

Pupils' Language Preference and Its Related Reasons and Problems in Learning Primary School Mathematics

Kor Liew Kee

Universiti Teknologi MARA, Malaysia

Lim Chap Sam

Universiti Sains Malaysia, Malaysia

Chew Cheng Meng

Universiti Sains Malaysia, Malaysia

Tan Kok Eng,

Universiti Sains Malaysia, Malaysia

Abstract: Abstract: 978 primary school pupils aged 11 years old from six National schools (NS) and six Chinese vernacular schools (CS) participated in a study that investigated pupils' language preference in multilingual mathematics classrooms. Data were collected using questionnaires and measured in percentage scores. The significant differences were verified using chi-square tests. Results showed that the majority of NS pupils preferred to use English to do mathematics and opted for either Malay or Bilingual (Malay and English) in teaching, questioning, and discussing. The CS pupils preferred mainly Mandarin at all times. The resulting reasons were found to associate with cognitive, affective and psycho-social elements while problems faced by pupils were mainly English language problems, mathematics problems, personal and teacher factor.

Key words: Mathematics discourse; Primary school mathematics; Multilingual classroom; Pupils' language preference; Language of instruction.

Introduction

Teaching Mathematics and Science in English or better known as PPSMI (a Malay abbreviation) was implemented in 2003 in all Malaysian primary schools. There are two streams of primary schools in Malaysia, the national schools and the vernacular schools. The national schools use Malay (the national language) as the language of instruction, while the Chinese and the Tamil vernacular schools use Mandarin and Tamil respectively as the medium of instruction. In the past

mathematics in these primary schools was taught in Malay, Mandarin and Tamil separately. The switch to teaching mathematics in English, a second or third language to most Malaysian primary school pupils was controversial and had caused a lot of debates. In July 8, 2009, the Malaysian government has decided to abolish PPSMI, and gradually revert back to teaching primary mathematics in either Malay language or in pupils' mother tongue by year 2012. Again, controversial debates and arguments continue with the new proposal. Some parents appeal not to revert back to national language especially in the secondary school. It looks like the same arguments given by those who were against PPSMI were put forward by those who are against the abolishment of PPSMI. This language issue remains hot and controversial.

As anticipated PPSMI policy had apprehended most Malaysians as English language is not the first language, but second or third language to the majority of students and teachers. After five years of implementation, Lim, Fatimah and Tang (2007) set out to survey quantitatively the perspectives of PPSMI policy from the views of 443 mathematics and science teachers, and 787 primary Year 5 pupils from 20 schools in three northern states of Peninsular Malaysia. They found that only 11% of the mathematics teachers explained mathematical concepts entirely in English and 51% of the mathematics teachers used other languages (such as Mandarin, Malay or dialects) in more than half of the mathematics teaching time. They also disclosed that such phenomenon occurred more often among the Chinese primary than the national primary school teachers and more often in rural schools than urban schools. On the pupils' views, they found that 74% of national schools pupils preferred to learn mathematics and science in English while only 43% of the pupils from the Chinese vernacular schools agreed. The pupils from the Chinese schools were also found to be more confident and positive toward learning mathematics and science in Mandarin. Nevertheless, all pupils agreed that the use of English could bring them brighter future.

Without doubt, the PPSMI language policy has received constant critiques from parents and educators of whether it actually improves both the pupils' English language competency and mathematics achievement, or whether it has burden the mathematics learning of the majority of the pupils whose first language is not English. However, we heard very little about the present pupils' voices about the language policy. Hence, this paper set to examine the primary school pupils'

language preference in learning mathematics and their reasons and problems behind these preferences.

Reviews on Language Preferences and Language Practices

Research in bilingual and multilingual mathematics classrooms (Alder, 1998, 2001; Setati, 1998; Setati & Alder, 2001; Moschkovich, 2002, 2005) has ardently studied how bilingual or multilingual teachers and students communicate mathematical ideas during mathematics lessons. Review of literatures shows that there are two major theoretical perspectives that evaluate language practices. The psycholinguistic examines language use in experimental settings and opines language is cognitively based while the sociolinguistic examines language use in a natural setting and views language acquisition as cognitive, cultural, social, and situated.

The practice of alternating between two or more languages or code-switching during mathematics discourses has raised interests such as is there a preferred language of instruction among the speakers and what are the reasons behind this language choice. Delving into the mathematics discourse of the secondary school students in a multilingual classrooms, Moschkovich (2005, p.122) noted that “bilingualism is an individual, social, cultural, historical and political phenomenon.” She pointed out that bilingual students’ choice of language in mathematics classrooms is specific and situated. She observed that the relationship between students’ choice of language is dependent on the purpose, the place, the topic, the participant and the social relations among them. These phenomena entail situation relating to whom the student is addressing (bilingual or monolingual), private or public setting, what mathematical topics are been discussed (algebra, geometry, etc.) and whether it involves oral or written mode, and what social roles participants play (is the speaker addressing a teacher, peers, elders, or children). She added that students’ experiences with mathematics instruction can also influence their choice of language used. For example, if students have not been exposed to a particular mathematics topic taught in their first language, then it is reasonable for them to talk about that topic in their second language.

The importance of the political role of language in relation to language practices was separately emphasized by several other researchers (Gee, 1999, Setati, 1998, Zentella, 1997). Based on her work on the mathematics teachers teaching in multilingual classrooms in South Africa, Setati (2005) found that political role, pedagogy and cognitive facet are aspects that one will consider when making

decisions regarding which language to use, how to use it, and for what purpose. She claimed that language is a political tool which is exhibited when “a teacher enacts multiple identities in and through language in different social situations” (p.451).

Although preference for a language is not analogous to code-switching, it shares some similarities in the reasons why it is favoured. For instance, considering Baker’s (1993, cited in Setati, 2002, p.14) perceived eight reasons on why code-switching was used, two of the given reasons “for ease and efficiency of expression” and “to express group identity and status or to be accepted by a group” were likely reasons directed to an individual’s choice of language. Adding to the above reasons, Merritt, Cleghorn, Abagi and Bunyi’s (1992) ethnographic observation of three Kenya primary schools revealed that there were four basic determinants of teachers’ language choice and code-switching: (1) official school policy, (2) cognitive concerns, (3) classroom management concerns, and (4) values and attitudes about the appropriate use of multilingualism in society at large.

Theoretical Framework

In this study, we adopt the socio-historical approach of Vygotsky as our theoretical framework. Vygotsky (1978) contended that language is not only a tool of communication but a tool for reflection and thinking. Hence, competency in the language of communication and thought are prerequisites for effective engagement in the teaching and learning process. Language inevitably functions as a mediator that transmits mathematical knowledge, values and beliefs between teacher and students in a mathematics classroom. Meanwhile, we also adhere to the perspective of sociolinguistics and embrace the interactionist approach of Bruner (Sierphinska, 1998) that language is “a social practice - a discourse. It is language-in-action, or language as a mean for accomplishing cognitive, social, and other ends” (p.51). The multilingual mathematics classroom provides a social practice for primary school pupils to accomplish cognitive, affective and social discourse.

Research Questions

This paper was part of a larger research project that focused on communication in primary school mathematics classrooms in 12 primary schools. It sought to answer the following research questions:

1. In a multilingual primary school classroom, what language of instruction in mathematics do pupils prefer?
2. Were there any significant differences in pupils' language preference in learning primary school mathematics between
 - (a) pupils from the National and the Chinese vernacular primary schools?
 - (b) pupils from Penang and Kelantan states based on (a)?
3. What were the reasons for pupils' language preference in learning primary school mathematics?
4. What were the problems faced by primary pupils in learning mathematics in English?
5. Was there any significant difference in the problems faced in learning mathematics in English between pupils from the National and Chinese vernacular primary schools?

Method

Sample

A total of 978 primary five pupils aged 11 years old participated in this study. The data was collected from 12 primary schools, six each from the National primary schools (NS) and the Chinese vernacular primary schools (CS). The majority of the pupils in the NS primary schools were Malays while the CS primary schools pupils were mainly Chinese. The 12 schools were distributed across two states: Penang and Kelantan in the northern peninsular of Malaysia. Penang is situated at the north-western coast of the peninsular with a population of 1.5 million. It is a developed industrialized and urbanized state. The population composition of Penang is made up of 41.8% Chinese, 40.5% Malays and 10.4% Indians. The languages commonly spoken in Penang are English, Malay, Penang Hokkien dialect, Mandarin, and Tamil. Kelantan is an agricultural state located at the east coast of the peninsular and is economically less developed than Penang. Kelantan has a population of 1.3 million that is made up of 95% Malays, 1.5% Chinese and

1% Indians. Kelantanese (a Malay Dialect) is the lingua franca of the state that is commonly used in daily communication.

The community in Penang and Kelantan is basically multilingual. In Penang, most of the pupils in the NS primary schools converse in Malay and speak English only during the English lessons. The majority of pupils from the CS primary schools communicate in Mandarin. English and Malay are rarely spoken outside English and Malay subject classes. Chinese Hokkien dialect is used occasionally by some pupils during informal conversation. Whereas in Kelantan, the NS primary schools pupils speak Malay and Kelantanese substantially while the CS pupils speak mainly Mandarin and some Kelantanese in schools. In both types of schools, English is rarely spoken outside the English classes. Table 1 displays the demographic details of the sample.

Table 1
Demographic information of the sample

	Types of schools	Penang	Kelantan
No. of schools	National (NS)	2	4
	Chinese vernacular (CS)	2	4
	Total	4	8
No. of participants	National (NS)	217	230
	Chinese vernacular (CS)	243	288
	Total	460	518

Instrument

Questionnaire used in this study consisted of three parts. Part A entailed the demographic information of the participants. Part B had four items inquiring pupils' language preference in the teaching and learning of mathematics. It required the participants to choose one of the five categories of choices offered: English, Malay, Mandarin, Bilingual (English and Malay, English and Mandarin or Malay and Mandarin), and a mixed of English, Malay or Mandarin respectively with the local dialect. Part C consisted of four open-ended questions requiring participants to give one reason respectively to their choice of category in Part B.

Pupils' preferred languages in Part B and Part C were investigated under four contexts of study:

- i) The language used by the teacher when teaching mathematics.
- ii) The language used by pupils when asking teacher questions.
- iii) The language used by pupil when discussing with each others.
- iv) The language used by pupil when learning and doing mathematics.

The last open-ended question asked pupils to list all the problems faced by them in learning mathematics in English.

Pilot test were carried out in a vernacular school to check for clarity and consistency of the items. No internal reliability test was conducted as the items in the questionnaires were measured in nominal scale.

Data Analysis

This study collected both quantitative and qualitative data. Quantitative data in Part B were analyzed using frequency counts whereas the qualitative data from the open-ended questions in Part C was categorized and analyzed quantitatively. Chi-square tests were used to check the statistical differences about language preference and the corresponding reasons and problems among different types of schools.

Findings and Discussion

In this study, the results generated were described in percentage count in relation to the four contexts of study (*teaching, questioning, discussing and learning*) and within each context comparison was made between the two types of schools (NS and CS) as well as between the two different states (Penang and Kelantan).

Pupils' language preference in learning primary school mathematics

Between NS and CS. A percentage count was carried out on a total of 447 NS and 531 CS pupils. Figure 1 presents the percentage breakdown in graphical form the

percentage breakdown according to the four learning contexts, types of school (NS/CS) as well as the preferred language.

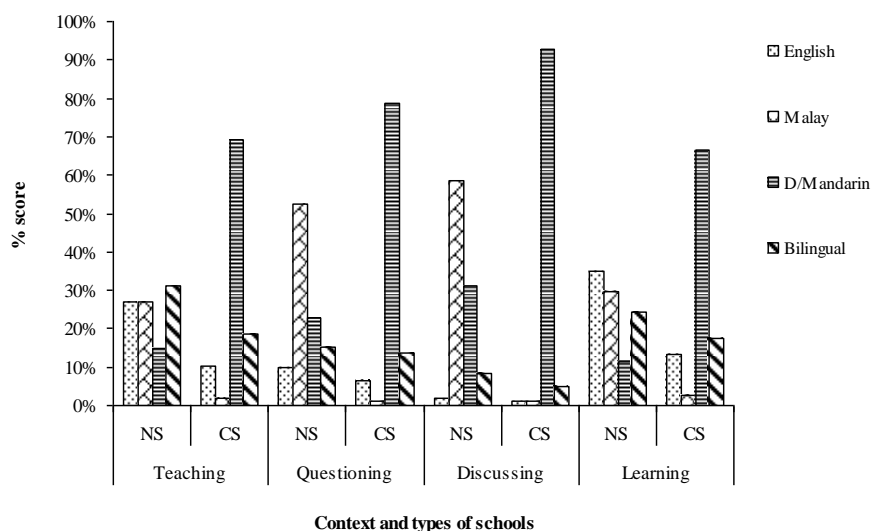


Figure 1. NS and CS pupils' preferred language in % score

Figure 1 shows that pupils from the National type schools (NS) preferred their teacher to use bilingual (Malay and English) to teach mathematics (31.2%), they preferred to use Malay when asking teacher questions (52.3%) and when discussing with friends (58.6%). They were found to prefer to learn and do mathematics in English (34.9%).

Pupils from the Chinese vernacular schools (CS) preferred their teacher to teach mathematics in Mandarin (69.1%), they preferred to use Mandarin when asking teacher questions (78.7%) and when discussing with friends (92.9%). They also preferred to learn and do mathematics in Mandarin (66.4%). In short, pupils in CS collectively preferred Mandarin than any other languages in the process of learning primary school mathematics.

Between Penang and Kelantan. A percentage count was performed on 460 pupils from Penang and 518 pupils from Kelantan. Figure 2 illustrates the charts of the

breakdown of the percentage breakdown according to context and states for a total of 447 NS pupils ($n_{\text{Penang}} = 217$; $n_{\text{Kelantan}} = 230$). The “Dialect mixed” category refers to a mixed of Malay and English with Kelantanese dialect.

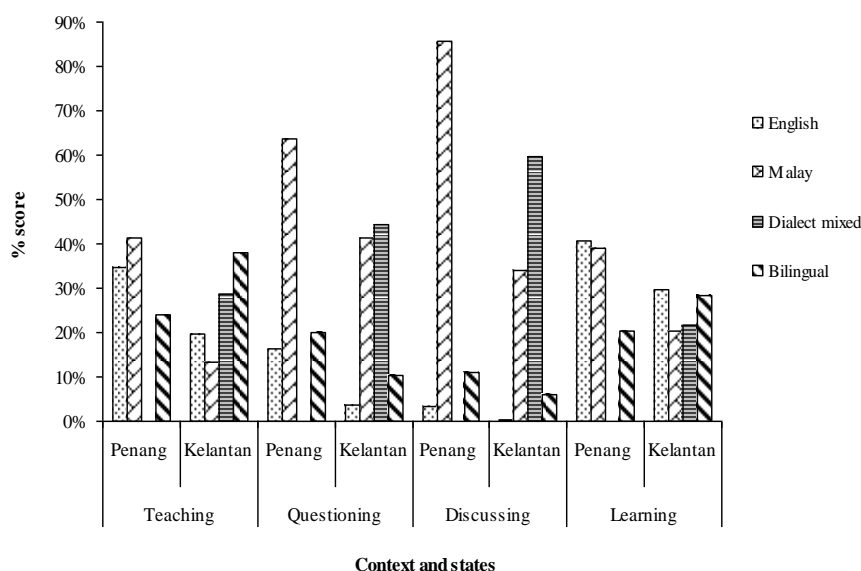


Figure 2. NS pupils’ preferred language(s) between Penang and Kelantan

Based on Figure 2 above, it was observed that NS pupils in Penang preferred their teacher to teach in Malay (41.2%) whereas pupils in Kelantan preferred their teacher to teach using bilingual (38%). Another distinctive difference is NS pupils in Penang preferred to use Malay when asking teacher questions (63.7 %) and when discussing with each other (85.7 %). However, NS pupils from Kelantan preferred to use Kelantan dialect in questioning (44.5 %) and during discussion (59.6%). Nonetheless, the similarity observed was NS pupils from both states preferred to learn and do mathematics in English.

Table 2 below displays the percentage breakdown according to context and states for 531 CS pupils ($n_{\text{Penang}} = 243$; $n_{\text{Kelantan}} = 288$).

Table 2
CS pupils' preferred language between Penang and Kelantan

Context Preferred Language	<i>Teaching</i>		<i>Questioning</i>		<i>Discussing</i>		<i>Learning</i>	
	Penang	Kelantan	Penang	Kelantan	Penang	Kelantan	Penang	Kelantan
English	14.5%	6.6%	7.8%	5%	1.7%	0.4%	19.2%	8.1%
Malay	1.2%	2.2%	1.2%	1.4%	0.4%	2%	1.7%	3.7%
*D/Mandarin	65.6%	72.2%	77.8%	79.4%	91.9%	93.9%	61.7%	70.6%
Bilingual	18.7%	18.7%	13.2%	14.1%	6%	3.6%	17.5%	17.6%

*D = Kelantanese Dialect for NS only; Mandarin for all CS.

It is obvious that the majority of CS pupils both from Penang and Kelantan preferred Mandarin (> 60% overall) as the medium of instruction in mathematics in *teaching, questioning, discussing* and *learning* the subject.

Differences in pupils' language preference between schools and states

Besides the actual percentage count, this study also aimed to determine whether language preference depended on the types of schools or states. Chi-square tests were conducted to find out if there are any significant differences in pupils' language preference between NS and CS schools as well as between the states (Penang and Kelantan). Results obtained showed that the differences observed under the four learning contexts were significant at $p < .0005$ between schools and states except for the context of "discussing" in the CS group.

Table 3
Pupils' preferred language(s) between schools and states

(a) Between NS and CS				
Context	N	χ^2	df	p-value
<i>Teaching</i>	959	545.25	4	.000**
<i>Questioning</i>	969	726.62	3	.000**
<i>Discussing</i>	921	828.32	3	.000**
<i>Learning</i>	953	515.00	3	.000**

(b) Between Penang and Kelantan (NS and CS respectively)

Context	School	N	χ^2	df	p-value
<i>Teaching</i>	NS	457	252.83	3	.000**
	CS	502	296.33	4	.000**
<i>Questioning</i>	NS	458	323.11	3	.000**
	CS	511	414.24	4	.000**
<i>Discussing</i>	NS	444	394.89	3	.000**
	CS	477	434.24 ^a	4	.000** ^a
<i>Learning</i>	NS	451	229.96	3	.000**
	CS	502	290.61	4	.000**

significant at $p < .0005$; ^a 2 cells (20%) with < 5 expected count.*Reasons for pupils' preferred language***

The four open-ended questions in Part C received a variety of responses. Data were initially categorized according to the common key words appeared in the written responses. The process of identifying the key words was conducted repeatedly on all responses until all categories were mutually exclusive and exhaustive. Subsequently, all the identified categories were grouped into three clusters namely: *cognitive*, *affective* and *psycho-social*.

(1) Cognitive

Cognitive cluster accommodates reasons that associate with language competency. Words such as “faham” (understand), “*fasih*” (会, fluent), “mudah” (easy), etc. were extracted from the verbatim. The key words were sought repeatedly until the data were exhausted and subsequently placed under the *cognitive* cluster. For example,

- Saya *fasih* dalam bahasa Melayu [I am *fluent* in Malay language].
- Mudah untuk bercakap [Easy to speak].
- 我比较懂英语数学 [I can understand mathematics better in English].
- 我会了解 [I can comprehend].

(2) Affective

Affective cluster focuses on participants' feelings and emotion, desirability, and intrinsic motivation towards the preferred language. It includes reasons that carried words such as "suka" (enjoy), "minat" or "gemar"(like or interested), "ingin", 想 (desire, want), etc. For example,

- Saya *ingin* belajar dalam bahasa inggeris [I would *like* to learn in English].
- 我想学讲英语 [I *want* to learn to speak English].
- 我对英语很有兴趣 [I *like* English].

(3) Psycho-social

The psycho-social cluster focuses on the utilitarian purpose of the language which emphasizes on personal gains and benefits as well as the social importance of the language. For example,

- Saya ingin belajar di luar negara nanti saya dewasa [I hope to study overseas when I grow up].
- Saya ingin menjadi pakar bahasa pada masa akan datang [I want to be a language expert in the future].
- 如果到了大学就会用英语来对老师说话 [In the university, you speak to your lecturer in English].

Psycho-social cluster also includes reasons related to cultural background and languages practice in a society. For example,

- Itu bahasa saya [That is my lingo].
- Kami biasa bercakap Kelantan [We are used to speaking in Kelantanese dialect].
- 这是我们的交流语言 [It's the language we communicate].

Figure 3 below displays the distribution pattern of *cognitive*, *affective* and *psycho-social* reasons given by both NS and CS pupils. In addition, the average percentage scores calculated across the four contexts of study showed that NS pupils ranked *cognitive* the highest (70%), *affective* (19.4%) and *psycho-social* (10.6%). However, a different trend was observed in CS schools. The average percentage scores given by the CS pupils across the four contexts of study showed

the highest was *cognitive* (67.8%), *psycho-social* (16.2%) and the lowest was *affective* (15.3%).

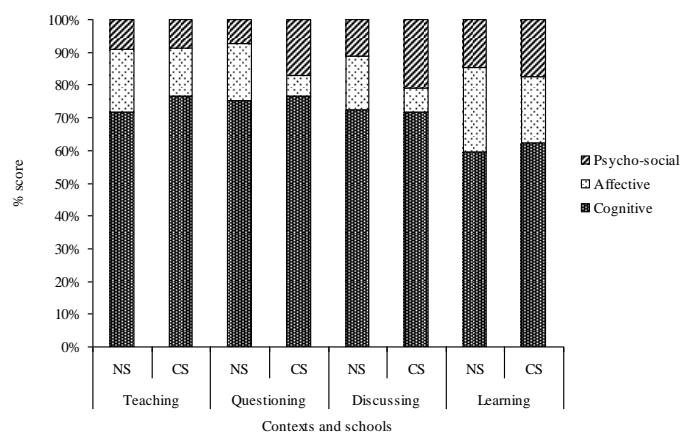


Figure 3. Distribution of reasons for pupils' preferred language between NS and CS schools

Problems faced by primary pupils in learning mathematics in English

Further analysis of the data showed that the problems faced by primary pupils in learning mathematics in English can be divided into four main categories:

(1) English language problems

This category consists of problems in understanding English language, not fluent or weak in the language, for example:

- saya tidak faham maksud bahasa Inggeris [I don't understand the meaning in English]
- 有时英文词汇会比较难，不懂什么意思 [sometimes the English vocabulary is more difficult, don't know the meaning].

(2) Mathematics problems

This category includes problems in understanding basic mathematical operations, questions or word problems, for example:

- saya tidak faham dalam bahasa matematik [I don't understand mathematics language].

- 有时数学的题目很复杂的 [sometimes the mathematics problems are very complicated]

(3) Pupil personal problems

This category comprises problems related to pupil personal factor, for example:

- kerana saya malu untuk bertanyakan guru [because I was shy to ask my teacher].
- 有时候我不知道怎么做，也不知道那里不明白[sometimes I don't know how to do and which area I don't understand].

(4) Teacher problems

This category consists of problems related to teacher factor, for example:

- sebab cikgu saya cakap bahasa Inggeris [because my teacher spoke in English].
- 有时老师讲的英文太深，听不懂 [sometimes the English used by my teacher is too difficult, I can't comprehend].

Differences in the problems faced by primary pupils in learning mathematics in English in NS and CS schools

Table 4 shows that in general the majority of the primary pupils listed the problems faced by them in learning mathematics in English as 'English language problems' both in NS (65.2%) and CS (72.8%). However, significantly higher percentage of NS pupils listed the problems faced by them in learning mathematics in English as 'mathematics problems' (30.0%) than their counterparts in CS (17.2%). 'Teacher problems' and 'pupil personal problems' were less than 10% in both types of schools.

The results of the chi-square test [$\chi^2 (3) = 25.12, p < .05$] indicated that difference in the problems faced by primary pupils in learning mathematics in English between NS and CS was significant.

Table 4

Results of chi-square test for significant difference in the problems faced by NS and CS pupils

Problem School	English language problems	Mathematics problems	Pupil personal problems	Teacher problems	Chi- square	df	p-value
NS	163 (65.2%)	75 (30.0%)	9 (3.6%)	3 (1.2%)	25.12	3	.00*
CS	423 (72.8%)	100 (17.2%)	20 (3.4%)	38 (6.5%)			

*significant at 0.05

Implications and Conclusion

The findings in this paper indicated that there are significant differences between NS and CS pupils' language preference in learning primary school mathematics. In the context of teaching, most NS pupils preferred Malay and bilingual while the CS pupils preferred mainly Mandarin. Pupils tended to use their mother tongue or their daily communicating language (e.g. Kelantanese or Hokkien) when engaging in questioning and peer discussion. This phenomenon supported Baker's (1993, cited in Setati, 2002) reasons on ease of expression and group identity. For learning and doing mathematics, the result obtained was similar to findings of Lim, Saleh and Tang (2007) that NS pupils from Penang and Kelantan preferred to learn and do mathematics in English. This finding is controversial to the public assumption that NS pupils would prefer to use Malay in doing mathematics. However, the CS pupils from both states preferred to use of Mandarin at all times. Seemingly, pupils in Penang and Kelantan observed similar trend in the language preference as the as their counterpart in the NS and CS schools.

On the related reasons for the language choice, it was found that most pupils preferred a language that brings cognitive benefits, for instance, a language that can help them to understand the subject matter better. Fluency in the language was another common reason given by most of the pupils. These reasons are similar to those identified earlier by Merritt, et al. (1992) and Setati (2005) that "cognitive" concerns prevail when making decisions regarding which language to use. Worthy of note are some pupils preferred a language because they like the language and want to learn to excel in it. Some chose the language because it was their lingua

franca and it allowed them to express their ideas easily. These reasons are believed to correspond to the notion that language is socially and culturally situated (Moschkovich, 2005; Sierphinska, 1998; Vygotsky, 1978). Other notable reports were some pupils chose to practice a specific language because it was officially used in the school and public exams. Such reason complies with the claim that politics or social good influences the language choice (Setati, 1998; Zentella, 1997). In addition, results of this study also disclosed that most pupils from the Chinese vernacular schools (CS) were found to associate language preference with utilitarian purpose which was related to education advancement. Besides accomplishing cognitive and social elements, this study contended that language choice among children is associated with the affective elements (e.g. enjoy, desire, like, etc.) as well.

Meanwhile, the observed trends showing that NS pupils prefer Malay and CS prefer Mandarin in the learning of primary schools mathematics were likely to attribute to major problems categorized as “English language problems” and “mathematics problems” which are cognitive in nature. Other reasons for the language preference may be related to the affective and psycho-social elements which are linked to pupil personal problems and teacher factors.

The findings on pupils’ language preference in primary school mathematics reported in this paper have added some knowledge in the area of language practice. It is our hope that it will contribute new information to the PPSMI policy which was carried out in 2003 before the Cabinet’s announcement of the reverting back to teaching of mathematics and science in the national language in July, 2009. Some may argue that the data we collected might have been out-of-date and therefore of less significance since the PPSMI policy will be abolished completely in 2012. However, we maintain that data taken from the pupils, representing perspectives straight from the horse’s mouth remain important and useful implication for decision of policy makers for future curriculum reform. Future researchers are recommended to include factors such as pupils’ socio-economic background, parents’ education, parents’ occupation, language(s) use at home and teacher’s ethnicity and language proficiency to gain more insight into the reasons for pupils’ language preferences.

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Author:

Kor Liew Kee [CORRESPONDING AUTHOR], Department of Computer &
Mathematical Sciences, Universiti Teknologi MARA, Malaysia;
korlk564@kedah.uitm.edu.my

Lim Chap Sam, School of Educational Studies, Universiti Sains Malaysia;
cslim@usm.my

Chew Cheng Meng, School of Educational Studies, Universiti Sains Malaysia;
cmchew@usm.my

Tan Kok Eng, School of Educational Studies, Universiti Sains Malaysia;
ketan@usm.my