Teaching primary mathematical concepts in Chitumbuka: A quest for teacher education

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Abstract
In Malawi, primary school teachers for standards 1 to 4 are trained to teach all subjects except English in Chichewa. However, when they go into the schools they have to teach in other local languages as well. This article reports on a study which investigated how primary school teachers for standards 1 to 4 contend with teaching primary mathematical concepts in Chitumbuka. A sample of 12 professionally qualified standards 1 to 4 Chitumbuka speaking primary school teachers from three schools in Rumphi district was used. The study employed a qualitative study approach using a case study design. Data was collected through lesson observations, in-depth interviews and focus group discussions. The data was analysed by reading through the transcripts to identify patterns that emerged from the data which were developed into categories. The categories were developed into themes which were interpreted for meaning. The findings revealed that the teachers faced linguistic and pedagogical challenges. However, the teachers devised strategies to cope with the challenges. This study was significant for it revealed the teachers’ lack of mathematical language competence. At present, primary school teachers experience challenges as a result of teaching in a mother tongue in which they were not trained to teach; and a language which differs considerably from the one used in the learners’ textbooks.

INTRODUCTION
The Malawi education system has undergone several changes with respect to the language of instruction used in the schools, particularly at primary school level. When Malawi gained independence from Britain in 1964, the education system inherited a language policy that gave priority to the learning of English but also included two indigenous languages in the curriculum, namely, Chinyanja and Chitumbuka. In 1968, Chinyanja was made the national language and English the official language. The name Chinyanja was immediately changed to Chichewa. Chichewa was prescribed as the language of instruction in the early years of primary school and a compulsory subject in all classes throughout Malawi, while Chitumbuka was discontinued as a language of instruction in primary schools. Chichewa became the sole Language of Teaching and Learning (LoTL) and over time, more prominent and widespread than other local languages (Moto 1999).

In 1989, the government directed that all pupils’ books (except those for
Teaching primary mathematical concepts in Chitumbuka: A quest for teacher education

English studies (for standards 1 to 4) should be written in Chichewa (Dunga 1993; Chamdimba 1994; Chilongozi 1994). Thus, pupils in the public school system had to learn mathematics, general studies and other subjects through the medium of Chichewa irrespective of whether or not Chichewa was their home language (Chilora 2000; 2003). In 1994, the newly elected democratic government of Malawi declared primary school education free. The declaration saw some reforms made in the education sector. Thus, on 28 March 1996, there was a language of instruction policy change, instituting learners’ mother tongue as the language of instruction for standards 1 to 4. The language in education policy directive (Ministry of Education 1996) read:

... with immediate effect all standards 1, 2, 3, and 4 children in our schools be taught in their mother tongue or vernacular as a medium of instruction. English and Chichewa will however, continue to be offered as subjects in the primary curricula. In the past Chichewa was used as both medium of instruction and subject, making it very difficult for beginners to grasp ideas. However, English will be used as a medium of instruction beginning in standard 5.

The decision taken by the Government that teachers should use the pupils’ mother tongue as a medium of instruction in the early years of the primary school meant that all subjects including mathematics should be taught in local languages. However, this decision to teach all subjects including mathematics in the pupils’ mother tongue in lower primary has proved a challenge to teachers who are not trained to teach in the other local languages apart from Chichewa. Hence, this article reports on an investigation into the challenges teachers face as they teach in Chitumbuka and examines the strategies which they use to deal with them.

**RESEARCH PROBLEM**

Teachers in Malawi are trained to teach all subjects, except English, in Chichewa from standards 1 to 4. Teachers in the northern region of Malawi have to teach in Chitumbuka, a language in which they are not trained to teach. Some scholars have pointed out the significance of training teachers in a language they are going to teach. Moto (2003, 124) observes that ‘the fact that someone knows a language is no guarantee that s/he can teach in that language’. Similarly, Pfaffe (2003, 132) states that ‘both the learner and the teacher have to be competent in the language of instruction’. Moyo (2001, 132) also observes that ‘speakership alone does not grant a teacher the necessary expertise to teach in that language’. Kaplan and Baldauf (2005, 130) point to the fact that once a language policy has been drawn up there is a need to have ‘a group of teachers trained in the pedagogy and reasonably fluent in the target language’. Finally, Khirsty (1995) argues that although teachers may speak their mother tongue fairly well, they may have little or no knowledge of how to use it for teaching. Therefore, teachers have to be educated in using the local language for instruction. At lower levels of primary school, the assumption has been that anybody
who speaks the language can teach in that language and therefore this aspect of training has been under-emphasised.

Policies on language in education have been pronounced without seriously thinking of teacher training in institutions of higher learning which has led to the crucial role of the teacher and language of instruction being forgotten. Another assumption is that when a teacher is trained to teach in one language he or she can transfer the knowledge and skills to teaching in another language. Therefore, there is no need for special training of teacher educators in institutions of higher learning. As such the responsibility of training has been left to lower level institutions. But the truth is that teaching in a first language differs considerably from teaching in either a second or a foreign language. Consequently, the teachers who have to teach in such languages naturally face all sorts of challenges and have to devise strategies for dealing with those challenges.

PURPOSE OF THE STUDY

The purpose of the study was to explore primary teachers’ experiences as they teach mathematical concepts in Chitumbuka, a language in which they are not trained to teach.

RESEARCH QUESTION

The main research question was, how do teachers contend with teaching primary mathematical concepts in Chitumbuka?

The following were the two subsidiary research questions that guided the study:
1. What challenges do the teachers face as they teach in Chitumbuka?
2. How do they cope with the challenges?

THEORETICAL BACKGROUND

Research in mathematics education has focused on the role of language in mathematics because language is the means by which teachers communicate mathematical concepts to the learner through oral and written materials (Cocking and Mestre 1988). Mathematics is made meaningful through the use of language and teachers should be able to use and communicate adequately in the language of mathematics (Capps and Pickreign 1993). Language, thus, plays a vital role in the process of teaching mathematics. The relationship between language and concept learning has been emphasised in the psychology of mathematics learning. Skemp (1971) argues that a teacher’s lack of language to describe the concepts has implications for teaching mathematical concepts to learners. Therefore, it is important that the vocabulary and structure of the local language are available to the teacher in order for him or her to become competent in teaching mathematical concepts. This will be possible if in higher education mother tongue teaching is incorporated in the curriculum.
According to Mercer (1995), teachers and their teaching play a significant role in initiating and guiding knowledge construction. Teachers have to cope with the language in which mathematics is taught. Teachers also have to develop effective ways of teaching the language of mathematics. It is, therefore, important to understand the different language practices that teachers in mathematics classrooms use to effect communication of mathematical concepts. The challenge for teachers is in assisting learners to master the language of mathematics. A teacher’s poor linguistic resources may result in poor development of thinking and concept development in the learners (Cocking and Mestre 1988). In a learning situation, a teacher creates opportunities for learners to understand concepts. However, it is not an easy task for teachers to guide learners in constructing mathematical knowledge through recognition of mathematical terms and concepts. In social-constructivist based teaching, the teacher’s communication with learners is a process of fitting new knowledge into existing experience, or previous knowledge, and the teacher’s competent use of the language of learning is a critical aspect of the teacher’s role. According to Orton and Frobisher (1996, 53), language is the vehicle for communicating ideas and thoughts, both in talking to others and in ordering one’s own thinking. Language consists of ‘words’, and these words are labels for concepts and ideas.

Mathematics is a subject that uses specialised vocabulary and terminology (register) and has its own specific discourse. Therefore, because of the specialised vocabulary and different meanings attached to everyday words, the mathematics teacher faces several challenges. Since teachers use language to teach mathematical concepts, they should be able to use language that best describes the concepts involved. Hence, competence in the language of communication and thought becomes a prerequisite for effective engagement in the teaching and learning process. It is, therefore, necessary to have a specific mathematical language for teaching mathematical concepts in order to avoid a situation where, for example, a wrong word may be assigned to a given concept (Setati 1998). The challenge of teaching mathematics in a language in which the teacher was not trained to teach is, therefore, an issue worth examining. Given the fact that teachers in Malawi teach primary school mathematics in Chitumbuka, a language in which they were not trained to teach, the study examined the challenges the teachers faced and how they coped with those challenges.

**RESEARCH DESIGN AND METHODOLOGY OF STUDY**

The research approach was qualitative using a case study design. The study focused on exploring experiences of teachers who teach in Chitumbuka.

**Sample and sampling procedure**

The sample consisted of 12 professionally qualified primary school teachers from three schools in Rumphi district of the Northern Region of Malawi. The sample was obtained through purposive sampling. The focus was on lower primary school
teachers of mathematics (standards 1 to 4). Participants were selected from standards 1 to 4 because, according to the current directive on language of instruction policy directive in Malawi, the learners’ mother tongue is supposed to be used as the language of instruction in these classes.

**Context of the study**
Rumphi was chosen because it is a district where Chitumbuka is the predominant language spoken. The researcher also expected to find children who are exposed to Chitumbuka only before they go to school. In Rumphi district schools, there was also a high probability of finding teachers who speak Chitumbuka.

**Data collection methods and instruments**
The methods used for data collection were observation, in-depth interviews and focus group discussions, during which the researcher took down notes and audio recorded the proceedings.

**Data analysis**
Data analysis involved transcribing the lesson observations, in-depth interviews and focus group discussions. The researcher read through the transcripts from all the data sources and identified patterns, created categories and identified common themes that emerged across the cases. The themes that emerged gave a general picture for interpretation.

**DISCUSSION OF RESULTS**
The findings of this study uncovered the challenges that arose in the process of using Chitumbuka to teach mathematical concepts at primary school level and the strategies that the teachers used to deal with them. The analysis of the data from the lesson observations, in-depth interviews and focus group discussions revealed that teachers faced linguistic and pedagogical challenges. In this discussion which is by themes and sub themes the researcher presents the linguistic and pedagogical challenges.

**Linguistic challenges**

**Vocabulary and terminologies**
The analysis of the data revealed that teachers encountered terminology problems as they taught mathematical concepts. Certain mathematical terminologies which may or may not be present in the Chitumbuka language posed a challenge to the teachers. The teachers stated that it was very difficult to teach mathematics in Chitumbuka because the language lacked the vocabulary to express mathematical terminologies and concepts. To be able to articulate the meaning of certain concepts involves the availability of a language that can best describe and convey the meanings of the
Most of the teachers said that they lacked a thorough knowledge of the mathematics register in Chitumbuka. For instance, during an in-depth interview, T4 talked at length about this challenge:

T4: Aah. The subject matter is in Chichewa language and we teach in Chitumbuka. This creates a challenge. For example, when teaching the concept of “fractions”. The terminology for the mathematical concept is in Chichewanised English. Similarly, for the concept of shapes like rectangle, square, circle are in Chichewanised English. Even for capacity, the concept of “litre” is a challenge to teach in Chitumbuka language. The terminologies, “millilitre”, “centilitre” are all in Chichewanised English. But when it comes to teaching, teacher interaction with pupils in terms of explaining concepts is a problem, to tell pupils what “litres”, “fractions” are in Chitumbuka for them to understand the concept is a challenge. Then I just use English words for the explanation of the concepts followed by use of diagrams and demonstration of the concept ...

The findings showed that the use of inappropriate terminology has the potential of causing difficulties in teaching mathematical concepts. For example, the Chichewa word *kuonkhetsa* for the concept of ‘addition’ actually means ‘breast feeding’. Consequently, it does not reflect the mathematical idea of addition. Teachers, therefore, should know the register of mathematics if they are going to be able to guide their learners. The researcher felt that this would not have been a challenge if teacher educators in higher education institutions were exposed to mother tongue teaching knowledge and skills which they would have consequently transferred to the teachers during their pre-service training.

**Translation difficulties**

The data analysis across the cases also revealed that the teachers encountered translation difficulties. There were instances where some attempts to translate mathematical concepts from Chichewa to Chitumbuka resulted in inappropriate structures and terminologies. One example is the word *vunkha* for the concept of ‘capacity’. Different teachers came up with their own versions of the same conceptual word. Another example of translation as a challenge is the terminology for the concept of ‘subtraction’ which yielded a variety of translations, such as *kutolako*, *kufumiskako*, *kufumyapo*, *kuwuskako*. All these words are not in a one to one correspondence with the English word which describes the concept of ‘subtraction’.

Thus, there is need to devise a standard Chitumbuka word for subtraction so that the concept is attached to one correct terminology. This would avoid a situation where different teachers use different translations for the same mathematical concept. Similarly, for the concept of ‘multiplication’, individual teachers came up with their own different translated versions as follows: *kwandaniska*, *kukuliska*, *kuwavinandi*, *kupangavinandi*.

During the in-depth interviews and focus group discussion sessions, the general view of the teachers was that there was a need for translated mathematical concept
terminologies into Chitumbuka in order to resolve the translation problem. The following teacher’s statement was typical of the teachers’ responses during the focus group discussions and exemplifies the teachers’ concern about these ‘own’ translations:

T3: I think they should find ways of translating Chichewa books into Chitumbuka if no new books can be written. That would make our work easy to teach. We are all not good at language and we can not translate on our own. There are many kinds of Chitumbuka in different areas in the north, if we translate alone we will have different translated versions of the same terminology, some wrong. With the wrongly translated terminology we will teach wrong mathematics concepts ...

On the basis of the foregoing findings, it is suggested that there is a need to develop Chitumbuka language mathematical concept terminologies so that they can be used effectively in the education system to teach mathematical concepts. This would facilitate improvement of the teachers’ mathematical language competence.

This has implications for higher education since teacher educators are trained in such institutions. If provision for the teaching of translation skills were made in the higher education curriculum, the skills acquired by the teacher educators would spill over to the training of the primary school teachers.

**Pedagogical challenges**

The study revealed that there were pedagogical challenges pertaining to the use of Chitumbuka to teach mathematical concepts. Teachers require pedagogical knowledge of how to deliver the subject content using the language of instruction. Initial teacher preparation in the language of instruction is a pre-requisite for the acquisition of mathematical content knowledge and instructional strategies. The study found the following pedagogical challenges:

**Teacher preparation**

The findings showed that the teachers have had no training in the methodology of teaching in Chitumbuka. Many teachers indicated that they did not receive systematic training in the use of mother tongue in mathematics teaching. The teachers lacked proper methods in terms of the knowledge and skills required for teaching mathematics in Chitumbuka. They also lacked exposure to the mathematics register in Chitumbuka before they got into the classroom. The strategies which they use to deal with the challenges came from their own initiative and creativity. Such strategies are varied and in most cases inaccurate.

Teachers need to understand the subject matter they teach. According to Ball and Bass (2000), teachers need to have an in-depth understanding of meanings and connections in the subject matter and not just procedures and isolated information. Teacher education matters a great deal as stipulated by Darling-Hammond (2005). She observes that teachers who are fully prepared in the language of instruction
in both their content and pedagogy are highly rated and are more successful with learners than those without preparation. Goodlad (1999, 693) argues that ‘an ill-prepared beginning teacher is likely to be the ill-prepared experienced teacher’. In this sense, an ill-prepared teacher is one who has not been prepared to teach using the language of instruction.

Therefore, the implication for higher education is that the pedagogical knowledge and skills of mother-tongue teaching should begin at such institutions. Teacher educators in colleges of education should acquire such knowledge and skills which they then transfer to the teachers being trained to teach in primary schools.

Almost all teachers complained about lack of teacher preparation which they said had a bearing on their teaching. The following teacher’s observation illustrates the point:

T1: In primary teacher training colleges, there is needed to train teachers in teaching methodologies of mother tongues like Chitumbuka and Chiyao apart from Chichewa. We were not trained to teach in Chitumbuka language. Without the training, how can we successfully introduce and express those concepts in Chitumbuka language. I feel training is very important. But we still teach in Chitumbuka. Chitumbuka is the language that the pupils hear and understand. However, even without that training we use Chitumbuka language to be understood by learners for it is the language that we speak here. But speaking Chitumbuka does not mean we can teach in Chitumbuka, especially when it means teaching mathematics concepts. There are terminologies for certain concepts that we do not know, this is a problem. Mathematics does not use ordinary language it uses language that is strange, has its own words. Let’s train teachers in using Chitumbuka language to teach mathematical concepts ...

This observation reveals that although teachers speak their mother tongue fairly well, they have little or no knowledge of how to teach in it correctly. Teachers must have an adequate command of the medium of instruction if they are to teach well. When a new policy on language in education is introduced, pre-service teachers have to learn new methods in using the language of instruction. In-service teachers have to receive ongoing training for the subsequent classes they are going to teach.

Teacher training is critical if teachers are to teach with minimal challenges, for through training they will acquire mathematical language competence. However, this training should start with teacher educators in institutions of higher learning and trickle down through the teacher educators to pre-service teacher training colleges.

Professional support
The findings also revealed that teachers lack support in the form of continued professional development through workshops, seminars and in-service refresher courses. The teachers interviewed said that they had no orientation in how to teach in Chitumbuka when the directive on language of instruction was pronounced. They did not receive any professional support from primary methods advisors on how to use Chitumbuka as the language of instruction regarding terminologies of certain
mathematical concepts. The majority of teachers were of the view that they need some professional support in the teaching of mathematical concepts in Chitumbuka. The following statement from the focus group discussions exemplifies this:

T2: Let the ministry support us in teaching in Chitumbuka through seminars and orientation especially on mathematical concept terminologies and provision of textbooks in Chitumbuka. In-service courses could help us. There are some teachers who can do this, teachers who know Chitumbuka language and know how to teach and explain the concepts though the books are in Chichewa language. With those teachers we would go through the topics which have challenging mathematical concept terminologies and discuss examples of introducing, explaining, expressing and teaching those terminologies of concepts ...

However, the fact is that that teacher support programmes and efforts alone may not adequately prepare teachers to overcome all the challenges which they face in the mathematics classroom as they teach in the mother tongue. Training of teacher educators in institutions of higher learning would be one way of addressing the problem.

Textbooks in Chichewa
The results of this study also showed that teachers face challenges because instructional materials are written in the Chichewa language while the LoTL is Chitumbuka. With regard to the lack of mathematics textbooks written in Chitumbuka, most of the teachers consistently talked about the need for Chitumbuka language textbooks as the following statement illustrates:

T7: I think it is better for the ministry to write Chitumbuka language mathematics books for our learners so that they can read and understand better. Textbooks in Chitumbuka would help us teachers with terminologies and structures to explain mathematical concepts. The concepts would be easily explained if the terminologies were in Chitumbuka. Now we find problems to translate in order to clarify the concepts. Our own translations are difficult ...

However, teachers have devised strategies to overcome the difficulties imposed by the classroom situation in which the mathematics textbooks are in Chichewa and how best to present the mathematical concepts in Chitumbuka.

Teachers’ guides and lesson plans written in English
According to the study findings, the challenges teachers face in teaching in Chitumbuka in lower primary schools are compounded by the use of a teacher’s guide written in English and the learners’ books written in Chichewa. Teachers, therefore, prepare their lesson plans in English and deliver them in Chitumbuka. They translate from English to Chitumbuka and from Chichewa to Chitumbuka, respectively. In general the teachers observed that this process becomes confusing and derails the
correct conveyance of the intended conceptual meanings. The following teacher’s observation is typical of the teachers’ views on the challenge:

T6: Teachers’ guides are in English and the learners’ textbooks are in Chichewa language. We need teachers’ guides in Chitumbuka language or a Chitumbuka language pamphlet outlining words or terminologies that are difficult to translate. We feel mathematical concepts can be taught without problems when the register is in Chitumbuka language. Kutenga matter m’Chichewakupita m’Chitumbuka (taking stuff in English turning it into Chitumbuka) is difficult. Why not do have textbooks in Chitumbuka? Why should we battle with three different languages; Chichewa in the learners’ textbooks, English in the teachers’ guides and Chitumbuka for teaching. We cannot manage this on our own ...

The discussion points to the fact that there is a need for Chitumbuka teaching and learning resource materials. As long as they are written in both Chichewa and English the challenges experienced by the teachers will rage on. However, the solution would be to train the teachers in using Chitumbuka and letting them use Chitumbuka textbooks for teaching mathematics.

How do the teachers cope with the challenges?

In addition to the challenges that have been discussed the study also investigated how the teachers cope with the challenges in teaching mathematical concepts. The findings revealed the following strategies:

Translation

Translation refers to the transfer of meaning from one language to another and it also encompasses the transfer of conceptual meaning. However, most teachers were unable to accurately translate the mathematics tasks and concepts into the Chitumbuka language. Since translation is a complex process, it is possible that something may either be gained or lost in translation, thus making the translated version either easier or more difficult than the original. The concern about translation as a coping strategy is exemplified in the following quotation:

T8: We use translations. This helps us but own translation is not a solution, some words used by teachers in translation could be dialects due to lack of translation skills and knowledge of the language. There are different varieties of Chitumbuka. Some mathematical terms have no bearing with Chitumbuka words. Nkhamanga area Chitumbuka [is] different from that of Phoka side. There is need for standardized terminologies for mathematics concepts in Chitumbuka. Translation should not be done by individual Chitumbuka speaking teachers. Let Chitumbuka language specialists do it ...

The argument raised here is that translation is a specialist skill with which teacher preparation programmes should provide student teachers. This was evident when some teachers made mistakes in their translation of words into Chitumbuka because of the highly technical nature of the mathematics language. It is, therefore, suggested
that lower primary school teachers be prepared in the LoTL in teacher education colleges. In this way, teachers’ deficiencies in mathematical language competence would be minimised. However, despite the problems encountered with translation, translation remains the immediate resource to be used in the classrooms even when it is clear that speaking one’s home language is one thing and the ability to translate and explain concepts in it is another.

**Code-switching from Chitumbuka to English**

Code-switching which refers to a change by a speaker or writer from one language to another (Richards et al. 1985) was a far more successful strategy for the teachers to use in teaching mathematical concepts in the primary school. This strategy enabled the teachers to balance the use of two languages at specific points within a lesson (Baker 2001; Cook 1991). The teachers said that they code-switched from Chitumbuka to English when they found it difficult to introduce, develop or elaborate on a mathematical concept in Chitumbuka. The teachers lacked mathematical language competence since they were not trained to teach in Chitumbuka and there are no Chitumbuka mathematics textbooks. Although they spoke Chitumbuka, not all of them knew all the different terminologies of basic mathematical concepts which would have enabled them to explain the concepts clearly and be understood. The following statement is representative of what the teachers said during the focus group discussions:

T 12: We switch depending on words in mathematics that are difficult to say in Chitumbuka language, so we switch to English. English words are easy. We bring in some English. Learners want English. For example, the concept of addition, we just say “add”; for division, we say “divide”; and so on. Learners follow easily. But if Chitumbuka language terminology is known, we use Chitumbuka. But there are many words to explain mathematical concepts which are not known in Chitumbuka language. Then what do we do, use English here and there …

**Demonstration with actions using concrete objects and drawings**

The results also revealed that some of the teachers used concrete objects when confronted with the challenge of using Chitumbuka terminology for introducing and explaining a certain mathematical concept for learners to understand. This was done on the understanding that the direct teaching of mathematical concepts is not really possible. The general impression gained from the teachers during the in-depth interviews was that the concepts were easily introduced and explained when accompanied by the use of concrete objects or materials. Concepts were constructed out of experience in a socially mediated environment of the classroom. The following observation exemplifies what the teachers said:

T9: To introduce concept of triangles, circles and squares, we get realia, we use concrete objects and say zinthuzangodya (objects with corners).
Teaching primary mathematical concepts in Chitumbuka: A quest for teacher education

Zangodyazitundiyetriangke (of three corners are) triangle. Zinthuzozungulirandi circle (round objects are circles). Zamakonamakonandi rectangle, (those with four corners are rectangles), Zamakonaofanandi square (with same corners is a square). Pala tayowoyachonchondikuwalongolawakuvimanya. Wakupulikachomenepalawaonachithuchenecho (when we speak like that and show them they know. They understand when they see the thing) ...

What the quotation above shows is that the teachers followed a practical approach to the teaching of mathematics as a strategy to deal with the mathematical language challenges. In teaching the concept of a circle, for example, learners were involved in practical constructions; they would peg a piece of wood or any other materials into the ground, tie a rope around it, and draw a circle. However, using objects alone is not enough for the construction of conceptual meanings. If teaching has to be done in Chitumbuka, the concepts must be expressed in Chitumbuka.

Borrowing from English

The findings also revealed that most of the teachers found using borrowed English terminologies easier than Chitumbuka. Teachers used English in situations where Chitumbukan equivalents were unavailable to express mathematical ideas. This trend revealed that there is a need to enlarge the technical vocabulary found in Chitumbuka in order to enable users of this language to express mathematical concepts without borrowing from English. Examples of English words that were transliterated are: fraction, graph, angle, litre, pattern, perimeter, triangle, rectangle, circle, metre, hour, minutes and others. English mathematical concept terminologies were transliterated. The following teacher’s statement exemplifies what teachers said about borrowing from English as a coping strategy:

T11: We find difficulties when teaching concept of time in standard four. The concept of “minute hand”, “hour hand” difficult in Chitumbuka. I use English with Chitumbuka phonological aspect to teach concept of “hour”, “minute”. In Chitumbuka no word for “hour” and “minute”. I draw and demonstrate with action moving of the “hour and minute hand”. I say “hour” (awa), “minute” (miniti), “second” (sekondi), “past” (pasiti), “to” (tu), “noon” (numi). I think teaching would be easier if there were Chitumbuka words for the “hour” and “minute” hand as the case is in Chichewa. In Chichewa it’s Mphindi for “minute” and ola for “the hour” ...

However, the approach taken here denies the learners the opportunity to learn how to express the concepts in the target language, Chitumbuka. The use of the transliterations clearly negates the whole intention of teaching mathematical concepts in Chitumbuka. It must be noted that some teachers used transliterations even where Chitumbuka equivalents were available because, they said, English is capable of handling the mathematical concepts. The teachers also felt that the learners need English in preparation for standard 5 where they will use English. Since English has a well-developed mathematics register, some teachers preferred using an English word where a Chitumbuka equivalent did not exist. However, the shortcoming of such
a strategy is that teachers may end up teaching in English instead of Chitumbuka, which would defeat the purpose of teaching in the mother tongue.

**IMPLICATIONS FOR HIGHER EDUCATION**

The failure to train teacher educators in the use of the mother tongue as a medium of instruction has led to negative effects on pre-service teachers. Teachers have not always been at the centre of attention in reforming the education systems pertaining to their training in institutions of higher learning. The general belief is that teachers do not need formal training in mother tongue instruction and educational systems could be changed without having to deal with teachers. Countries that wish to improve the quality of education, however, must first improve the training of their teachers. The starting point for improving upon the acquisition and use of the mother tongue in teaching, is in institutions of higher learning. Teacher educators should be assisted to contextualise their work by using the mother tongue for teaching in the hope that their students, who would be teachers, would do the same.

This would also involve looking into the appropriateness of the teacher education curriculum. The curriculum should be designed for preparing teacher educators to understand and appreciate student teachers’ needs. Even though a lot of new curriculum materials have been developed, not much has been done in the area of mother tongue education. This has left mother tongue education in the teacher training colleges that prepare pre-service teachers, unattended.

In addition to the training of pre-service teachers, it will also be necessary to upgrade the competence levels of teachers already in the system. Higher education institutions will have to provide a range of additional courses for in-service teachers so that they are able to acquire mathematical language proficiency as well as methodological skills in utilising the pupils’ mother tongue as the LoTL in all the various learning areas including science and mathematics.

Here it is necessary to remember that the issue is not merely that of teaching the pupils’ mother tongues as subjects, but rather the ability to use the mother tongues as the media of instruction for the entire curriculum. For student teachers to be empowered to achieve this, the focus of attention must be on those who prepare teachers in colleges and higher education institutions.

**CONCLUSION AND RECOMMENDATIONS**

The study was undertaken to investigate the challenges that teachers faced as they taught in Chitumbuka, a language in which they were not trained to teach. The study also sought to document the strategies that the teachers used to cope with the challenges, since teaching mathematics in a language in which they were not trained to teach is problematic. The study revealed that teachers who teach in Chitumbuka face linguistic and pedagogical challenges. Lack of familiarity with mathematical concept terminologies, translation skills and training in mother tongue is critical
Teaching primary mathematical concepts in Chitumbuka: A quest for teacher education

for the teachers. However, the teachers devised strategies to cope with those challenges. The key issues that the study has raised from the findings are: teachers’ lack of mathematical competence; inconsistencies in the translation of mathematical concepts; uncertainty about which medium of instruction to use; discrepancies between the medium of instruction and the language in teachers’ guides and learners’ textbooks; and teachers’ creativity in the use of manipulative skills during the teaching and learning process.

The study noted the different language practices that teachers use in mathematics classrooms in order to communicate mathematical concepts to learners. In summary, the findings showed that mathematics teachers should acquire communicative competence in mathematical language in order to rectify situations where incorrect words are assigned to concepts. Mathematics teachers have to gain control of the mathematics register. These findings are a challenge and point to the need for teacher education in order to enhance the teaching of mathematical concepts in Chitumbuka.

The implications for higher education have been raised in the discussion in order to point to the fact that if the challenges that teachers face are to be solved, methodologies of mother tongue teaching should start from institutions of higher learning where teacher educators are trained. These teacher educators would consequently train pre-service teachers in mother tongue instruction.

In the light of the key issues raised, the following recommendations are made: Firstly, in the absence of mathematics textbooks written in Chitumbuka, the Ministry of Education should provide in-service education courses in the teaching of mathematics in Chitumbuka. Secondly, since there are no standardised Chitumbuka mathematical concept terminologies, the Ministry of Education, through the office of the Education Division Manager, should select and review the selected areas in which teachers have mathematical concept difficulties. The Ministry should also develop and standardise mathematical concept terminologies to avoid inconsistencies in the use of some terminologies by teachers. Thirdly, in the long term, the Ministry should introduce pre-service teacher education programmes in mother tongue instruction, and provide mathematics textbooks written in Chitumbuka. Pre-service teacher education would, among other things, provide learning experiences for student teachers in order for them to consolidate their understanding of certain difficult concepts of the primary school mathematics curriculum.

NOTE
1. In this article T stands for teacher. Thus T4 stands for teacher 4 who participated in the interview. Similarly, T1, 2, 3, 4 and so on stand for teachers 1, 2, 3, 4 who participated in the interviews.
REFERENCES


Ministry of Education, Science and Technology. 1996. Use of mother tongue as a medium of instruction in Standards 1, 2, 3 and 4: Circular letter ref. no in/2/14, 28 March 1996.


