

Teaching Mathematics in Foundation Phase Multilingual Classrooms: Teachers' Challenges and Innovations

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ABSTRACT The reality in South Africa is that teachers are required to work in multilingual classrooms where the language of instruction often differs from the home language of all or the majority of learners. The research on which this paper is based focused on problems teachers experience and the innovative strategies that could constitute best practice for teaching mathematics in multilingual classrooms. The question that was addressed is how teachers can teach learners representing a variety of home languages. In some cases the teachers are not familiar with the home language of the learners. Focus group interviews, involving Foundation Phase teachers in three independent schools, were conducted. The language of teaching and learning in the schools is English. Most of the teachers are English second language speakers. Components for effective mathematics teaching in multilingual classrooms are committed, well-trained teachers, well-resourced classrooms, a variety of teaching strategies, use of concrete media, encouragement of oral rehearsal, enough response time and motivation. Multilingualism should be seen as an asset rather than a barrier in the classroom.

INTRODUCTION

"... Education policy has changed over the last few years and additive bilingualism is currently advocated in the interest of allowing all children access to meaningful education" (Scheepers 2006: 2).

Is it not time that we focus on the positive perspective of being a fluent speaker of more than one language rather than dwelling on the political and historical past or the dangers of using a second language for teaching, learning and development? Multilingualism is a global phenomenon, with at least half of the world being bilingual. Fluency in the second language will depend on the specific need for the language as well as the frequency of its use (Tokuhamu-Espinosa 2003: xiii).

Since schools in South Africa accommodate diverse cultures; they need to provide for the multicultural and multilingual needs of learners (DoE 2003). This requires a common code of communication, so that all learners have access to quality teaching and learning. Teachers are often challenged to adopt teaching strategies that will enable all learners to participate successfully within the classroom and, in particular, the mathematics classroom.

The Language in Education Policy (DoE 1997) allows for home language instruction where possible. It is, however, not always pos-

sible to use home language as language of learning and teaching (LOLT) in multilingual classrooms. It is in these circumstances that many schools prefer to use English as LOLT to provide all the learners with an equal opportunity to learn. According to the review of the National Curriculum Statement DoE 2005: 13), many teachers in the Foundation Phase opt for a "straight-for-English" approach due to the unavailability of textbooks in African languages. It often happens that a variety of home languages are spoken among the learners and the challenge is which one should be chosen as the LOLT.

In addition to the reality of multilingualism in schools, mathematics constitutes a language or mathematical register in itself which is a set of meanings that belong to the language of mathematics. The mathematics register refers to terminology specific to mathematics; for example, *volume* can refer to loudness in contrast to the capacity of a container. The mathematics register is used to communicate and participate in mathematical discussions. It is especially challenging during the Foundation Phase. Not only do learners need to adapt to formal schooling, but often also to a new language of teaching and learning, as well as to the mathematical register. Teachers need to think and apply innovative strategies in these circumstances in order to enhance the understanding of mathematics.

The emphasis of this paper falls on the challenges teachers face in multilingual classrooms, specifically in mathematics teaching. Teachers can, however, implement several strategies to address the needs of learners in a multilingual class effectively. The aim of the research on which this paper is based was to investigate the key challenges in multilingual classrooms as well as strategies used to address these challenges when teaching mathematics using English as language of instruction (LOI). The aim is to provide guidelines for teachers in multilingual classrooms where the LOLT is different from the majority of learners' home language.

Background and Literature Review

Multilingualism: It is through language that we teach and learn. It is often language that causes a barrier to learning which challenges teachers to effectively teach and guide learners to understanding (Foundation Phase for All 2008: 18). Research (Foundation Phase for All 2008: 18) has proven that it is best for learners to develop reading and writing skills in their strongest (home) language to be able to transfer these skills to an additional language. However, this is not always the case in South African classrooms.

Tokuhamma-Espinosa (2003: 217) defines multilingualism as knowledge of two or more languages. Since there are 11 official languages in South Africa, multilingualism is a phenomenon with which teachers are confronted on a daily basis. Teachers in South African schools are challenged in multilingual classrooms to identify and address the language needs of their learners (McCarthy 2005: 170).

Problems Related to English as Language of Instruction: Different terms are used in the literature to refer to learners who are taught in a language that is different from their home language. For example, the terms English Language Learners (ELLs) or English Second Language Learners (ESLLs) refer to learners who come from different home language backgrounds and who need to learn English in order to cope with the English language of instruction in the school.

Herrera and Murry (2004: 1) refer to culturally and linguistically diverse (CLD) classrooms. This definition encompasses elements such as the different needs, realities, abilities and strengths that need to be taken into consideration when preparing to teach mathematics in

multilingual classrooms. At the same time, CLD focuses on different teaching strategies that should be employed in order to provide for second language learners.

Another factor to be considered in second language teaching and learning is Limited English Proficiency (LEP). Learners with LEP score low on reading, writing and listening in standardised tests. LEP also influences their English comprehension in general (Donaldson 1987: 4). It is important for teachers to adopt different teaching and learning strategies in order to provide sufficient opportunities for these learners by establishing a classroom atmosphere that is conducive to active participation and understanding (Gorgorio and Planas 2001: 10).

Tokuhamma-Espinosa (2005: 55) argues that ESLLs should not be seen as learners who need to be 'fixed', but that they must be made aware that they have a valuable resource (their home language) to offer and to use in the development of their second language, the language of instruction.

ESLLs often make use of code switching in their attempt to make sense of and understand mathematics. Code switching means that a person thinks and uses words and syntax of the home language as well as words and syntax of English when trying to speak and write English (Donaldson 1987: 5).

The Mathematics Register: Mathematics has specific terminology entailing symbols and words. The mathematics register refers to a set of meanings that belong to the language of mathematics and express mathematical meaning when used for mathematical purposes (Setati 2002: 89). Learners start their exploration of making sense of mathematics by using concrete media before developing representational media. The latter step is eventually followed by symbolic representation at an abstract level.

Vygotsky (1978), in his theory on learning, refers to an inner language, which means that learners speak aloud in order to organise their thoughts, experiences and actions, especially in the Foundation Phase (Grade R-3).

Various problems may occur in a multilingual classroom in terms of mathematics vocabulary and syntax. These problems include the use of technical words (terminology) that learners do not usually use outside the classroom, for example *parallelogram* and *multiplication*. A word like *volume* could also be confusing, because it

means *measurement* in mathematics and *level of sound* in everyday English. Learners may find it difficult to distinguish between the precise mathematical meaning of a phrase in contrast to everyday English expressions such as *a fraction of the cost*. Prepositions must be used precisely and have to be clearly understood, for example in instructions such as 'Divide 25 by 10' and 'Divide 25 into 10'. Long-winded, clumsy statements or questions may pose a problem to second language learners. For example, a question such as, 'Which number between 25 and 30 cannot be divided equally by either 2 or 3?' could baffle the learners (Haylock and Thangata 2007: 99-102).

Problems may arise in multicultural classrooms with regard to teachers' assumptions of learners' prior knowledge of specialised terms such as *subtraction*, *divisor* and *subtrahend*. The vocabulary of mathematics also tends to contain a variety of words that sound similar, for example *addition* and *audition* (Herera and Murry 2005: 51-53).

The teaching strategies that teachers implement to accommodate the special needs of second language learners are explored in the next section.

Teaching Strategies in Multilingual Mathematics Classrooms

The National Curriculum Statement (DoE 2003: 23-24) states that teachers should create an environment in which mathematics can be taught effectively by believing that every learner can learn mathematics. Mathematics is usually seen as an abstract subject, but the use of media and apparatus, especially during the Foundation Phase but also in later years, can contribute to better development and understanding of mathematical concepts. It is further stated that the teaching, learning and assessment in mathematics have the following implications for teachers:

- ♦ They must recognise that the learning of mathematics cannot be rushed.
- ♦ Each learner learns at his or her own pace and through different opportunities.
- ♦ Frequent and repeated use of mathematical concepts is critical to learning.
- ♦ Understanding develops over time and through the use of mathematics.

Creating a positive classroom atmosphere that is conducive to teaching and learning provides support for ESL learners (Goddard 1988: 78; Rigg and Allen 1989). It means that the teacher accepts learners and their diversity and provides for the accompanying challenges.

It is necessary to take learners' preferred learning styles into consideration when planning teaching and learning activities. Bender (2005) advocates differentiated instruction for effective mathematics teaching and learning. Differentiated instruction includes the use of multiple intelligences in mathematics teaching (Bender 2005: 8).

The use of concrete media is of utmost importance for fostering mathematical concepts in the Foundation Phase (Bender 2005: 47). Van de Walle (2007: 13) stresses the importance of doing mathematics, which means that learners will actively be thinking about mathematical concepts. Verbs related to doing mathematics are *explore*, *represent*, *explain*, *investigate*, *formulate*, *predict*, *conjecture*, *discover*, *develop*, *solve*, *construct*, *describe*, *justify*, *verify* and *use*. As Wall and Posamentier (2007: xiii) rightly stress, "[m]athematics is not a spectator sport – especially that of young children". Models can and should be used in learners' discovery of mathematical ideas. Van de Walle (2007: 33) also cautions teachers against the wrong use of models. For example, he warns against teaching the learners how to use a model. Models should not be used as 'answer-getting' devices but as thinking tools. Representation refers to pictures, symbols, charts or diagrams that are used to express mathematical ideas and relationships and serve as powerful learning tools (Van de Walle 2007: 5).

It is important to keep in mind that learners need to advance from the concrete to the semi-concrete and eventually to abstract learning levels and the model poses an efficient instructional method for a multilingual classroom (Bender 2005: 50). Learners use concrete media or objects and semi-concrete representation in order to be able to visualise mathematical problems or concepts and this is a prerequisite to abstract learning and understanding.

Bender (2005: 20-22) advocates a number of teaching 'tactics' for mathematics teaching, such as movement as tool, peer buddies (where learners assist one another), colour coding cue words (for example when subtracting the subtrahends or odd and even numbers in different colours),

teaching with edibles, teaching mathematics concepts using games, using a mathematics portfolio (save at least one activity per week in order to gather evidence of learner's work), and using multiplication charts.

In addition to the abovementioned strategies, Herera and Murry (2005: 309) suggest the use of practical application problems, teaching of specific meta-cognitive strategies such as self-monitoring, self-evaluation, explicit instruction of the mathematics language related to the concepts that are covered, use of journals, engaging learners in a variety of methods such as cooperative learning, direct instruction, computer-assisted learning and guided discovery, and connecting concepts to the background knowledge of the learners by asking them to write their own problems.

Teaching and Learning in a Multilingual Situation: As early as 1971, John and Honer (1971: s xxiv) speculated about the influence of second language instruction on young learners and stated that one positive aspect may be that learners use their home language more for problem solving.

Donaldson (1987) emphasises various aspects as prerequisites in the provision of effective bilingual education. Some important aspects are sufficient materials and facilities. Teachers should be adequately qualified and should receive additional training with regard to ESL instruction. Teachers must be patient; aware of what needs to be taught and the best teaching methods; they need to have empathy and a real interest in each learner; they do not need to be bilingual but should have support personnel and materials that are bilingual; they should know when to use or provide home language instruction; they must be able to motivate and use positive reinforcement and they should set definite outcomes.

Parent Involvement: Coelho (2004: 31) stresses the importance of parental involvement for second language learners to adjust successfully. Schools must welcome the participation of parents and should communicate effectively with them. Schools should also encourage the development of the home language together with English. They should make parent meetings more accessible to parents (for example, time and place), be specific about expectations for behaviour such as completing homework, punctuality, they should also promote positive inter-

cultural relations, and involve parents in finding and creating resources in their own languages (Coelho 2004: 31-33).

RESEARCH DESIGN

The research design or methodology is a qualitative investigation which would enable the researcher to explore, analyse and describe the research question in order to reveal the most appropriate and effective teaching strategies for multilingual classrooms. The aim was to investigate what constitutes best practice in classrooms where English is the second language and learners are therefore not taught in their home language.

The research was a phenomenological study because the dominant method was phenomenological interviewing (Henning 2004: 34). The interviews were semi-structured where Foundation Phase teachers participated in focus group interviews. The researcher facilitated the process but joined the interview as a stranger who remained an outsider (Henning 2004: 42).

Henning (2004: 48) explains that the decision to use an action research approach is based on the fact that the researcher envisages an intervention programme after the initial research. It therefore is a long-term investment which is both intervention and research. It usually develops over a period of time in different cycles of research and social action.

The research encompassed the following: a literature review, focus group interviews, tape-recording interviews, transcribing interviews, field notes, analysis of transcriptions and writing of the report.

A description of the research, aim of the research and process were submitted to five independent schools. Three schools granted the researcher permission to interview Foundation Phase teachers after school hours in order to cause no disruption of teaching.

Two schools (A and C) are from more affluent backgrounds and one school (B) less affluent. All three schools are independent schools. The more affluent schools have the additional benefit of having their smaller class sizes.

FINDINGS AND DISCUSSION

Background of the Schools

School A has a preschool feeding into the Primary school. There are, however, learners that

attend school A that enter school from other preschools. The LOLT of the in-house Grade R is English. Some learners from other Grade R settings may not be fluent in English. Learners in the Foundation Phase are therefore English home language speakers or from different other languages and thus ESL speakers. The teachers are all English-speaking. The language of instruction is English.

School B also has a Grade R facility where learners are taught in English. All learners are English second language speakers. The Grade 1 classes have 50 learners each. The language of instruction is English, and the teachers speak English as a second language. The teachers do not speak all the different home languages of learners and can therefore not necessarily communicate in the learners' home language.

School C has a Grade R facility where learners are taught in their home language, which is not English. They are taught all mathematical terminology in English. In Grade 1, Literacy and Life Skills are taught in their home language but Numeracy is taught in English. The class sizes are not more than 25 and therefore this situation is conducive to learning. Teachers are second language speakers. This means that the teachers speak the home language of the learners but teach in their second language.

Analysis of Interviews

The data provided below was gathered during the focus group interviews conducted at the schools. The emerging themes as well as sub-themes which emerged from the data are also discussed in the sections below. Where relevant, excerpts from participants' comments are provided verbatim and unedited. In some cases they have been translated.

Problems Encountered in the Mathematics Classroom

Home Language: In all three schools the home language differs from the LOI. Learners come to school with limited English proficiency, which may cause problems. Learners speak a different language at home and the parents are often not fluent in English and cannot assist their children. In school B the learners speak different African languages.

Teachers in School A indicated that understanding is a problem because learners do not understand them. Learners speak different African languages or Portuguese, Asian languages or Afrikaans. There are also learners in the class whose home language is English.

Learners' Background Knowledge: Teachers in schools A and B complained that learners lack sufficient background knowledge which is necessary for school readiness. Learners come to school lacking the basic pre-number and pre-writing skills.

Reading: is often experienced as a problem but it is not only related to mathematics but in general and more applicable to literacy.

School B indicated that learners from other schools or preschools pose problems because they do not have the same background knowledge as learners from their own preschool who had already been introduced to English instruction. When writing is being taught it is difficult to control the groups because while one group is being assisted the others will become restless.

Writing: Although writing is not a mathematics problem as such it restricts learners' progress because teachers have to spend more time on the teaching of writing. Learners find it difficult to copy from the board (school B)

Word Sums: All three schools indicated that the learners may not understand the English: "One has to help them understand the English and meaning of the word problem."

Teachers use pictures to clarify and assist with understanding. The learners must draw what is asked, which helps them to understand and indicates which operation should be used, whether it be addition, subtraction, multiplication or division.

"Word sums must be accompanied by pictures." (Free translation)

They read the problem in English but use their home language to explain where necessary (schools A and C).

School A indicated that Grade 2 teachers use only English when doing mathematics. They feel that the learners know the concepts and do not need the home language translation.

"I tell them what it is, show it and they repeat, for example odd and even numbers. If they do not understand the concept, it does not matter which language is spoken they will not know it."

If a difficult word such as “estimate” is used they will refer to their home language to explain it. After the explanation they will introduce the English word and from there on only use “estimate”.

It is important not to move too much between the languages because that causes more confusion (schools B and C).

By Grade 3 learners have a good understanding of English and it is necessary to establish when doing word problems whether it is a lack of language or mathematical context understanding that contributes to problems (school C).

School B reported that learners struggle a lot with word sums due to a lack of understanding of the language as well as the mathematics concepts.

Basic Number Sense: Teachers mentioned that basic number sense must be fostered in Grades 1 and 2 in order for learners to know them by Grade 3. Some learners seem to be uncomprehending (“blank”) when asked to perform calculations with the basic numbers (schools A, B and C).

School B mentioned that learners struggle with their basic number sense due to a lack of background as well as the language.

Parental Involvement: Lack of parental involvement is a major problem in school B. It is also echoed by school A. Teachers send messages in the learners’ message books but often with no response. They use SMS messages to attract parents’ attention but only a few respond to these. They really need parents to be partners in the teaching of their learners to assist with homework and other problems. Parents’ attitude may be that they “send children to school and the teachers must do their job”.

Parents can assist at home to enrich their children’s background knowledge.

Parents complain that their children come home late when teachers keep learners after school hours in order to assist the learners with extra help and work (school B).

Emotional Problems: School A indicated that some learners show aggression when they struggle with words or concepts.

Teaching Strategies Used in the Schools

The strategy to introduce English instruction in school C is to introduce counting in English as well as some basic terminology such as

more than, less than from the fourth term in Grade R. The learners are therefore introduced to mathematics in English in an informal way.

Most of the learners in School C attend the preschool and are therefore prepared for the teaching strategy implemented in Grade 1. Most of the learners from other preschools have an English background and will therefore not have problems understanding the language used in mathematics.

Learners from other schools or preschools have problems with regard to English instruction and cause teachers to re-teach and repeat a lot (schools B). Learners are taught basic concepts but learners from other preschools are not necessarily prepared for school, which causes difficulty for teachers.

School A starts their instruction in English (grade R) using pictures. “You show them a picture of clothing, a vest, then they will say ‘vest’ and that is how you teach them, when you show them the real article.” They also read them stories to help build vocabulary. Teaching is based on the use of concrete media.

School A also indicated that all learners must be screened or tested for school readiness as a prerequisite for acceptance in their school. Not all learners attend their preschool. There is a difference in background knowledge between learners from other preschools and their own preschool. It definitely helps to have a Grade R class: “A lot of learning takes place through play.”

Formal Schooling: School A requires that learners must be able to speak some English when entering the school. Many learners speak only English and therefore do not have a good command of their home language. The teachers use themes which are interesting to capture the learners’ attention. Since the teachers are English-speaking they cannot assist learners in their home language (which is not English). Therefore learners are exposed to English, which forces them to use English when communicating. There is a speech therapist who assists learners with vocabulary and pronunciation.

In school C both languages are used in Grade 1. It is a 50/50 situation in the beginning with 50% instruction in English and 50% instruction in their home language. Home language instruction gradually tapers down and in Grade 2 it amounts to about 99% English instruction. The mathematics is introduced in English but their

home language is used to explain anything the learners find difficult. School C uses English as LOI but will explain in the home language where necessary.

School B has no prerequisites in place and learners may attend their own preschool or any other preschool. Learners therefore come to school with a variety of English language skills.

Classroom Management: All the schools arrange their classrooms with individual desks facing the board. Schools A and C do group work and the groups are made up of learners who speak different languages, for example ESL learners and English home language learners. In school A class sizes vary between 18 in Grade R, 17 in Grade 1, 19 in Grade 2 and 20 in Grade 3. This provides the opportunity for teachers to work individually with learners that struggle with a concept while the others are kept busy with things such as puzzles or worksheets.

Schools A and C indicated that they do mat work which is followed by individual mathematics work. No mat work is done in school B because of limited space and large class size.

There are also round tables in the classroom where group activities take place (school C). When learners have to do individual tasks they have workstations situated against the walls where each learner can sit on his or her own and work. During the group work learners are encouraged to communicate. They may assist each other. The teacher observes the learners in order to establish what is understood and how they think, reason and calculate. They work together to find solutions but eventually have to complete their own individual worksheets.

When learners start working individually, the ones that do not understand will approach the teacher one by one for additional help (school A).

If learners do not understand a concept after repeated explanation the teacher will allow a peer who understands the concept to assist or explain. They may therefore assist in this sense because peers may understand one another better than when the teacher explains (school A and B).

“... because they understand a friend better which I may not bring across. They may assist each other”. (Free translation)

In school B, due to the large class sizes, the learners’ desks are arranged in a formal manner. Whole class instruction (direct or transmission

teaching approach) is given where learners are taught the methods in order for the learners to follow. “Practical lessons are difficult to conduct with large classes because it is difficult to control and the learners want to participate all at the same time – therefore a discipline problem.”

Own Strategies and Drilling of Concepts: In schools A and C learners investigate concepts using concrete media. There is also drilling of bonds and tables but it is supported by materials such as beads, beans and other counters.

Tables are learnt off by heart, for example 2, 4, 6, ... “Then point it out on a chart, it is like magic when they see it.”

The teacher will explain how to do a certain calculation. If learners apply their own strategy which is different from that of the teacher, they may use their strategy but it will not necessarily be introduced to all the learners (school C).

Learners may use media or manipulatives to try and find an answer but they may not probe their friends for the answer. They have to find a solution on their own. After a concept has been explained and discussed and the teacher wants to assess whether it is understood, the learners may not communicate with one another. The teacher will observe each learner in order to establish any problems or shortcomings (school A).

In school B learners use algorithms to do calculations because teachers feel that they do not have the time for other methods due to class size. They do, however, make use of concrete media such as fruit, and state that learners enjoy practical discovery. No mention was made of own strategies.

All three schools use a direct approach to teaching and learning where the teacher explains concepts and the concepts are repeated in exercises/worksheets.

Parental Involvement: School C commented that parental involvement is of great importance and the parents co-operate well with the teachers. Most of the parents are involved. It is important to inform parents that when they assist learners at home with mathematics they will also do this in English. Parents receive the information at parent evenings and they work well together. The learners are also informed and encouraged to tell the parents to use English when assisting with homework.

Parental involvement is very important for school A because parents can assist in their home language. Parents receive a work schedule indicating what is taught. Parents are told what is to be covered. There is, however, a lack of parental involvement. Parents do not assist learners with their problems and it is expected of teachers to solve all the problems. Parents are provided with possible activities to do with their children such as counting in both the home language and English, allowing them to develop common sense, reading stories and helping with vocabulary. Basic words and phrases such as *on*, *into* and *on top* are used; for example "Put your shirt on inside out."

School B reported a lack of parental involvement. Parents do not attend school meetings or parent evenings.

Code Switching: When learners experience difficulty with a concept they revert to their home language to reason and explain, but will immediately afterwards use the English terminology (school C). One must take care not to move between the languages too often because it causes confusion. For example, if learners use English for fifty-six and one says this in Afrikaans ("ses-en-vyftig") they tend to swop the numbers and write 65 instead of 56. English seems to assist learners' understanding of place value better than their home language which in this case is Afrikaans.

"It makes more sense in English, the numbers make more sense than in their home language because they learn it from the start and they know nothing else."

In school B teachers also use the learners' home language to explain difficult concepts when learners have difficulty in understanding.

There was no mention of code switching at school A (the teachers do not speak any of the other home languages).

By Grade 3 learners have a good understanding of English and it is necessary to establish when doing word problems whether it is a lack of vocabulary or mathematical context understanding that contributes to problems.

Media/Models/Manipulatives: All three schools indicated the importance of concrete media to assist learners in understanding the mathematics concepts. Media mentioned are, for example, A4 whiteboards and whiteboard markers, 100 chart, blocks, expansion cards, wooden figures such as cubes and cones, abacus,

counters (beans, blocks, bottle tops, play animals), matches/toothpicks and elastic bands to make groupings, jelly tots and toothpicks to construct, measuring tapes to find numbers bigger, smaller or in between, using their own bodies to understand a concept and using a number line on the floor. It was also mentioned that a teacher can stick big dots on the line and learners can walk on the line or jump from one dot to the other. When a learner does not participate, it is usually an indication of a conceptual problem that can be addressed after identification.

Learners must work concretely. There must be many manipulatives in order to enhance understanding (school A and C).

"If you do not do practical work you will not understand mathematics." (Free translation)

Learners learn by manipulating the models and being actively involved. Pen and paper work must follow understanding. If learners do not experience or do mathematics concretely at first, they find engaging in writing too difficult.

Communication: ESLLs are observers at first but after a few months of exposure to English they start to take part in games and conversations. It is important to encourage learners to persevere, although it may be difficult at first. Once they understand, their self-confidence grows and they experience a feeling of achievement.

It seems that learners use their home language when doing mental arithmetic. In Grade 1 they often say the answer aloud in their home language. When asked what that is in English they are able to provide the answer in English. Using their home language to reason and talk to others can be beneficial. They should, however, be encouraged to use English vocabulary where possible.

CONCLUSION

From the above discussion and the empirical research it is clear that teachers face challenges in multilingual classrooms. For learners to master the new LOI together with the new mathematics register requires an innovative classroom practice.

The key challenges in the mathematics classroom are to utilise learners' existing background knowledge. It is necessary to establish a classroom environment that is conducive to teaching and learning in a multilingual situation, for ex-

ample by using direct teaching as well as incorporating a variety of media to assist learners' understanding. Repetition is of great value. Parents need to take responsibility at home to support their children in coping with the new LOI.

A programme of gradual introduction of English words and register for mathematics (50/50% moving to 80/20% and eventually 100% English teaching in Grade 3) suggests best results.

Implementing the necessary teaching strategies combined with a well-resourced classroom can provide ESL learners with appropriate tools to master mathematics despite the barrier of learning using their second and sometimes third language.

Components for effective mathematics teaching in multilingual classrooms are committed, well-trained teachers, well-resourced classrooms, a variety of teaching strategies, use of concrete media, encouraging oral rehearsal, enough response time and motivation.

Classroom management that is conducive to teaching and learning in the Foundation Phase involves providing space for mat work and organising the desks in such a way that learners face the board directly. Learners communicate freely during mat activities. Teachers assess learners during the mat activities to identify problems and shortcomings in their mathematics and language understanding.

Parental involvement is important, and school and home must work together in partnership. Parents need to understand their role in preparing and supporting their children's mastery of English and mathematics concepts.

In conclusion: the three schools that participated in the research demonstrated that the use of English as LOLT for ESLLs can provide a solution in a multilingual mathematics classroom. It is important to take cognisance of the teaching and learning strategies implemented, in order to provide possible solutions for the realities of so many multilingual classrooms in South Africa.

Mathematics is a language shared by all people regardless of culture, religion, or gender. Numeracy is a language shared across the globe irrespective of one's home language. It is a language of numbers, symbols and procedures.

Is it not time that we focus on the possibilities of multilingualism instead of politicising the LOLT to the detriment of our learners?

REFERENCES

- Bender WN 2005. *Differentiating Math Instruction: Strategies that Work for K-8 Classrooms*. California: Corwin Press.
- Coelho E 2004. *Adding English: A Guide to Teaching in Multilingual Classrooms*. Toronto, ON: Pippin.
- Department of Education 1997. *Language in Education Policy*. Pretoria: Formset Printers Cape.
- Department of Education 2003. *Revised National Curriculum Statement Grades R-9. Teacher's Guide for the Development of Learning Programmes- Mathematics*. Pretoria: Formset Printers Cape.
- Donaldson JP 1987. *Transcultural Education Model: A Guide for Developing Transitional ESL/LEP and Bilingual Programs Kindergarten through Adult Education*. Florida: Learning Publications.
- Foundation Phase for All 2008*. (School Development Unit) Gauteng: Macmillan South Africa.
- Gorgorio N, Planas N 2001. Teaching mathematics in multilingual classrooms. *Educational Studies in Mathematics*, 47(1): 7-33.
- Grauberg E1998. *Elementary Mathematics and Language Difficulties: A Book for Teachers, Therapists and Parents*. London: Whurr Publishers Ltd.
- Haylock D, Thangata F 2007. *Key Concepts in Teaching Primary Mathematics*. London: SAGE Publications.
- Herrera SG, Murry KG 2005. *Mastering ESL and Bilingual Methods: Differentiated Instruction for Culturally and Linguistically Diverse (CLD) Students*. Boston: Pearson Education.
- John VP, Horner VM 1971. *Early Childhood Bilingual Education*. New York: MLA-ACTFL.
- Macmillan 2008. *Foundation Phase for All*. South Africa: Macmillan South Africa (Pty) Ltd.
- McCarthy TL (Ed.) 2005. *Language, Literacy and Power in Schooling*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Rigg P, Allan GA1989. *When they Don't All Speak English, Integrating the ESL Student into the Regular Classroom*. Illinois: National Council of Teachers of English.
- Setati M 2002. *Language Practices in Intermediate Multilingual Mathematics Classrooms in South Africa*. Johannesburg: University of the Witwatersrand.
- Tokuhamu-Espinosa T 2003. *The Multilingual Mind: Issues discussed by, for, and about People Living with Many Languages*. London: Praeger.
- Van de Walle JA 2007. *Elementary and Middle School Mathematics: Teaching Developmentally*. Boston: Pearson.
- Vygotsky L 1978. *Mind in Society: The Development of Higher Psychological Processes*. Cambridge: Harvard University Press.
- Wall ES, Posamentier AS 2007. *What Successful Math Teachers Do, Grades PreK-5, 47 Research-based Strategies for the Standards-based Classroom*. California: Corwin Press.