

The Impact of English First Additional Language as Medium of Instruction on the Teaching of Mathematics in Schools

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ABSTRACT The study focuses on the impact of English as language of teaching on the teaching of Mathematics. The rationale for the study is based on the fact that the pass rate in Mathematics is low. The study was carried out in a rural area where the researchers used observation and interviews to gather the data. It is interpretive and based on a case study. The study reveals the negative impact of learning in an additional language. However, teachers still see the use of English as the language of instruction still valuable because all the textbooks and concept are in English. The study concludes that academic writing is nobody's language and needs to be taught not only by language teachers, but also by the content subject teachers.

INTRODUCTION

Research has shown the transition which English first additional language learners need to make to conveniently use English as the language of teaching and learning in South Africa (Foncha 2013). In view of this, the statistical data of English competence of teachers shows that very little attention has been invested in studying the impact of English as Medium of Instruction. The transition which English Second Language (ESL) students need to make when using English as language of learning in higher education is a matter of great concern in the South African higher education sector. In this regard, Chiwome and Tondlana (1992: 248) postulate that non-English speaking students who are African mother-tongue speakers prefer to be taught in English, particularly at university, even though it takes longer to learn in the second language (L2) than in the mother tongue. These students are often labelled as at risk or disadvantaged as a result of the linguistic, cognitive and social transition they have to make when entering higher education where most teaching staff are white (although this is changing rapidly) and proficient in English.

Approximately 30,000 Grades 4 and 5 learners were assessed with alarming findings being reported. Based on this, the study revealed that South Africa's Grades 4 and 5 learners achieved the lowest mean scores compared to the other participating countries (PIRLS 2006). Fleisch (2008: 105-130) states that shifting from mother-tongue instruction in reading, writing and nu-

meracy in the first two to three years of schooling to a second language (L2) in Grade 4 where the learner is expected to be proficient in reading across the curriculum, is problematic. This may be true because these learners have a limited vocabulary of about 500 words and can only read simple 3-7 word sentences in the present tense (Fleisch 2008: 130). According to Pretorius (2002: 191), at this stage these learners have barely mastered reading comprehension skills in the mother tongue let alone the L2.

Other factors contributing to poor L2 acquisition and academic achievement particularly in Mathematics in township schools and rural areas are: lack of access to the media, lack of opportunity to hear or to speak English, lack of English reading material at home and at school, and poor language teaching by both English and content teachers whose own English proficiency is limited. Pretorius (2002:172-173, 187) argues that poor matriculation pass rates in Mathematics and other content subjects suggest a reading-to-learn barrier to academic performance which results in poorly equipped students entering higher education institutions. Pretorius and Machet (2004: 58) refer to the "paradox of the primary school professional", where teachers of literacy who are themselves unskilled and do not read due to a strong oral culture and lack of reading materials.

The South African National Curriculum Statement (NCS) declares that, since the first additional language (FAL) may also be used as language of teaching and learning, it should achieve levels of proficiency that meet the threshold lev-

el necessary for effective learning across the curriculum. This proficiency includes ‘the abstract cognitive academic language skills required for thinking and learning’ (DoE 2002:4). This is suggestive of the complex and complicated nature of academic writing which is required for learners to become successful in their studies.

Arkoudis (2003: 162) states that it is generally accepted that English teachers play a leading role in providing learners with the knowledge, skills and understanding they need to read, write, speak and listen effectively. In contrast, Goodwyn and Findaly (2003: 27) think that all teachers have a stake in effective literacy. In view of this, Crandall (1998: 18) is of the opinion that learners may fail to understand academic concepts through the language of teaching and learning because their content subject teachers are incapable of assisting them.

In South Africa, a majority of children do not speak English as their home language but are required to undertake their school-leaving examinations in English. Most schools offer mother-tongue instruction in the first three grades and then transition to English as the language of instruction in the fourth grade. For many children around the world, access to higher education and the labour market depends on becoming fluent in a second language. This presents a challenge to education policy.

It is a known fact that a less number of learners are passing Mathematics which in a way has made our society to view it as a subject for geniuses (Osburn 1925). Osburn further opines that even teachers do not have confidence to teach Mathematics. In view of this, schools discourage pupils from taking Mathematics as a subject. This is a contributing factor to the lack of skills in fields like engineering, medicine, technology etc. since these fields require a pass with good grades in Mathematics.

The nature of America’s workforce has changed dramatically in the past several decades, due in large part to the infusion of rapidly changing technology”. This trend has resulted in an increased need for workers with greater mathematical skills and higher education. In spite of these trends, employers are finding that their workforce is simply not prepared to meet even the most basic skill requirements, including reading, writing, and mathematics (US Department of Education 2005: 1).

Almost half of all adults cannot perform tasks at the level necessary of quantitative proficiency, such as using a calculator to calculate the difference between the regular and sale price of an item in an advertisement (Kaestle et al. 2001: 208). In the context of South Africa, the difficulty of studying Mathematics seem to stem initially from the use of an additional language (English) in its teaching among many other factors (Mkohlwa 2015). In this regard, there are still learners who struggle with understanding the basic concepts of English and there are still teachers who suffer with learners who are lacking basic English skills (Foddy 1994). To make matters even worse, most content teachers tend to see academic writing as the job of the English teacher against the language policy which states that English is the language of learning and teaching. In view of this, teaching Mathematics and other content subjects should be in English and not mother tongue as is the case.

Objectives of the Study

The focus of this study is on the use of English in the teaching and learning of Mathematics in schools around Alice in the Fort Beaufort District of the Eastern Cape Province. Based on this, it would be needful to:

- To assess the challenges learners face when English is used as medium of instruction in grades 10-12.
- Examine the implications of using English as medium of instruction to the attainment of Mathematics knowledge and skills among.

Literature Review

Westby (1994) is of the opinion that content teachers feel that the teaching of language skills is not their responsibility. They expected language skills to be taught in the lower grades by English language teachers. Westby also states that teachers are worried of not completing a full syllabus if too much time is spent on teaching language skills. Although these teachers are concerned about lower levels of language proficiency displayed by learners in rural schools, they do not suggest any strategies for dealing with this problem.

South Africa is a prime example of a country facing the dilemma of how to most effectively

equip a majority of its population with an additional language, in this case English. Although there are 11 official languages in South Africa, Afrikaans and English are the only languages with a developed academic literature and in which it is possible to write the secondary school leaving examinations. According to the 2011 census, only about 23 per cent of South Africans speak Afrikaans or English as their first language (Statistics South Africa 2012). In order to achieve educational and hence labour market success, a majority of South African children therefore need to become fluent in either English or Afrikaans. In reality, the vast majority choose to learn English rather than Afrikaans as the second language, given its status as a global language.

Language competence and proficiency are central to educational success (Foncha 2013). As a matter of fact, this involves more than the ability to communicate in everyday conversational contexts, but is specifically related to the use of language for academic purposes. As Westby (1994:341) aptly states: "In the preschool years, children learn to talk but as they move into school they talk to learn. In academic tasks, language is used in the service of thought". Language for academic purposes requires the understanding and use of classroom discourse which includes the educator's verbal instructions and lessons, as well as written text. The academic language register therefore encompasses both oral and written modes of communication (Cummins 2000). Importantly, it develops as a result of exposure to formal education. This implies that educators facilitate this development through the use of appropriate teaching strategies, focusing on the linguistic aspects implicit in the subject matter of various learning areas. Explicit language teaching is now included as an aim of the outcomes-based curriculum. However, there is evidence to suggest that teachers in South Africa are unaware of their responsibility to meet the language related needs of learners and also lack the training of specific methodological skills to promote effective learning of academic language (Uys et al. 2007).

In summary, culture is a serious issue that may not always be recognized in a mainstream classroom. Many teachers overlook culture and may try to jump right into English and content knowledge without knowing their students' backgrounds (Foncha 2013). Teachers need to be

open to learning new cultures and having their student embrace all cultures in the classroom. By taking great strides to learn about each other's values and beliefs the teacher and student would not only maximize the effectiveness of ESL but make it a successful learning experience for all involved (Sivasubramaniam 2004). A student who is shy or reluctant to answer questions may be more outspoken when talking about their own values that tie with their home life.

In South Africa, English is used as the language of teaching and learning (Language in Education Policy 1996). For many learners, English is the first additional language as much as it is used as a language of teaching and learning. As mentioned in the introduction, its teaching and learning has to achieve levels of proficiency that meet the threshold level necessary for effective learning across the curriculum (Educational Commission 1984). This proficiency includes the abstract cognitive academic language skills required for thinking and learning. Learners may fail to understand academic concepts through the language they are still learning by the virtue that their subject content teachers are incapable of assisting them to do so (Crandell 1998: 18).

In view of the language issues raised above, the teaching of Mathematics through the use of English as the medium of instruction has become very contentious. It is known that a majority of South Africans study a wide range of school subjects using a language that is not their mother tongue (Mkohlwa 2015). Language and Mathematics are the key instruments associated with gaining insight into problems. In view of this, it might be ideal for Mathematics to be taught in mother tongue and also for the language of instruction being the mother tongue of the learners (Heese 2010). Based on the above, this study is meant to investigate the challenges facing language planners and subject advisers in the implementation of changes in the syllabi that could result in the elimination of the language problem on the teaching and learning of Mathematics. This is meant to argue that the absorption of what is learnt might be different from first language speakers who have conceptual understanding of the language of instruction unlike those who use it as first additional language. This in part may account for the high failure rate in Mathematics in particular and other content subjects at large.

Based on the foregoing, South Africa as a multilingual nation needs to ascertain that learner's main language needs to be treated as a resource rather than a problem (Heese 2010). Heese thinks that it is the place of language planners and policists to find ways of enabling learners to use their mother tongue in teaching and learning. In other words, the language of learning and teaching issue which is supposed to be handled by all the teachers has now become the problem of the language teachers and the learners. This is because the content teachers' main aim is to divulge the content to the learners even if it means using mother tongue to achieve their goals.

METHODOLOGY

The data for this study was gathered through a community engagement project from one school in Alice where the researcher was a volunteer, teaching English first additional language in the school. The school in question only has four teachers with none as an English teaching practitioner. When the researcher started teaching in the school, he/she noticed that most of the content subjects were taught in the mother tongue. The keen interest on Mathematics is based on the fact that it is the lowest performing subject in the school and in the national examination as well. The data was collected through observation where field notes were captured and also through an interview with the Mathematics teacher. Mkhohwa did the capturing of data in isiXhosa and the translation as well.

DATA ANALYSIS AND DISCUSSION

The following data was collected for this study during an observation of one maths class in the school by the researchers:

Teacher: *How do you differentiate whole numbers from rational numbers?*

Learners: *irrational numbers (code switched into isiXhosa) [Numbers that start from 1 onwards]*

Teacher: *what is a proper fraction?*

Learners: *(quiet)*

Teacher: *what kind of fraction is $\frac{1}{2}$?*

Learners: *ihalf is a proper fraction (code switched into isiXhosa) [Half is a proper fraction because the numerator is smaller than the denominator].*

In the Mathematics lesson, the teacher asked the learners what they know about decimal fractions. The learners were so quiet and the teacher explained in isiXhosa that all the numbers are rational numbers. He mixed the language of learning and teaching with isiXhosa "*sathi iirational* [we said rational] numbers are whole numbers". The teacher asked in English "how do we differentiate whole numbers from rational numbers", learners responded in isiXhosa, "*iirational numbers ngamanani aqala ku one ukubheka phambili*"; [rational numbers are numbers starting from one onwards]. Then the teacher explained in English what the learner said. The lesson continued, the teacher asked "what is proper fraction? What kind of a fraction is $\frac{1}{2}$? *Yeyiphi?*" [What is it?] Learners responded in isiXhosa that " *$\frac{1}{2}$ is a proper fraction because inumerator incinci kune denominator*" [the numerator is smaller than the denominator]. In the researcher's observation the first part of the lesson was introduction, the lesson continued to the conversion of proper fractions to decimals. It is done by dividing the numerator by the denominator. The teacher used $\frac{1}{2}$ as an example, and did so in isiXhosa "*bangaphi oo2 ku1*" [how many two's are there in one], the learners do the calculations in isiXhosa simply demonstrating their understanding. The teacher gave the learners more activities to do on the chalkboard. As the learners were doing the calculations they used isiXhosa. The learner on the chalkboard asked the class "*bangaphi oo4 ku3*" [how many 4's in 3's] while converting $\frac{3}{4}$ into decimals. The teacher allowed learners to use their mother tongue (isiXhosa). The teacher gave the whole class activities to do as a classwork. The language of learning and teaching (English) was used by the teacher most of the time, though he also used isiXhosa to explain certain parts of the lesson for clarity while the learners were using their mother tongue most of the time. However, there is evidence to suggest that teachers in South Africa are unaware of their responsibility to meet the language related needs of learners and also lack the training of specific methodological skills to promote effective learning of academic language (Uys et al. 2007).

The data that follows was based on an interview with the Maths teacher:

Question: Do you know what the medium of instruction for this school is?

Teacher: *English.*

Question: Which language do the learners use in class?

Teacher: *most of the learners are able to express themselves efficiently in their mother tongue (isiXhosa) but some of them can express themselves fluently in English because they like to read magazines etc.*

Question: Why do you prefer to teach Mathematics in isiXhosa?

Teacher: *This is the language that the learners can express themselves in. The English teachers are not doing their job well and there is nothing else I can do. I have to use the language that is easy for the learners to understand. Our school does not even have an English teacher so who is supposed to teach the learners English?*

Question: If you could have it your way, which language would you prefer to use in teaching Mathematics?

Teacher: *English of course. You see that all the concepts are in English and all that I struggle to do is to switch to isiXhosa just to make the learners understand. English can expose them to the world and nation building.*

Ironically, the teacher has a positive attitude towards English as the language of teaching and learning regardless of the difficulties or problems faced by the learners. His focus is the future of the learners so that they can be able to communicate with the world internationally, and be able to put bread on the table. Even if these learners were to learn in isiXhosa and perform pretty well, chances are slim for them to join upward mobility economically. Nation building is another domain that would require a good knowledge of English to make it possible for diversity in South Africa to be united given the number of languages present. There is no doubt that the apartheid regime used language as a tool to divide and rule.

The findings from this study indicate that teachers encounter a number of challenges when using English as Language of teaching and learning (LoLT). These include difficulty on the part of learners to follow lessons delivered in English. Secondly, learners might not be able to understand instructions during tests and examinations. Thirdly, both teachers and learners may be unable to express themselves well in English. One technique that teachers are using to overcome these challenges is by code-switching. Code-switching seems to be the only way to

overcome the problems that learners face with the use of English as a LoLT. Accordingly, teachers should be encouraged to code-switch as much as possible because this would mean that the learners are able to understand them better and perhaps this can improve the academic performance of the learners. Code switching, however, must not be seen as an excuse for a lack of knowledge or fluency in English; it must be seen as a tool for successful learning and teaching. However, the core purpose of English being made as medium of instruction is not achieved as much as it is generally accepted that teachers of English play a leading role in providing learners with the knowledge, skills and understanding they need to read, write, speak and listen effectively. Goodwyn and Findlay (2003: 27) assert that all teachers have a stake in effective literacy irrespective of their subject specific.

The findings further reveal that some teachers feel that English as a LoLT has a negative influence on the academic performance of their learners. They believe that using isiXhosa as a LoLT would make a difference towards the right direction in academic or learning performance because the learners would understand the subject material better than when it is in English. On the other hand, some teachers call for the introduction of English as the LoLT in schools to start as early as grade R. For this to materialize, well-trained teachers, well-written textual materials and improved methods of teaching would be needed to be firmly in place, as these are more important than the length of time for which English has been used as the LoLT (Phillipson 1992: 214).

CONCLUSION

It is needful for these researchers to caution at this point that, isiXhosa as learners' mother tongue must be taught effectively to ensure that it (isiXhosa) is preserved. If the focus remains only on the English medium, then there might be a shift from additive to subtractive bilingualism. Thus for the constitution, the bill of rights and language policy to be kept afloat, the CAPS document needs to be upheld.

RECOMMENDATIONS

An alternative solution to the problem might be to use English as LoLT from grade R, rather

than from grade four as is the case. This is to enable learners to get used to the language so that by the time they finish grade 12, they would have a better command of English that can allow them to comprehend even the content subjects.

In addition, the government needs to avail resources that can ease the learning of foreign languages. Perhaps the best way to solve a number of learning problems that learners face as a result of using English as a LOLT is to change to isiXhosa as LOLT in schools, although the language of assessment (English) remains a crucial issue.

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