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CODESWITCHING IN MATHEMATICS LESSONS IN ZIMBABWE

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Background and Context of the Study

This paper reports the preliminary results of an on-going study of codeswitching during the teaching of Mathematics in several types of primary schools in Zimbabwe. Briefly, *codeswitching* refers to the use of two or more languages during a single utterance or sequence of utterances between two or more speakers. Codeswitching is a choice available only to those who have the ability to use the languages in question. The general purpose of codeswitching is to facilitate communication and understanding between speakers (Eastman, 1992).

This research aims to throw light on the purposes of codeswitching in primary classrooms as well as its likely effects on learning. Although this paper is limited to observation and description, in due course we intend to show how systematic, careful use of the learners' first language serves a dual purpose: (1) it may promote understanding of the mathematical concepts being taught, and, (2) it may help to develop academic skills in the first language as well as in the second (Hewlett, 1995). We hope that the findings of this enquiry will also help teachers to fine-tune language-in-schooling practices to match children's varied needs in rural, urban, farm, high density, and low density schools, thereby maximising children's access to mathematical and other knowledge.

This work has pre-service and in-service teacher educators in mind, for it is particularly important that teachers of young children understand the role that the first language plays when instruction is via a second language. According to Carey (1991), Cummins (1994), Wong-Fillmore (1985; 1991) and others, learning via a second language is facilitated when the first language is allowed to further develop in, as well as out of, school. While many Zimbabwean children use the mother tongue extensively outside of school, the development of academic cognitive skills tends to occur exclusively in English. This is so because use of the first language for academic purposes is not encouraged after the third grade, with the result that it becomes more and more restricted in use to the home context where in some cases little reading or writing are practised. It therefore becomes increasingly difficult for children to rely on the first language for processing what they are taught in school, thus impeding the kind of deeper understanding that undergirds true school-based learning (Carey, 1991; Cummins, 1994).

We take the position, then, that the school has an important role to play in developing bi-literacy to the greatest extent possible, especially in areas where use of the mother tongue predominates outside of school. Briefly, bi-literacy may be accomplished by using the first language strategically, in systematic, well-thought-out ways during the instructional process while also insuring that English is taught in ways that meet the pupils' academic and later social needs. Ultimately, every multilingual school setting has the potential to foster a form of bilingualism that is 'additive' rather than 'subtractive' in its social and academic effects for the learner (Lambert, 1981). When the second language (in this case, the language of instruction) is learned at the expense of the first, the net result for the learner's achievement in school has been shown to be negative (Delpit, 1988; Hewlett, 1995; Wong-Fillmore, 1991).

For those concerned with mathematics education in multilingual communities, identification of and study of particular problems arising from the issue of language would seem to be indispensable if help is to be given where it is needed. In Zimbabwe, children's exposure to and understanding of English, the language of instruction, differs greatly depending on the kind

of community lived in: children from rural (low density) and urban (high density) areas have much less exposure to spoken English than do those from middle class, urban low density areas. Thus a language policy is needed that is sufficiently flexible that the needs of pupils from these vastly different settings can be met. As a general rule English is considered the medium of instruction. However, use of the mother tongue in the first three years is not discouraged. This being said, there is a risk that in rural and in urban high density schools teachers may feel constrained to use English when in fact the children's understanding might better be promoted through one of the mother tongues.

Definition of codeswitching is a subject that has long been of interest to linguists, anthropologists, and educators. Eastman (1992) notes that attempts to distinguish codeswitching from codemixing and borrowing are not fruitful. Nor is codeswitching simply an inability to keep two languages apart. What is important is that codeswitching is a choice that is open to bilinguals which serves a range of macro to micro sociolinguistic purposes, depending on the situation and context. For example, Graddol et al. (1996) define codeswitching as speech variation related to the *formality* of a given context. That means the bilingual might codeswitch from one variety of English to another or, in Zimbabwe, from English to Shona or Ndebele (or from L1 to L2). Maybin and Mercer (1996) suggest that the codeswitcher uses language to express *identity* and to pursue relationships, again, depending on the social context. Further, codeswitching is influenced by the speaker's past experience and *current conversational goals*, as well as the social events of which the conversation is a part. Edwards (1983) sees codeswitching as not random but subject to grammatical constraints and triggered by a range of psychological variables such as hesitation, and sociological variables, such as *topic, audience, and particular context*.

The classroom presents a highly specialised context in which psychological and sociological variables come together in unique ways. While teachers everywhere assess the context of instruction for moment to moment cues that the learners do or do not understand, the situation in many developing country classrooms is compounded by many factors including, sometimes, less than a full command of the language of instruction on the part of the

teacher. As Cleghorn, Merritt and Abagi (1989) found in their study of language use in Kenyan primary classrooms, the teacher's task is much more difficult when language and cultural differences intersect with the language and content of a lesson (see also Merritt et al. 1992). That is, when the concept being taught has no equivalent in the learners' home language and culture, teachers have to engage in a process of 'dual translation' in order to get the idea across. Then, codeswitching is a choice as well as a *resource* for insuring that meaningful communication takes place. It was thus the purpose of the present study to determine what it is that the speakers achieve by closely analysing situations where the teachers and/or the learners opt to switch from English to Shona and from Shona to English.

Methodology

The data were collected by observing Mathematics lessons in a cross-section of 12 primary schools in Zimbabwe. In addition, extensive informal interviews were carried out with teachers. Included were two private high fee-paying schools, five regular rural schools, one farm school, two high density urban schools and two low density urban schools. The sample does not pretend to be statistically representative, as the study is largely qualitative and exploratory. However, based on our knowledge of Zimbabwe's school system we are confident that the schools included in this study are not atypical of those in their respective setting.

To elaborate a little, private/high fee-paying schools are located in urban as well as non-urban settings. Only parents who can afford to pay the very high fees send their children to such schools. The classes are characterised by a low teacher-pupil ratio and excellent learning facilities. Low-density government schools are situated in middle-class 'suburbs' where the family income is generally high and population density low. Catchment zones are predetermined by the ministry. At independence (1980) schools in all-white suburbs inherited good facilities (e.g. classrooms designed for small classes) and thus have continued to have a lower teacher-pupil ratio compared to high-density schools. High-density schools are situated in heavily populated, previously and still all-black locations/townships. Classes have a very high teacher-pupil ratio (50 children per class on average). Schools

have morning and afternoon groups to cater for the large population. Facilities are overstretched. Rural, farm, and mine schools are operated by a local authority (the farm, estate, mine or district council) for the benefit of the community. Facilities are often quite limited. Generally speaking the teacher-pupil ratio is high, but this also depends on the population density of the catchment area. Little English is spoken outside of the school setting.

In each of the 12 schools visited, two Mathematics classes were observed - one at the infant level, the other at the junior. Observations were carried out in five different schools at Grade 1, 2,4 levels and in three or fewer schools at Grade 3, 5, 6, and 7 levels(see Table 1). All teachers in this study were able to use both Shona and English to communicate.

Table I
Use of Shona by Purpose and School Type

	Nearly all the time	For explanation	For instruction	For a comment	Hardly (very little)	Never
Grade 1	Ch	Ch, Ny	Ch, Ny Muk	Ch, Ny Muk	Ny, Muk	B, LM
Grade 2	Mz	Mz, Chits SM	Mz, Chits SM	Mz, Chits SM	Mz, Chits SM	R, S
Grade 3	JC	JC	JC	JC		B
Grade 4		Chits SM	Chits, SM	Chits, SM		LM
R,S						
Grade 5		PC, Mz	PC, Mz	PC, Mz	Mz	B
Grade 6					Ch	Muk
Grade 7		Ny			Ny	

During each observation session, the following questions were explored:

- (1) How frequently during a lesson does codeswitching occur?
- (2) Under what circumstances and/or at what points during the lesson does codeswitching occur?
- (3) What are the apparent purposes of codeswitching?
- (4) What evidence is there that codeswitching facilitates or impedes learning?
- (5) Who (teacher or pupils) engages in codeswitching?

The data were recorded according to a scheme for coding the context, speaker, time during the lesson, frequency and apparent type codeswitching (English to Shona, Shona to English) (Cf. Table I). Simultaneous field notes were recorded in order to capture unanticipated events and details.

Following each lesson informal discussion/interviews were held with each teacher to obtain their views of the lesson in question as well as any comments they might offer as to the patterns of language use observed. In due course, the observational and interview data will be further analysed in the light of data on student achievement in Mathematics and other subjects in each type of school.

Results

There were no observed instances of codeswitching in either of the two high fee-paying (B and R) and two low-density schools (LM and S); English was used exclusively during instruction of the nine lessons observed in these schools. This must be noted against the background that the high fee-paying schools were racially mixed with nearly as many black as white children, while classes in the low-density schools were predominantly black in composition. Thus, it appears that English is the de-facto first language (or a second first language) among teachers and learners in middle and upper-middle class schools (regardless of racial make-up). In contrast, only three classes (at Grades 6 and 7 in schools Ch, Ny, and Muk) in rural schools

were marked by the exclusive or near exclusive use of English. This is important considering the fact that the end of primary(Grade 7) examination in Mathematics is taken in English.

A few examples are presented below which show the kinds of situations that codeswitching occurred in as well as the variety of purposes it served.

Situation 1 - Slotting in of L1 for Repetition

In the example below we see a frequently observed pattern of codeswitching in which the teacher easily moves back and forth from English to Shona, slotting in the first language repetition of what has been said in English. This appears to emphasise what has been said, while possibly retaining the pupils' attention to the problem at hand. Note how the formal terms remain in English. These are the terms that the pupils need to know for examination purposes while understanding appears to be promoted through the first language.

T: "... The denominator is the number that tells us into how many parts the shape has been divided. *Ndiyo iri kutaura kit shepi yauri kuona yakadhivhaidwa* into how many parts? *Ine mapatsi mangani nhamba yepasi?* Right, then *ipapo ndiudzei* the top number. What is it called, the top number, Esau?"

Esau: "The numerator."

[MZ, rural school, Grade 5]

Situation 2 - Codeswitching for Affective Connections

In this example we see how use of the first language for disciplinary comments may have *affective* purposes in that it is more personable and less formal than English would be in such circumstances. Stated differently, we would say that this is an effective strategy for teachers to reduce the formality that attended the use of English, possibly providing a linguistic bridge between the culture of the classroom and that of the home. In this case the class is involved in a paper folding activity.

T: "...Fold the paper into two equal parts. *Vamwe vatopedza*. [Trans. Some of you have finished already!]. Then open your paper.

T: ...Give examples of whole numbers? fractions? Tendai eh?

Tendai: ...nineteen

T: ...good. Then fractions? *Mumwe ave kukanganwa zvatabva kuita manje*. [Trans. Some are forgetting what we have just done.]

[MZ, rural school, Grade 5]

Situation 3 - Use of L1 to Give Instructions

Here we see use of L1 to give instructions, with the occasional formal English term 'slotted in' where a Shona equivalent may not. Again, we would say that use of the L1 for giving instructions has an affective component: it allows the teacher to communicate to the children that instructions are very important and that it is essential to understand them (and instructions are essential features of examination).

T: "... *Pedzisai samu dziripa board idzo, mugonyora answer yenyu pamberi pe equal sign*". [Trans: Attempt the sums on the board and write your answer after the equal sign.]

[CHITS, rural school, Grade 2]

In the final example the teacher used Shona almost exclusively for special attention to two groups of learners who were considered slow. Here we see evidence of the fact that teachers make linguistic choices depending on the perceived needs of the learners; in this case, children who are deemed to be slow are believed to need to hear the lesson content in their own language in order to increase their chances of understanding. However, it is of note that instructions in examinations are in English, thus examination results may simply be skewed in favour of those who know more English.

Situation 4 - Matching Instruction to the Learners' Needs

T: ...Group 4 and 5 *tarisai ku* board (Teacher writes on board: $3 + 3 + 3 = 9$). [Trans: Attention to the board, groups 4 and 5]. Three 3s *aunonyorwa zvakadai* [Trans: Three 3s is written this way]

T: "4 threes *anonyorwa zvakadai* " [Trans: Four 3s is written this way]

T: "*Saka ndiani angandiudze kuti two 3s anonyorwa sei?*" [Trans: How do we write 2 threes?]

[CHITS, rural school, grade 2]

Analysis and Discussion

This paper has allowed only a glimpse into the variety of purposes that codeswitching serves in the various rural and high density schools in Zimbabwe. Overall, it appears that codeswitching serves three main purposes: (1) to explain or clarify procedures to be followed; (2) to promote understanding of important concepts; and (3) to build an affective bridge between the school and the home.

The effects of codeswitching on learning in the types of settings described above, are still little understood. Observation of the language used during the teaching of specific units of the curriculum needs to be coupled with a study of children's mastery of those same units, in the different kinds of school. The existing data on children's learning of Mathematics and other subjects stem from tests that were conducted in English; we cannot really say what children *understand* that is possibly only capable of being expressed via the first language. This is an area that we are continuing to explore and plan to report on in another article. In the meantime, tentative findings would suggest that among the many disadvantages faced by children attending rural and high density urban schools (Nyagura, 1992), home-school language differences present another. This will be the case as long as the potential of

and for additive bilingualism is not recognised by education policy makers and as long as mother tongue languages are not valued in the school context.

When children do not understand what they are taught due to inability to understand the language of instruction, then codeswitching provides a valuable resource for promoting understanding. However, teachers' good teaching instincts may need to be supported by local, school, or community-based assessments of student learning that give credence to teachers' informal, first language evaluations of children's progress in subjects such as Mathematics.

The foregoing is not to suggest that children from rural and high density areas have less need for English than do children from urban and low density areas. What it means is that the rural child has less opportunity to acquire English in and out of school. It means that teachers respond to the learners' language abilities with an eye on the children's understanding of important concepts as well as on what they need to know for examination purposes. The net result, however, is that the children's exposure to English in school is reduced so that they are further disadvantaged when it comes to passing English-only examinations and proceeding to good secondary schools.

Thus, what may be needed is more time spent on teaching English-as-a-second language in rural and high density schools while continuing with as much codeswitching in subject content lessons as is necessary for understanding. Alternatively, teachers might be encouraged to engage in the kind of double-purpose language use as seen below. Here the teacher is simultaneously attending to the development of L2 while introducing new mathematical terms.

T: "...circle? Into how many parts have I divided the circle?"

Pupil: "You are divided ..."

T: "You are divided! Do you say 'You are divided'? *Chirungu!*" [Trans: Mind your English!]

Pupil: "It is divided into four parts."

T: "Good. She has corrected herself ..."

[CH, rural school, Grade 7]

Conclusion

Finally, it might be helpful for teachers to receive in-service support regarding ways to systematise the switch from L1 instruction to L2 instruction around Grade 3. At the moment it appears that there is a mismatch between what teachers believe they are supposed to do (use English) and what the children can cope with. To this end, teachers appear to be responding to the learners' needs through the use of codeswitching.

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