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Implementing Language-in-Education Policy in Multilingual Mathematics Classrooms: Pedagogical Implications

Anjum Halai and Simon Karuku
Aga Khan University, TANZANIA

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In this paper, we examine selected literature on classroom-based research to understand how students and teachers (re)negotiate the language of interaction in a mathematics classroom when the official medium of instruction is different from the students' dominant language. We identify the tensions and dilemmas associated with the implementation of language-in-education policy in selected postcolonial Anglophone countries where English is used as a medium of instruction at various stages of formal schooling. We also examine the pedagogical implications of these tensions and dilemmas, paying particular attention to emerging issues of code-switching, translation and 'safe' use of language.

Keywords: language-in-education policy, multilingualism, mathematics education

INTRODUCTION

One of the greatest challenges encountered by mathematics students in multilingual classroom settings (that is, contexts in which students from varied linguistic backgrounds are taught the same curriculum materials by the same teacher in the same classroom at the same time) is that of linguistic alienation from the classroom discourse. When they lack fluency and proficiency in the language of teaching and learning, students are particularly disadvantaged with respect to their ability to listen with understanding, to comprehend the written word, to express themselves orally and in writing (Chitera, 2011; Morris, 1978), and to develop conceptual understanding of the mathematical concepts and procedures. In the early years of schooling, a discontinuity between students' dominant language or mother tongue and the language of teaching and learning usually translates into a mismatch between the students' background knowledge and the new content being presented in school (Coleman, 2010; Dutcher & Tucker, 1997; Malekela, 2003; UNESCO, 2003). UNESCO's (2003) position paper on education in multilingual contexts argues for the need to strike a balance between, on the one hand, allowing students to use their mother tongues as cognitive tools in the classroom and, on the other hand, providing them access to global languages of communication through education so that they can successfully compete nationally and globally. Striking this balance is not an easy task because of a number of factors, including the complexity of the linguistic and ethnic landscape in many schools, lack of concrete measures to implement the official language-in-education (LiE) policy, limited or unavailability of mother tongue instructional materials, and negative attitudes towards the use and development of mother tongues (Jones & Barkhuizen, 2011; Musau, 2003; Muthwii, 2004). This paper examines selected literature on classroom-based research to understand how teachers and students (re)negotiate the languages of interaction in a mathematics classroom when the official medium of instruction (MoI) is not the same as the students'

Correspondence to: Simon Karuku, Institute for Educational Development, Aga Khan University, Salama House, 344 Urambo Street, P.O. Box 125, Dar es Salaam, Tanzania
E-mail: *simon.karuku@aku.edu*

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State of the literature

- Language-in-education policies are informed by several factors, including the pressure to conform to hegemonic ideologies of colonial language as the dominant language of globalization.
- There often exists a discrepancy between the stated official language-in-education policy and the actual practice in the mathematics classroom.
- There seems to be an emerging consensus that multiple languages in the classroom are a resource that could be drawn upon to enable learners to access mathematics, and to improve the quality of teaching and learning.

Contribution of this paper to the literature

- By reviewing and synthesizing selected literature, this paper enriches the emerging knowledge base in language-in-education policies in multilingual mathematics classrooms.
- The paper provides insights into the process of teaching and learning in multilingual mathematics classrooms.
- This paper recommends a re-examination of the curricula of teacher training programs in countries such as those considered in this paper, with a view to mapping out strategies of how to not only create awareness amongst mathematics teachers of the issues considered in this paper, but also to develop courses that could effectively prepare teachers for the challenges thereof.

mother tongue. We identify the tensions and dilemmas associated with the implementation of the official policy of language-in-education (LiE), focusing particularly on the pedagogical implications of this implementation. We examine the role of such linguistic practices as code switching and translation in relation to the prevailing LiE policies. To situate the review on the practices in multilingual classrooms, we present a brief overview of the LiE policies in selected postcolonial Anglophone countries where English is used as a medium of instruction at various stages of formal schooling. These include, but not exclusively, countries in the sub-Saharan Africa and Asia.

POLITICS AND PRACTICE OF THE PREVAILING LANGUAGE-IN-EDUCATION POLICIES

The development of a country's LiE policy is not just a pedagogical issue; it is also a human rights issue, with important ramifications on national unity and social integration. A country's LiE policy should embody the country's commitment to honour cultural diversity in ways that foster harmony. Put differently, a country's LiE policy should guarantee people's access to justice in the language of their choice. In post-apartheid South Africa, great strides have been made in addressing historical injustices related to language and LiE policies. In addition to the constitutional recognition of eleven languages as national official languages, the current LiE policy has given parents the right to choose the MoI for their child (Department of Education, 1997). This means that the entire primary and secondary education can, in principle, be conducted in the children's mother tongues as the media of instruction. More often than not, however, English is the preferred MoI from grade 4 onwards in majority of schools, even when learners do not have the necessary proficiency in English to effectively engage with the subject matter (Brock-Utne, 2005). This can partly be explained by the fact that the use of children's mother tongues as media of instruction is all too reminiscent of the apartheid policies – during apartheid, mother tongue schooling was used to perpetuate racial division and subjugation (Busch, 2010, p. 284), and partly by the fact that English is seen as the language of access and power and, as such, the knowledge of the indigenous languages does not pay off in the linguistic marketplace (Kamwangamalu, 2009, p. 138).

In East Africa, the desire for English-medium instruction is underpinned by the linguistic capital of the English language and the symbolic power the language bestows on those who can communicate in it (Mazrui, 1997; Musau, 2003; Rea-Dickins & Yu, 2012). The mastery of English is considered an indispensable tool for educational and economic achievement and advancement. Many East Africans, even among those not formally schooled, assume that the best way for the children to develop a good command of English is for them to be taught via this language at school (Brock-Utne, 2004; 2012; Musau, 2003; Muthwii, 2004; Neke, 2005; Rea-Dickins & Yu, 2012). It is no wonder, then, that the prevailing LiE policies in the East African countries are pro-English rather than pro-mother tongue (Brock-Utne, 2012; Musau, 2003; Rea-Dickins & Yu, 2012). Since 1967, Kiswahili has been the lingua franca and the sole MoI in primary schools in Tanzania, a country with close to 120 indigenous languages. Critics, however, argue that this seemingly inclusive LiE policy does not go far enough in endowing Kiswahili with some of the privileges, prestige, power and material gains that have for so long been associated with English (e.g, Rubagumya, 1991; Brock-Utne, 2004; 2012). For example, although Kiswahili is the language used in such places as parliament, banks and lower judicial courts, the LiE policy's stipulation that the MoI in post-primary education be English (United Republic of Tanzania, 1995) is seen by many as counterproductive. Tanzanian teachers in post-primary institutions often switch to

Kiswahili to clarify a point to students, most of whom have difficulty following what is taught in English (Brock-Utne, 2004; 2005; 2012; Malekela, 2003; Rubagumya, 1991). Rubagumya (1991) and Brock-Utne (2004) have very convincingly argued that using Kiswahili as the MoI in secondary schools would be more effective in achieving the learning objectives of most subject areas, including mathematics. Citing other researchers, Brock-Utne (2004) demonstrates how the use of Kiswahili in teaching the basics of mathematics to secondary school students can help the students better understand mathematics than when the content is taught using English. The debate on the effectiveness (or the lack thereof) of English as the MoI in post-primary education in Tanzania has been ongoing for at least three decades. The government's rejection of the proposal by the Presidential Commission on Education to make Kiswahili the MoI in secondary education by 1985 and in tertiary education by 1992 can be attributed to the conditionality pressures of the Bretton Woods institutions under the Structural Adjustment Programs (Mazrui, 1997, pp. 41-42; Rubagumya, 1991, p. 75).

When discussing the Tanzanian LiE policy, one issue that many Tanzanian-based researchers tend to overlook (or at least gloss over) is the fact that Kiswahili is for many students a second language, meaning that in the early years of schooling, some children – especially in the rural areas – may be linguistically alienated from the learning process. And given that the teachers' deployment policy does not take into consideration the teachers' competencies in indigenous languages, the teachers may lack effective ways of assisting those children who may have difficulties understanding some ideas or concepts due to language barriers. Another often-overlooked issue in the Tanzanian context is the teachers' proficiency in the English language. Since studies have shown that many secondary school students are not proficient in English language (e.g., Brock-Utne, 2004; 2005), the period of time spent in teacher training may not be sufficient for the teachers to be proficient in the MoI by the time they begin teaching. Undoubtedly, the teacher's proficiency in the MoI bears on the quality of teaching and, ultimately, on student learning.

As the East African countries work towards the operationalization of the East African Community (EAC), there may be fears and suspicions among the Tanzanians who feel that they will be short-changed in the common job market as a result of the disparities in the LiE policies of the member countries. For example, Tanzanians are considered more proficient in Kiswahili than in English, and although Kiswahili is recognized in the EAC treaty as the lingua franca of the EAC, English is the only official language of the EAC (EAC, 2010). The current LiE policy in Kenya closely mirrors that of Uganda. It stipulates that in linguistically homogeneous areas, the dominant language of the community in which the school is situated should be taught as a subject and used as the MoI in the first three grades of primary school, while in linguistically heterogeneous areas, English or Kiswahili should be used as the MoI. In all cases, English becomes the MoI from the fourth grade onwards (Republic of Kenya, 2006). One distinction between the Ugandan and Kenyan LiE policies is that in the latter, Kiswahili is taught as a subject right from grade one, and can be used as the MoI in the first three grades of primary school in linguistically heterogeneous areas (Republic of Kenya, 2006, p. 3). In Uganda, Kiswahili has been an optional subject, but beginning 2012, it was made compulsory and examinable in primary and secondary schools as a way of integrating fully with the other EAC partners (Ligami, 2012).

Bunyi (1999) as well as Cleghorn (1992) note that the switchover to English as the MoI in the fourth grade presents enormous challenges for the majority of Kenyan children and their teachers who live in rural and poor urban areas where English is rarely used. Bunyi argues that "the use of English as the MoI leads to differential educational treatments and consequently to the maintenance of socio-economic inequalities" (p. 344). Cleghorn's (1992) study of instructional practices in three rural schools in Kenya found that important ideas were more easily conveyed when teachers did not strictly adhere to the official LiE policy. These observations raise questions about the appropriate timing for the switchover to the use of English as the MoI.

The issue of the MoI takes on an added significance and complexity in many postcolonial Anglophone countries where English as the MoI is juxtaposed with local, regional, national and international languages. In India, for example, the Education Commission of 1966 stipulates that a child should learn three languages; namely: (1) the mother tongue or the regional language (i.e., the language of the state in which the school is situated); (2) the official language of the Union (i.e., Hindi) or the associate official language of the Union (i.e., English) so long as it exists; and (3) a modern Indian or foreign language not covered under (1) and (2) and other than that used as the MoI (Government of India, 1966, p. 358). Dua (1991) has discussed some of the challenges of successfully implementing this policy across India. These challenges include insufficient resources to train teachers and develop teaching materials in languages other than Hindi, English and Sanskrit; lack of agreement on how to implement the policy across the various types of schools in the educational system; lack of consensus on the level of education at which the languages should be introduced and the duration for which they should be introduced; and lack of consensus on how to sequence the

languages as well as how to switch from one MoI to another in the educational process (Dua, 1991; for related issues, see also Sriprakash, 2010).

In Pakistan, approximately 95% of children do not have access to education in their mother tongue, and as a consequence, the learning outcomes of primary schools are extremely poor (Coleman, 2010). English as the MoI is seen as an element of education quality and a pathway towards progress (Rahman, 2002). It is difficult to obtain a white-collar job in either the public or private sectors without a minimum level proficiency in the English language and, as a result, English language serves as one of the sources of social stratification in society (Government of Pakistan 2009, pp. 19-20). The new LiE policy of 2009 is seen as a counterweight to this social stratification. The policy states that English shall be taught as a subject right from class one, and that children from low socio-economic strata shall be provided with opportunities to learn English language. With regards to the MoI, the policy states that for the first five years of primary school, provinces "shall have the option to teach mathematics and science in English or Urdu/official regional language; but after five years the teaching of these subjects shall be in English only" (p. 20). This policy is slightly contradicted by the requirement that English be used as the MoI for sciences and mathematics from fourth grade onwards (p. 20).

Perhaps the most contested debate on the LiE policy has taken place in Malaysia. Prior to 2003, the MoI for mathematics in Malaysian primary schools was Bahasa Malaysia (Malay) in national schools, Mandarin in Chinese schools, and Tamil in Tamil schools. In all cases, Malay was taught as a subject in primary schools and used as the MoI for mathematics and science in secondary schools (Lim & Presmeg, 2011; Parkinson et al., 2011). But in 2003, following concerns about falling standards of English, unemployment rate of the ethnic Malays and the continued segregation of the races, there was a shift in LiE policy. English was re-introduced as the MoI for mathematics and science (Lim & Presmeg, 2011; Parkinson et al., 2011). The Chinese-medium primary schools, however, were allowed to use both Mandarin and English as the media of instruction for mathematics and science. In recognition of the fact that instruction in the indigenous languages since 1967 had raised a generation of teachers who were not necessarily proficient enough to teach science and mathematics in English, the government took a number of measures to assist teachers in attaining this proficiency. These measures included: testing of teachers' proficiency in English and subsequent in-service training of those who did not achieve a certain threshold; provision of electronic instructional materials – including teaching scripts – to support instruction in English; provision of English language textbooks; sending a cohort of science, mathematics and English trainee teachers to English-speaking countries for at least a part of their training; pairing of English teachers with mathematics and science teachers to act as support; mentoring by senior teachers; introduction of *English for Science and Technology* as an additional examinable subject alongside the existing English language; fostering of a positive attitude to both English and the Malay language amongst teachers and learners; and provision of national examinations in both English and Malay language (Parkinson et al., 2011). Despite all these efforts, however, a number of studies revealed that the achievement of Malaysian students in mathematics and science was deteriorating (Ministry of Education Malaysia, 2009). Students were finding it difficult to learn mathematics and science in English due to lack of proficiency in the English language, thus forcing the teachers to use Malay during instruction. The studies further revealed that since 2003, the gap in achievement between schools in the urban and rural areas in mathematics and science had continued to widen, and that only a small proportion of teachers were using the English language fully in the teaching of science and mathematics (pp. 8-9). These reasons, among others, led the government in 2009 to shift its LiE policy. Beginning 2012, the LiE policy reverted to pre-2003 policy; that is, the MoI for mathematics and science became Malay, Tamil and Mandarin in national, Tamil and Chinese primary schools, respectively, and Malay in secondary schools (Ministry of Education Malaysia, 2009). In addition, the number of hours for teaching and learning of English and Malay were increased. The implementation of the new policy is being carried out in phases, with the teaching and learning as well as examination of science and mathematics being carried out bilingually for the next couple of years (p. 16).

In summary, while it is a commonly agreed-upon fact that learners need to develop the skills required to compete mathematically in a global world using international languages like English, the pragmatics of how this can be effectively achieved in complex multilingual situations, especially in the early years of schooling, remain an open question. For them to learn mathematics effectively through English, the students need to be proficient in the English language, which is often not the case in countries such as those considered above. As is evident from this review, the LiE policy is guided not just by concerns about quality of education, but also by other social and political concerns. Although there is a lack of consensus amongst stakeholders about the timing of the introduction of English as the MoI in the mathematics classroom, opinions converge on the fact that the use of an MoI that the learner is not proficient in is counterproductive to the learning process. The bilingual or multilingual system of education is seen as the way forward, whereby students

are able to study mathematics in the language they are proficient in while their English skills are being developed. This has a bearing on the teaching and learning process. What follows is a discussion of some of the issues that arise for teaching and learning as a result of the implementation of policies such as those noted above.

LEARNING AND COMMUNICATIVE STRATEGIES IN MULTILINGUAL MATHEMATICS CLASSROOMS

To communicate mathematically in a multilingual classroom, students have to engage in at least two discourses. In addition to learning the language of mathematics, the students have to learn the MoI for mathematics. Both discourses have their own pragmatics, vocabulary, semantics and syntax. To develop proficiency in the language of mathematics, the students have to be proficient in the MoI for mathematics. Pragmatically, then, the students would first need to develop proficiency in English language before being exposed to English as the MoI for mathematics. However, as noted in the previous section, this is usually not the case in many postcolonial Anglophone countries. This section examines the existing literature on teachers' and students' language use in multilingual mathematics classrooms to draw out some of the implications of the implementation of LiE policies on mathematics teaching and learning. It is focused on and constrained to three main issues; namely, code-switching, translation, and 'safe' use of language.

Code-switching

It is one thing to develop an LiE policy and another to implement it. Although the official LiE policy may prescribe a particular language as the MoI, this may at times be way off the reality of what happens inside the classroom. This is true with the practice of code-switching, the use of more than one language in the same conversation (Adler, 2001; Setati, 1998). In multilingual classrooms, code-switching plays an important role in mediating textual meanings for learners who have limited control over the language of those texts, particularly in the grades immediately following the switch to a new MoI (Ferguson, 2003, p. 39). When there are perceptible learning difficulties in the learner's understanding of some ideas or concepts, the teacher often switches to a language that the learner is more proficient in to reiterate or elaborate the ideas (Brock-Utne, 2005; Halai, 2011). Code-switching may also be used to qualify the key components of a phrase or sentence in a problem (see Halai, 2011, p. 127) or to reformulate the teacher's instructions or students' utterances (Setati, 1998; 2005).

Halai (2011) examined the nature and purpose of code-switching as students worked through mathematical tasks using heuristics that closely mirrored Polya's (1957) problem-solving strategy of understanding the problem, devising a plan, carrying out the plan and reviewing the solution. She identified at least two functions for which students engage in code-switching in the course of learning mathematics. One is seeking understanding of the demands of the task at hand, and the other is explanation and justification of the mathematics decisions being taken. Halai argues that students should be supported at the first stage of the problem solving process where they make sense of the problem statement and take decisions to proceed accordingly.

Code-switching can sometimes be used as a resource for managing the classroom behaviour of students (Ferguson, 2003; Setati, 1998; 2005). For example, the teacher can code-switch to reprimand a student who has not done the homework (Ferguson, 2003), to reprimand disruptive behaviour, to get or maintain the learners' attention, or to encourage learner participation (Setati, 1998).

When the MoI is different from the students' mother tongue, code-switching involves a need on the part of the learner to understand the language structures, grammar and vocabulary of both the language of the text and the language into which the switch takes place. As such, lack of correspondence between the language of formal mathematics and students' mother tongues may make the use of code-switching problematic.

Setati and Adler (2000) examined the language practices of teachers in primary multilingual mathematics classrooms. Drawing on two research projects in South Africa, the authors focused on code-switching, and argued that different English language infrastructures present primary mathematics teachers with different challenges for communicating mathematics. According to the authors, the LiE policy should take cognizance of the fact that the political and pedagogical issues in rural and urban multilingual mathematics classrooms in South Africa are different. The authors argued that poor performance of bilingual learners cannot be attributed to the learner's language proficiencies in isolation of wider social, cultural and political factors that infuse schooling. As such, argued the authors, there is a need to examine classroom practices where the bi/multilingual speaker is not only treated as the norm, but his or her facility across languages is viewed as a resource rather than a problem (p. 245).

One of the dilemmas of code-switching in multilingual mathematics classrooms is that on the one

hand, the teacher would want to ensure that the students are learning mathematics with understanding – which means allowing the students to code-switch to overcome or compensate for any linguistic deficiency – while on the other hand, the teacher would want to ensure that the students are mastering the language of learning and teaching (Adler, 1998; 2001; Halai, 2009; Setati, 1998). Setati (1998) particularly notes that in as much as the teacher would want to encourage students to code-switch in the mathematics classroom, he or she would also want to ensure that the learners understand the language of learning and teaching because it is the language of evaluation (p. 37).

To add to this complexity is the lack of official recognition of or support for code-switching, which might be attributed to "the concern about the efficiency of a pedagogy that supports the switching between languages" (Martin, 2005, p. 89). Although code-switching may be allowed during classroom instruction, the students are not expected to do so in an examination. This complexity may produce timid students who fear expressing themselves (Halai, 2009; Muthwii, 2004; Rea-Dickins & Yu, 2012). In her study, Halai (2009) observed that students had to seek permission from the teacher to use Urdu in front of the class, reinforcing "the broader societal patterns of coercive relations of power between dominant and subordinate languages" (p. 61).

There is a need to recognize code-switching as a valuable resource that can be utilized in multilingual mathematics classrooms to facilitate learning. An official recognition of code-switching would encourage the policy makers and curriculum developers to rethink how to prepare mathematics teachers to make use of code-switching as a resource and minimize the problems of imprecise rendition of mathematical ideas that is often associated with code-switching. It is our view that code-switching can play an important role in improving the quality of classroom discussions and interactions. Learners are more likely to actively participate in classroom discussions and other learning activities if they feel that their linguistic and culturally diverse backgrounds are recognized and valued.

'Safe' use of language

Another linguistic strategy for coping with the difficulties arising from using an MoI that is different from the learners' mother tongue is what Heller and Martin-Jones (cited in Rubagumya, 2003, p. 162) refer to as 'safe talk'; namely, classroom talk that allows the classroom participants to be seen to be accomplishing the lesson, when in fact little learning is actually taking place. An example of 'safe talk' is the teacher's elicitation of 'chorus' responses from the learners (Brock-Utne, 2005; Rubagumya, 2003). This practice is 'safe' in the sense that from the perspective of those learners who may not know what is going on, there is no risk of losing face, and from the teacher's perspective, the lesson will be seen to be running smoothly. The reality is that these practices do not facilitate meaning-making among the learners.

In a study involving a grade four mathematics classroom in South Africa, Setati (2005) examined the relationship between the language(s) used, mathematics discourses, and the cultural models that emerged. The teacher in Setati's study switched between English and Setswana, the students' main language. The teacher's use of Setswana tended to produce conceptual discourses; namely, discourses in which the reasons for calculating in particular ways and using particular procedures to solve a mathematical problem become explicit topics of conversations. The teacher's use of English tended to produce procedural discourses – discourses that focus on the procedural steps taken to solve a problem. Procedural discourse is akin to 'safe talk' since the discourse is focused on the solution to the problem instead of conceptual understanding.

Translation

As used in the literature on multilingualism in mathematics classrooms, 'translation' refers to the act or process of rendering the meaning of what is said or written in one language into another language orally (e.g., Setati, 1998, p. 37). Understood this way, the distinction between code-switching and translation becomes subtle and blurred. One way of distinguishing the two is to characterize translation with instances where the meaning of what is said or written in an entire communicative episode (a sentence or a phrase that makes communicative sense) in the source language is rendered entirely in the target language orally. An example can be found in Clarkson's (2007) study that examined the use of language in mathematical problem solving among high-ability Australian Vietnamese students. Clarkson observed that whenever the students switched languages, they did so by translating the entire problems. This, according to Clarkson, can be attributed to the fact that the students had a well-developed mathematical register in Vietnamese.

Translation can be used for a variety of purposes; it could be used to emphasize an important point, to enable those students who might not understand what is being said in the MoI to participate in the lesson, or to overcome the lack of some expressions in a given language. Translation can also be particularly important in solving "word" problems, which require more than just cognitive skills. An important challenge with translation, however, is to ensure that it does not lead to mistranslation of the intended mathematical meanings (Chitera, 2011; Halai, 2009; 2011). Chitera remarks:

> *One of the challenges with the process of translation is to ensure that mathematics is not diluted or watered down. … [T]he process of translation is complicated and the possibility of every learner coming up with meanings different from the meaning of the teacher or 'true' meaning is very high (p. 237).*

Halai (2011) presents an episode in the mathematics classroom where students whose first language was Urdu translated the problem statement such that the mathematical intent embedded in the word problem was lost, and students' mathematical learning appeared to be hindered due to the translation.

Another challenge with translation is that it may take its toll on classroom time. In a study conducted with a suburban Chinese primary school, Lim and Presmeg (2011) observed that a substantial amount of class time was wasted in translating mathematical terminologies for the pupils. Still another challenge with translation is that in some cases, it is not possible to translate an entire English/mathematical statement since some of the mathematics terms are not available in the learners' mother tongues (Setati, 1998).

Despite its challenges, translation is a valuable resource for fostering mathematical understanding in learners. It can be an effective means for connecting the school mathematics and learners' everyday lives (Setati, 1998). Moschkovich's (1999) study of discourses in a primary mathematics classroom showed how a teacher's use of 'revoicing' – repeating, restating or reformulating students' utterances – can facilitate students' participation in a mathematical discussion. By listening to and working with the learners' mathematical language productions, the teacher reframed the students' utterances towards appropriate mathematical discourses.

Official recognition of the role of translation in mathematics teaching and learning could make translation even more valuable in multilingual mathematics classrooms. Such an official recognition could pave the way for the possibility of allowing the learners, especially in their early years of schooling, to have examinations also given in the learners' mother tongues.

PEDAGOGICAL IMPLICATIONS FOR MATHEMATICS EDUCATION

When developing the mathematics curriculum, there is a need for official recognition of the multilingual nature of mathematics classrooms in such countries as the one discussed in this paper. Such an official recognition would entail accommodation of students' linguistic diversity. And since the teachers are the ones most responsible for day-to-day policy implementation, an official recognition would entail a need to train teachers on how to handle issues arising from teaching and learning in multilingual contexts (Halai, 2011; Morris, 1978). According to Morris, the teacher should be trained to involve the children in carefully structured activities, investigations and discussions which will ensure conceptual understanding. This is only possible if during teacher preparation and in-service courses, the teachers are sensitized about the multilingual nature of the classrooms (Halai, 2011). By raising awareness among teachers, they could be more proactive in identifying learning resources that are supportive of the multilingual context of their classrooms. However, this may be particularly important in the lower grades as it allows the children to connect classroom content to their home experiences. This has implications for teacher deployment policies in countries like Kenya and Tanzania, where the teachers' linguistic profiles and competence are not taken into account during deployment (Halai & Karuku, 2012).

Clarkson (2009) has suggested a number of practical strategies that teachers could use to promote learning in multilingual mathematics classrooms. Firstly, the teachers could map the languages that are represented in their classroom and record each student's competencies in the languages they use. With this knowledge, the teacher can attend to individual learner's needs. Secondly, the teachers could encourage each student to work with their languages in solving mathematical problems. This will cue the student to expand their knowledge of that language's mathematical register. This is particularly important since the meanings for utterances are context-relative. Thirdly, the teacher can make use of open-ended questions to encourage the growth of a rich language environment as well as independent thinking. Students are more likely to engage in stimulating classroom discussions when attempting to answer open-ended questions. Another mechanism that could be supportive of multilingual learning environment is engaging the students' home communities as a resource for their mathematics learning. In particular, the teacher could invite parents into the mathematics classroom to act as teacher helpers, with the request to use their first language with students frequently (Clarkson, 2009, pp. 153-158). Furthermore, utilizing the literature from the students' language can help the student connect mathematical ideas in both the language of instruction and the student's first language.

In addition to encouraging the use of the learners' home languages in the mathematics classroom, there is a need to consider multilingual assessment practices (Setati, 2005). In a study that investigated the role of language in students' achievement in examinations, Rea-Dickins et al. (2009) concluded that students are normally disadvantaged when they are assessed in a language other than their mother tongue. The students in this study demonstrated difficulties in the interpretation and understanding of examination

questions. One of the mathematical tasks was as shown in table 1.

The students responded to the task shown in Figure 1 in three different ways, depending on how they interpreted the phrase 'below 14 years'. The first group of students gave the answer as the sum of all the frequency entries corresponding to each of the ages up to and including age 14 (i.e., 3+2+5+4+2=16); the second group gave the answer as the list of all the ages less than age 14 (i.e., 10,11,12,13); while the third group gave the answer as the frequency entry corresponding to age 14 (i.e., 2). When the authors modified the original task by replacing "f" with "number of children" and replacing the word 'below' with 'under' or 'younger than', the accuracy of student responses increased. Those students who experienced difficulties translating the task into Kiswahili also experienced difficulties in solving the task either correctly or partially correctly (Rea-Dickins et al., 2009).

One of the challenges of multilingual assessment practices is ensuring that candidates are provided the same opportunity to demonstrate their skills and understanding. When mathematics tests are written in the learner's language of choice, there are situations when some test items are skewed in favour of one language. Jones (2009) gives examples of mathematical terminology in Welsh that can unexpectedly influence a candidate's response to a question: quadrilateral translates to pedrochr (four sides), while eighteen translates to un deg wyth (one ten eight) or deunaw (two nines).

While some of the suggested strategies for promoting learning in multilingual mathematics classroom might be feasible in classrooms with a few languages represented, this may be almost impossible in such ethnically diverse countries as Tanzania and Kenya. To be sure, encouraging the use of children's mother tongues (Clarkson, 2009) or grouping the learners according to their linguistic backgrounds (Jones, 2009) may be viewed as going against the spirit of multi-ethnic unity. With political will, however, curricular compromises that are beneficial to the learners can be made.

Table 1: One of the tasks that was translated from English to Kiswahili by Rea-Dickins et al. (2009, Appendix): The table below shows the age groupof children in a class

Age	10	11	12	13	14	15
f	3	2	5	4	2	4

Use the table to find out the number of children below 14 years

CONCLUSIONS

In this paper, we have considered the LiE policies of a number of countries where classrooms are of a multilingual nature, and where English is used as an MoI for at least a portion of formal schooling. We have also looked at the emerging knowledge base that provides insights into processes of teaching and learning in the context of multilingual classrooms. All the countries considered in this review have large proportions of student population without access to education in student's home/dominant language. It is evident from the foregoing that LiE policies are informed by several factors including social, political and economic factors, often due to the pressure to conform to hegemonic ideologies, redressing inequalities and injustices, and the importance of English in the global context.

As noted in this paper, there often exists a discrepancy between the stated official LiE policy and the actual practice in the mathematics classroom. Although there are no easy solutions to the pedagogical complexities attendant upon the multilingual contexts of mathematics classrooms in these countries, there seems to be an emerging consensus that multiple languages in the classroom are a resource that could be drawn upon to enable learners to access mathematics, and to improve the quality of teaching and learning.

A concomitant emerging consensus is that strategies such as code-switching and translation are resources that are available to the teachers and learners. A challenge is to ensure that these strategies are employed effectively to enable the learners to interpret mathematics texts so that the mathematical intent is not compromised. There is thus an urgent need to re-examine the curricula of teacher training programs in these countries, with a view to mapping out strategies of how to not only create awareness amongst mathematics teachers of the issues considered above, but also to develop courses that could effectively prepare teachers for the challenges thereof.

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