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The Use of English as a Medium of Instruction in Maltese Mathematics Classrooms: Continuing the Debate

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Abstract:

In 1999, a new National Minimum Curriculum for Primary and Secondary schools in Malta was published. One of the recommendations included in the document was that, preferably, Mathematics lessons should be conducted in English. The aim of this suggestion appears to be to discourage the prevalent practice of code-switching used in the teaching and learning of this subject and to help the children improve their knowledge of the English language. In this paper I highlight the possible consequences of such an immersion approach by discussing aspects related to Mathematical language. In particular, I discuss the role of Mathematical words and the difficulties encountered in solving word problems. I argue that focusing attention on English may mask important issues related to Mathematical language and that code-switching may in fact serve an important role in the teaching and learning of Mathematical ideas.

Introduction

In 1998, the Ministry for Education in Malta commissioned the writing of a National Minimum Curriculum (NMC) for all Maltese primary and secondary schools (Ministry for Education and National Culture, 1998). The aim of the new NMC was to encourage schools to reflect on important educational issues such as assessment, inclusion, creativity and technology and to come up with their own school policies on such matters.

One of the points raised in the document is that of the implementation of a policy on bilingualism. The island has its own language, Maltese, but as a result of 165 years of British colonial rule (Malta gained independence in 1964), English is also considered to be an important language in Malta. While Maltese is widely used as a means of

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everyday communication, and is the official language in parliament and the courts, English plays an important part in international business, tourism and education.

As Camilleri Grima (2003, p.56) explains: "the average Maltese person lives daily with two languages, moving from one to the other as the context demands". As a consequence of this, code-switching between Maltese and English has become common practice, resulting in a language pattern that Borg (1980) refers to as 'Mixed Maltese English'. Generally speaking, this pattern is a socially accepted form of communication.

The Use of English in Mathematics Teaching and Learning

The extent to which code-switching occurs depends on the speaker and the situation, but it is certainly a feature of classroom communication in most State Schools. Code-switching tends to be used in here because for many subjects, the textbooks are in English and all written work is done in English. In the Primary classroom, for example, written Maltese is only used for Religion, Social Studies and of course, Maltese. Furthermore, for many subjects the 'technical' words are retained in English, even within stretches of otherwise Maltese speech. This is certainly the case for Mathematics. Thus, the insertion of English technical words, together with the need to link with written whiteboard work or textbooks results in conversations that make use of code-switching.

The classroom excerpt below illustrates an interaction between a Primary school teacher and an 8-year-old child during a Mathematics lesson on Money. The words *coin*, *cent* and the numbers themselves are said in English, while the rest of the speech is in Maltese. This piece of conversation appears to be a preparation for the written exercise that will follow shortly afterwards, where questions like 'Which coin has the smallest value?' are written on the whiteboard. The original Maltese speech and its translation are indicated in a **bold** print:

> Teacher: **Qed nistsaqsikom liema** coin? **Liema hi l-kelma bil-Malti**? Which coin has the smallest value? [**I'm asking you which** coin? **What's the word in Maltese**? Which coin has the smallest value?]
> Fiona: **Kemm tiswa** … one cent. [**Its value** … one cent]

Such a language pattern appears to be considered undesirable by the writers of the NMC and this opinion, coupled with an aim to promote competence in the English language, prompted the writers to suggest that English should be used as the medium of instruction for Mathematics, Science and Technology. The apparent assumption is that if pupils are encouraged to operate in English, their level of understanding and speaking English will improve. The method of targeting a second language by teaching part, or all, of the curriculum through this language is known as the 'immersion' approach (Baker, 2001).

A period of public debate was allowed before the final version of the NMC document was published. During that time, I organized an informal meeting for Mathematics teachers, members of the NMC steering committee, University Mathematics Educators, linguists and officials from the Education Division during which opinions

were aired. The main points that arose in favour of using English as a medium of instruction were that such an approach supports children's learning of the language and their 'overall' education. I think that this opinion is based on the belief that the English language opens doors to various areas of knowledge and, as pointed out by Camilleri (2003) it is often perceived locally to be associated with social 'standing'. Other opinions expressed during the meeting were that English is useful when non-Maltese children are present in the classroom and that since technical words are in English, then it makes sense to conduct all the conversation in English.

Those who had reservations regarding the use of English and favoured code-switching instead expressed concerns about pupil participation and the teachers' own confidence in using English. Another opinion was that it was not practical to expect teachers to stick to English, especially at points where they felt that their pupils were not understanding the Mathematical concepts. Furthermore, since Maltese is a living language, then it should be allowed to develop according to the use to which it is put, and this may include code-switching with English, which is not necessarily a negative thing. Finally, it was suggested that if English competence is seen to be a problem then this should be tackled in its own right rather than through other subjects.

As a result of feedback from various quarters, the final NMC document was amended so that the immersion proposal was changed to a *preference* for English, with the final decision to be taken by the class teacher. To date, the language debate continues to crop up in various circles, usually centering on the points mentioned above.

The possibility of learning Mathematics in a second language is not unique to Malta, but can be found in other countries too, although reasons for the situation may vary. For example, pupils may belong to a minority group within an English speaking society or there may be a political reason for the promotion of English. Various researchers have commented on situations where non-English speaking children learn Mathematics in English, and the general stance is that such a experience is problematic for the learner. Brodie (1989) comments on the difficulties non-English speaking South African students face when they pursue education in English when this is their third or even fourth language; these include difficulties in understanding the teacher and the material, and with expressing themselves in English during the lessons; MacGregor (1993) describes the difficulty immigrant students in Australia have in following what the teacher is saying because she talks too fast and because sentence structure may vary from that familiar to them in their own language.

Sometimes it is word problems or 'story sums' that are a source of difficulty. Non-English speaking children may not understand them, as reported by MacGregor (1993) in the Australian context; Jones (1982) and Clarkson (1991) found in their studies that Papua New Guinean children lagged behind in word problems involving the expressions '*more'* and '*less'*; Adetula (1990) found that Nigerian children fared better in word problems involving these same words – *more* and *less* - when these were set in the children's native language (Yoruba or Hausa). Olivares (1996) draws attention to the fact that synonyms or words of similar meaning such as *add*, *plus, combine*, *and*, *join* may be a source of difficulty to students with limited English proficiency since they may not know their equivalents in their own language.

In the contexts mentioned above, there may not have been the option of code-switching, either because of political reasons, or simply because the teacher and pupils were not familiar enough with each other's language. This contrasts with the local situation where code-switching practices are already in place and generally accepted. In her study of various secondary school classrooms, Camilleri (1995) found that teachers favoured code-switching because it provided them with a comfortable mode of communication that allowed flexibility between spoken Maltese and written English. Indeed, in the international field of Mathematics education, code-switching is considered to be a useful pedagogical tool in that it provides an *additional resource* for aiding understanding. Teachers' use of the strategy has been described in the South African context (Setati, 1998; Adler, 2001), Kenya (Bunyi, 1997; Merritt, Cleghorn, Abagi & Bunyi, 1992) and Wales (Jones, 2000). With respect to the U.S. context, Olivares (1996) recommends that students learning in a second language be allowed to perform in either language. Of course, exactly when and why a teacher should code-switch is not a straight forward choice, and Adler (2001) refers to it as a dilemma that involves finding the balance between using the first language to aid understanding, and using English to provide access to a language deemed useful not only for Mathematics, but for other contexts too.

In situations were children are *necessarily* immersed in a second language, international research strongly recommend *systematic language support* for the learning of Mathematics. MacGregor (1993) suggests that the teacher finds time to focus on the actual language of Mathematics and that he or uses carefully planned activities that focus on language learning such as card games, fill-in-the-gap exercises, text reconstruction, picture dictation (that is, describing a picture) among others. Appleby (2003) describes her own classroom experiences of introducing new vocabulary to her Grade 3 ethnic minority pupils, encouraging them to identify such words in problems and then practice the words by writing out their own simple problems. Similarly, Brodie (1989) and Cuevas (1991) recommend that the teacher should plan specifically to focus on language. Gibbons (1998), when writing about a similar issue in Science education, suggests that a teacher's intentions of focusing on language should be made explicit to the students by stating 'we're going to talk like scientists' and 'your language has to be precise' or by evaluating children's responses in terms of the language used ('you explained very well'). Such comments are equally appropriate within a Mathematics classroom. Thus the teacher should not assume that the students are capable of using the language to learn the subject, nor should he or she hope that the pupils will 'pick up' the everyday and technical language as they go along. Rather, specific attention to language can help the pupils in their understanding of the subject.

According to Brodie (1989), "every situation where the need for bilingual education arises is unique, and will require its own analysis, research and solutions" (p.52) and I believe that it is important for research to be carried out locally to explore the issue in more detail. An attempt to do this was carried out by Caruana Anastasi (2003) who draws attention to code-switching patterns in English and Mathematics lessons. The author also reports a positive correlation between what she called 'exposure to English' and examination results for English and Mathematics and generally appears to argue in favour of an English immersion approach. However, I feel that the results need to be treated with caution, since it is not clear exactly what the English contributions during the lessons consisted of, and of course, a correlation does not

imply causation. There may very well be other variables that are enabling the children to do well in the exams, such as parental motivation, private tuition and so on. It is also possible that the teachers used more English *because* the children were generally perceived to be 'better' pupils.

Within the local debate, it seems to me that those who argue in favour of English immersion have at the fore the promotion of English itself, while those in favour of code-switching use Mathematical understanding as one of their main arguments. As a Mathematics educator, I believe that it is important *to keep the subject itself clearly in focus*. Assuming that we will continue to use English technical words and written texts, I believe that code-switching is here to stay for three main reasons: first, it is part-and-parcel of everyday and classroom communication; second, because I do not believe it possible to oblige people to change their language style and thirdly because many teachers believe that code-switching helps them convey meaning and understanding and may be reluctant to discard what they consider to be a useful tool. However, I think we now need to take the discussion further, by looking in more detail at the consequences of language use in the Mathematics classroom.

In this paper, I would like to continue the debate by raising some issues that are relevant to Primary Mathematics. In particular, I would like to reflect on two of the main reasons given in favour of using English as a medium of instruction, namely:

- that the 'technical' words of Mathematics tend to be retained in English, even in spoken speech.
- that word problems are written in English.

I acknowledge these facts and accept that they may be a source of some difficulty. However, I would like to problematise the assumption that the difficulties may be overcome by the exclusive use of English by drawing attention to aspects of Mathematical language that warrant attention in their own right.

English Technical Words

One argument in favour of English immersion is the fact that Mathematical technical words are retained in English. Thus examples of classroom statements might be (Maltese in **bold**):

> "Four **u** four **jagħmlu** eight." [Four **and** four **make** eight]
> "**Tfal, illum ser nitkellmu fuq** block graphs." [**Children, today we're going to speak about** block graphs]
> **"Ħarsu lejn l-i**square **li pinġejt fuq il-**whiteboard" ["**Look at the** square **I've drawn on the** whiteboard"].

Sometimes there may not be commonly known Maltese equivalents as in the case of *quadrilateral* and *axis (*dictionary translations of these words do in fact exist, but these are unknown to most people). In the case of other words, such as *odd* and *even*, the Maltese equivalents exist and may be used outside the classroom, but it is the English version that is used within the academic context. Finally, it is common practice locally – even outside the classroom – to say numbers in English, even though Maltese equivalents exist and are commonly known. Now, just as I would accept the use of the word *whiteboard* for the object attached to the wall, I can accept

the word *square* for the Mathematical object drawn on it, especially if its Maltese equivalent **kwadru** is not commonly used. Indeed, children in kindergartens are introduced to the four sided shape as a *square*, so in a sense *square* is a 'first language' word.

I would like to go beyond the realization that technical words are in English. In particular, I am interested in the role different words play, the potential usefulness of translation into Maltese and finally, the development of children's own Mathematical expression.

The Role of Mathematical Words

Hewitt (1999) suggests that Mathematical words serve as names for properties and relationships. Examples of properties are *odd* (number), *diagonal* (line) and *width* (of a table) while examples of relationships include *multiplication*, *place-value*, *percentage*. The challenge for Mathematics educators is to go beyond 'naming' and rather, focus on properties and relationships (Hewitt, *ibid*). For example, introducing young children to the word square as a name for a particular shape may appear to be a fairly simple task, but Hewitt suggests that what is really 'necessary' in mathematics learning is for children to develop an appreciation of the general concept of 'squareness'. This will allow them to distinguish shapes in terms of its properties; so, for example, even young children should be able to recognise a square when it presented to them in different orientations, rather than changing its name to a 'diamond'!

Similarly, there is more to the word *fraction* than associating it with the notation '¾'. The word *fraction* deals not only with the concepts of 3 and 4 separately, but with the relationship between them. Furthermore, while this relationship is at any one time defined in a particular situation (for example, three pencils out of a set of four) it is generalisable to other situations (three children out of a set of four, nine pencils out of a set of twelve, three slices of cake out of four, the number ¾ on the number line …). Thus, while contexts may be quite different, there exists a constant mathematical relationship between 3 and 4. As a Mathematics educator, I am more concerned with the consideration of relationships and properties underlying the names rather than by the fact that the names are in English.

Hewitt (1999) points out that words are arbitrary. For example, if a *square* had been called by some (to date non-existent) word like *'xilop'*, we would today talk about *'xilops* and *circles'* rather than *'squares* and *circles'*. However, it should be recognized that although arbitrary, there comes a time when a word is established so that within the Mathematics community, a square is called a *square* by everyone. Thus the role of Mathematical words is to enable communication with others. The established vocabulary allows pupils to participate within the culture of Mathematics by providing a common language with which to talk about Mathematical ideas.

In a class I observed, the teacher correctly pointed out the arbitrariness of the words *length* and *width* in relation to the sides of a rectangle and to *x-/y-axis*, in relation to a block graph, but went to the extreme of allowing the pupils to switch the words over at will, that is she allowed them to refer to the conventional *x-axis* as the *y-axis* and to the longer side of the desk as the *width*. This liberty goes against convention, and as

such is not desirable if effective communication is to take place within the classroom regarding the meaning of specific words.

Use of Maltese Translation

Establishing meaning of words is an essential part of teaching and learning Mathematics. Indeed, Hewitt (2001) highlights the importance of a teacher finding ways to help pupils establish links between a word and its normally accepted meaning. Some of the words used in the Mathematics classroom do in fact have commonly known Maltese equivalents. These are usually words relating to properties and relationships such as long [**twil**], more than [**iktar minn**], add [**għodd**] and so on. As explained above, such expressions may be harder to grasp than simple 'labels', and using familiar Maltese equivalents may help to convey meaning. Take the word *width,* for example. It is very possible that young Maltese children have heard and used the Maltese equivalent **wisa'** in their everyday lives. If they have, then it is unlikely that they use the word at random intervals, with no idea of its meaning. Thus, it would seem to me to be a useful pedagogic strategy to draw on this familiar word – which comes with a concept 'attached' to it already – to give meaning to the new Mathematical word *width*. This would be in line with the age-old maxims for Primary Education of 'starting from the known' and 'drawing on pupils' experiences.'

Such associations would not be possible in an English immersion situation and this have some bearing on the development of meaning of the Mathematical words. For example, as part of an on-going study I am carrying out, I observed lessons in a Grade 3 classroom where English was being used as a medium of instruction, and the teacher admitted that she was careful *not* to use Maltese in order to be in line with the new school policy for Mathematics. Two words that were used during the lessons were *longer* and *shorter* and I later asked six pupils of mixed ability to give me the Maltese equivalents for these words. They suggested **twil/qasir** [long/short], **kbir/żgħir** [big/small] and **għoli/baxx** [high/low]. Although these words may be roughly related to *longer/shorter* by virtue of the fact that they represent 'opposites' related to size, it would seem to me that linking with the exact Maltese translations - **itwal, iqsar -** would be a way of establishing more precise Mathematical meaning.

In contrast to this, I observed a teacher in another Grade 3 class, where code-switching was used (Farrugia, in press). I observed this teacher establish the meaning of the new English Mathematical word *change*, by linking it with the Maltese equivalent **bqija**. The teacher started off by organizing a role-play activity where children had to 'buy' items from a 'shop' and the 'seller' had to give change. As the role-play was carried out, a discussion took place *in Maltese* which included the Maltese equivalents for **change**, **give me back**, **has left**. The teacher stressed the Maltese word **bqija** [*change*] and asked the children to repeat it, thus drawing attention to it. Then, as the role-play continued, the teacher switched to English, asking similar questions as before but this time in English. She drew attention to the word *change* in the same way as she had done for **bqija**. Finally, some simple story sums were written on the whiteboard that included expressions such as 'What is his/her change?' and 'How much does he/she have left?' Thus, I felt that the teacher drew attention to the association between the words, working in both languages to establish the meaning of **bqija** / *change*. In this case I only interviewed two children - this particular data formed part of a pilot study – and these children were able to spontaneously associate the words *change* and **bqija**. I am aware that the many

differences between the two classroom situations (including the fact that the latter two children happened to be high achievers) means that the classes and children were in no way 'matched', but I think that the data may serve as a starting point for further reflection on the possible usefulness of using familiar Maltese translations.

Mathematical expression

Another aspect I would like to comment upon is the development and use of 'Mathematical language' in the classroom. Such language usually consists of a mix between everyday words such as *pencil*, *today, write* and so on, and the subject specific or technical words such as *circle*, *length*, *division*. Taken together, they constitute a Mathematics register. Halliday (1978, p.195) defines a register as:

> "a set of meanings that is appropriate to a particular function of language, together with the words and structures which express these meanings".

If English is used as the medium of instruction, then the register is an English one throughout; if code-switching is used, there is a tendency for the 'everyday' words to be in Maltese and the subject specific ones to be in English, resulting in a Mixed Maltese English register. Thus, the medium of instruction will influence the type of register that is developed and used in the classroom. As part of an ongoing project, I have had the opportunity to explore how Maltese speaking children express themselves in a school where the immersion strategy has been embraced by teachers, parents and children alike. I have drawn some conclusions regarding the effect of the English immersion method on the children's Mathematical expression (Farrugia, 2003).

In the two classrooms I observed - Grade 3 and Grade 6 - I identified three issues related to the use of Mathematical expression. First of all, I noted that the pupils did not use Mathematical words much, even when they were given the opportunity to talk about their work. However, by reflecting on which words were used more than others, I concluded that the lack of technical words was more of a consequence of the teacher's pedagogic style than of the English immersion method as such. This has implications for the *type* of activities that teachers organize and it would seem useful for teachers to plan activities that 'force' the children to use the Mathematical words. For example, Hewitt (2001) describes an activity where one pupil guides another to create a complex shape made up of triangles; the rules oblige the pupil to use a name of a triangle (e.g. 'isosceles') in every statement and do not allow him or her to point. So while classroom talk is a necessary condition for children to use Mathematical words, it may not be sufficient to guarantee their use. I think it is important for children to use subject specific words, since as stated by Sierpinska (1998), appropriate use of words by pupils is one way for the teacher to check understanding.

Another thing I noted in both classes was that gestures were used a lot. Although this may happen in any Mathematics classroom, I felt that the English immersion method went some way to encourage the use of gestures. I believe that the gestures may have served to replace language in general and Mathematical language in particular. This was the case for both the teacher and the pupils. For example, the Grade 3 teacher admitted to using gestures a lot in order so as not to resort to Maltese, while the Grade 6 teacher tended to accept gestural 'explanations' from the children so as not to put them under pressure in their efforts to use English. On other occasions, the teacher

helped the pupils along by 'filling in' the language. For example if a pupil gave a short answer perhaps accompanied by gestures to help her, the teacher would start by stating "Angelica is saying that …" and go on to give a more detailed elaboration of what she assumed the pupil Angelica meant to say. While this strategy helped the lesson flow, I felt that the teacher was doing the talking for the pupils and hence opportunities for them to talk Mathematically were reduced. It is important for children to have such opportunities since according to Pimm (1991, p.18):

> "Part of learning mathematics is gaining control over the mathematics register so as to be able to talk like, and more subtly to mean like, a mathematician".

Finally I noted that at times, the pupils used rather awkward Mathematical language such as 'I did them plus' which the teacher accepted, even though she was aware that it was not correct expression. I concluded that this was certainly a result of the English immersion situation which was obliging pupils to use English to express themselves.

Thus, if we are to promote English immersion we need to take into consideration the consequences for children's Mathematical talk. Should we accept incorrect expression so as not to discourage children? If not, we would need to find ways of encouraging correct Mathematical language, possibly by periodically focusing on it and drawing children's attention to correct usage. If on the other hand, we choose to retain code-switching practices, it would be interesting to describe the register in more detail and reflect on what is acceptable for a Mixed register. For example, the statement "I did them plus" is clearly incorrect. What about the Maltese version "**għamilthom** plus" which the child has obviously translated literally? I suspect that "**għamilthom** plus" would not jar so much in the code-switching classroom. If we were to discover other similar instances, we might find that we need to reflect on what 'sounds' right in the 'two' languages (English / mixed code) and therefore ask ourselves what constitutes a correct register in the respective languages. An interesting discussion indeed for both Mathematics educators and linguists!

Word Problems

One of the main reasons suggested in favour of an English immersion approach is based on the assumption that 'pupils do not understand story sums because they are in English'. However, word problems are challenging in themselves, whatever language they are presented in. In this section, I will outline these difficulties and look more specifically at the type of words found in problems.

General Difficulties

Word problems have been found to be universally difficult, as they involve translating a short story or situation into a Mathematical activity. Writing with regard to first language speakers, Ferguson and Fairburn (1985) suggest that aspects that hamper this task include unfamiliar vocabulary and the general writing style which differs from ordinary prose and lacks cues that may aid understanding. Another point of difficulty may be the irrelevancy of the situation described in the problem. Indeed, Boaler (1993) draws our attention to problems that may seem like 'real-life' situations at first glance, but are actually realistic only for an adult and not for a child. For

example, I recently observed a class struggling to solve a problem regarding plots for housing. In this case, the pupils had no difficulty with reading and understanding the actual words of the word problem. However, drawing a suitable sketch and working through the various steps of the problem was a challenge indeed and included visualizing the division of a large area into plots for houses with two larger corner plots on the end. I suspect that part of the difficulty that the pupils had in solving this problem was a result of the fact that pupils this age have limited or no experience of such situations. I might also add here that the situation presented was far from realistic (even for an adult), given that the original length of the plot was 2.5 kilometres long, resulting in an uninterrupted terrace of 312 houses!

Ideally, pupils should be presented with a variety of problems. The most common types are what Fairclough (2001) refers to as 'standard' ones such as the following:

> "A packet of coloured pencils contains 10 pencils. How many pencils are there in 5 packets?"

However, tackling more complex problems offers further opportunities to develop problems solving skills. For example in order to solve the problem presented below, a pupil might choose to use a sketch or a trial and error strategy.

> "There are some rabbits and some rabbit hutches. If 7 rabbits are put in each rabbit hutch, one rabbit is left over. If nine rabbits are put in each rabbit hutch, one hutch is left empty. Can you find how man rabbit hutches and how many rabbits there are?"(Burton, 1984, p.84).

Ideally, as Burton (*ibid*) suggests, problem solving should provide pupils with opportunities to enter into a 'spirit of enquiry' characterized by questioning and challenges. Children may not figure out solutions as easily as we might hope, but need to be guided to develop strategies for problem solving. For example, O'Connell (2000) suggests a five step method for problem solving: understanding the problem, choosing a plan, trying the plan, checking the answer and reflecting on what has been done. She also suggests ten hints for getting 'unstuck' when in difficulty. These include restating the problem in other words, using a manipulative and trying a different strategy. Thus, learning how to solve problems involves first-hand experience of a variety of tasks and discussion of the strategies involved.

Learning to solve word problems is in itself no mean task and requires a lot of effort on the part of both teacher and pupils, irrespective on the language used. If we believe that the difficulty lies only in the fact that the problems are written in English, then we may be closing our eyes to the complexity of learning how to solve word problems. By choosing to teach in English 'so that the children will then understand the word problems, we may be giving ourselves a false sense of security; it is 'false' because we fail to tackle the underlying challenge of problem solving.

In recent conversations I held with Grade 6 children, the pupils tended to agree that although they sometimes came across words they did not understand in a story sum, this was not the main reason why they found such tasks difficult. Even if they *did* understand each word, it was the figuring out of the solution that was challenging.

They suggested that even if the problem had is presented in Maltese, they might still face difficulty in solving it.

In the following excerpt I am talking to two ten-year-old, Maltese speaking girls, Federica and Joanne. This was the first year that their school was trying out the English immersion approach for Mathematics. Some of the interview, including this excerpt, was held in English:

I:	When the problems are written in English, do they trouble you in any way?
Joanne:	Not always, but sometimes I find the problems difficult.
I:	And what do you find difficult about them?
Federica:	How to work them out.
I:	To read them or to work them out?
Fed / Jo:	To work them out.
I:	So you would actually understand what they're saying?
Fed / Jo:	Yes.
I:	If I were to translate them into Maltese, what would you feel about that?
Federica:	I will understand them, but how to work it … I think it still will be a problem.

Such an opinion was voiced by other pupils too in separate interviews suggesting that at times, it may not be the English itself that causes difficulty, but the 'figuring' out of the problem.

The Language of Word Problems

Of course, I cannot deny that competency in the language English would help children to read and understand the words found in problems. I think that it is reasonable to assume that a better level of English would help in this regard. One assumption of the English immersion approach may be that using English throughout the Mathematics lessons helps to prepare children better for the English words found in the problems. However, I am not convinced that this is as effective as one might suppose, especially if we consider the 'everyday' words that crop up in word problems. Consider the following word problem:

> "A group of workers worked in the Sliema Garden. They paved 300m every day. What is the distance they paved after 7 days?"

I presented this problem to some Grade 6 pupils a day before I expected the teacher to present a similar one in class. Some of the pupils I interviewed were not familiar with the word *pave* and asked me what it meant. The word *pave* therefore is an example of a word that pupils might not understand. Yet, even though all their Mathematics

lessons were being conducted in English, the word *pave never cropped up* in the 24 hours that I observed. In fact, the word *pave* only appeared in the context of this particular problem when the teacher presented it to the class the following day. The same could be said about other unfamiliar words such as *storey* and [swimming] *stroke*.

I suspect that whatever the language of instruction, such words end up being explained *ad hoc* as they crop up in word problems. The point here is that it is impossible to anticipate every new everyday word that might crop up in a story sum, whatever the child's first language (an English speaker might not have know the meaning of *pave*, *storey* or *stroke*, although this would be less likely). I conjecture that the children's general background of English – say, exposure to English outside school, reading habits, school programmes *related directly to the teaching and learning of English* – play a more decisive role in providing opportunities for children to become familiar with everyday words like these.

On the other hand, word problems may include 'Mathematical' expressions such as 'how many more', 'longer than', 'difference between', 'increased by' and so on. Various writers, including Aiken (1977), Rothman and Cohen (1989), Cuevas (1991), Miller (1993) and Rowland (1995) have emphasized the importance of giving attention to Mathematical vocabulary and expressions in their own right. Whatever language the teacher is using, he or she would need to spend time on what these mathematical expressions mean, through several examples of their use and by encouraging the children to use them to formulate their own statements and questions. Using English as a medium of instruction does not render understanding of such expressions automatic. Furthermore, I believe that if the use of Maltese is 'permissible' then the teacher has more linguistic resources at his or her fingertips to convey the meaning of such expressions.

Conclusion

Over the years we have come to use a spoken Mixed Mathematics register that is generally accepted in classrooms; I believe that within the Maltese context, English written Mathematics is here to stay. However, it is not practical to hope that teachers in general will take on board the English immersion suggestion, for a variety of reasons. Given this situation, I think that we should start by accepting that Mathematics in our classrooms is brought into existence through two different registers or modes of communication: one is a spoken Mixed Maltese English code, while the other is an English written code. The next step is to find effective ways to link the two. There can be no hard and fast rules here, and different teachers may find different ways of achieving this.

I think the discussion regarding the use of English needs to take into consideration *Mathematical* language. There remains a lot to be reflected on in this regard including teachers' and pupils' awareness of different 'types' of words, the possible use of translation, the creation of opportunities for pupils to use Mathematical language appropriately during class discussions (that is, developing a Mathematics register), the complexity of the Mathematical language involved in word problems and the explicit focusing on Mathematical words and expressions, both in their spoken and written

form. One thing is certain: as we reflect on the medium of instruction for Mathematics, *it is important to keep the subject itself clearly in focus*.
The debate continues.

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