching to Tswana, Thato succeeds in engaging even the passive pupils. This she does by challenging the responses that they give and directing questions to specific members of the group. (S = Sam)

> I: *A re nneng sure. Kante la re di kae?* [Let's be sure. How many do you say there are?]
>
> S: *Ga re di tshela di le* nine *di re fa* a thousand and twenty-five. So *di etsa* litre. [When we pour nine of them we get a thousand and twenty-five. So they make a litre.]
>
> I: *Di etsa* litre? *Di tsena di le kae di* one hundred and twenty-five? [They make a litre? How many are the one hundred and twenty-fives?]
>
> S: *Di le* nine. [They are nine.]
>
> I: *Ema pele* Oupa. [Wait, Oupa.] *Bona, ke batla go itse gore Selina wa re le kereile di le kae.* [I just want to know what Selina says you got.] *Le ntse le bereka ba botlhe akere* [You have been working together right.] *Selina wa re dikae?* [Selina, how many do you say there are?]

Thato uses this type of switching to improve the pupils' ways of working together as a group. In the above extract,

she challenges the fact that they were working together and yet Selina cannot explain what they did.

When pupils give incorrect responses to a question, the teacher uses Tswana to probe further and to guide them to a more acceptable response.

> I: *Ke eng se se etsang gore di nne* nine? [What makes them nine?] *Ga ntse le tshela yaana o bona eng?* [What do you notice as you pour water?] *Go etsagala eng?* [What happens?] *Ka gonne nna ka re ga di nne* nine. [I do not think they will be nine.]

This kind of probing, particularly in the mother tongue, provides an opportunity for learners to think of alternative ways of solving the problem. It is important to note that since the learners are not preoccupied with asking questions or making their contributions in English, it is easy for them to speak and this is an opportunity to access mathematical meaning.

In the extract below, the teacher uses Tswana to question the pupil's inconsistency.

> I: Okay, *a ke gane,* but *o ne o tshwere selo se wa re se tsena ga* six, *o mong a re ga* nine *o mong a re ga* eight. *Yaanong e tshele re bone.* So *la dablapa yaanong le mpha* two hundred and fifty. [Okay, you are right, but you had this thing and said it goes six times, the other one said nine, the other eight. Now do it, let's see ...]

These pupils wanted to convince the teacher that 125ml goes nine times into a litre when they were using 125ml measuring jug and now they are saying that it goes eight times when using a 250ml measuring jug.

Informatory

This type of switching was also used during the lesson to give information. In the example that follows, the teacher is giving information to the whole class on what happened in one of the groups.

> I: *Tla re shebeng* one hundred and twenty-five *ya rona. Ke gore phatla e e etsa gore a seke a tlala. So nako e le neng le re* nine *e ne e le phatlha e.* [Let's look at our one hundred and twenty-five. This spout makes it impossible to be full. So, when you got nine it was because of this spout.] *Diphisinyana tse di neng di sala tse ke tsone tse di neng di etsa gore re nne le* extra one hundred and twenty-five, *ke tsone?* [All these remainders made us have an extra one hundred and twenty-five, didn't they?]

The switch here is used to give clarity to the whole class about the problems that this particular group encountered: why they always got nine as the answer.

Thato also uses this type of switching to communicate her views of teaching and learning to the pupils.

> I: *Ga go na motho yo o sa itseng mo lefatsheng.* [There's nobody who cannot do it.] *Niks ke a gana.* [I do not agree.] Not unless you prove that. *Ga a fetsa ka metsi ale o tla be a mpha karabo.* [When he finishes he will be able to give me an answer.]

This is very motivating and encourages the pupils to always say their point of view, it is especially so because the teacher

says it in Tswana and as a result there is a hidden message that says: 'I know you can do it'

Regulatory
In the following example, this type of switching is used to give direction to and exercise control over carrying out the task.

> T: *Kgadi a re ke robbing game ya go thiba ka monwana* [Kgadi says using a finger is cheating] *So tla re etseng so, wena Kgadi o etse ya gago o seke wa thiba, le wena o etse ya gago o thibe re bone gore re kereya bokae* [Let's do it this way: Kgadi you do it without using a finger and you do it using a finger and we'll see what we get]

The teacher also uses Tswana code-switching to regulate the behaviour of learners

> T: *Ke kopa gore le nne fa fatshe gannyane fela* [May you please sit down for a while] *David ke itse le duleng fa fat-she* [David, I said you should sit down]

Type 3: Direct translation
This type of switching was used only twice during the lessons The teacher used it whilst waiting for pupils to respond.

> *Example 1*
> Teacher: What else? *Ke eng gape*?
> *Example 2*
> Teacher: Do you have a half? *O na le* half *naa*?

It is not very easy to use this type of switching, since it demands that everything said in English be translated as is into Tswana or vice versa This is not always possible in mathematics, because some of the maths terms are either not available in Tswana or not readily used

The three types of switching used in Thato's class serve different purposes Type 2, which occurs the most, is used for teaching (explanatory), for meeting some pedagogical and communicative demands in the class (regulatory and informatory) Type 1 is used for clarification of instructions and for modelling mathematical talk Type 3, which occurred the least, is used to fill in the space during waiting time after the teacher has asked a question by repeating the question in the learners' first language

Discussion
In this article, I have described the types of switching that occurred in the classroom data that I collected It should be noted that whilst the classroom interaction was taking place in both English and Tswana, my notes were taken in English and the material written on the chalkboard was also in English.

As Ndayipfukamiye (1994, p 83) has pointed out, teach-ers meet the other demand, imparting knowledge, by resorting to the linguistic resources available – in this case, Tswana and English. The extensive use of Tswana may not be allowed, but it seems that it is the best means available to teachers to foster mathematical understanding in their pupils. Apart from being an educational resource, the use of the learners' first language is also a key to the world and culture of the learners involved. It enables the participants to make relevant connections with their lives beyond the school

Notes
[1] In some of the schools, the shift in language of learning was to Afrikaans

[2] For the purposes of this article, a *multilingual* person is any-one who is able to use two or more languages for some or all of speaking, listening, reading and writing

[3] The wide age-range is due to some pupils starting school late, some failing a grade and having to repeat a year, and some due to parental movement for purposes of work

[4] Tswana is one of the eleven official languages in South Africa

[5] Although this is an interesting issue to explore, it is not the focus of this article

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