



UNIVERSITI PUTRA MALAYSIA

**ROLE OF CODESWITCHING IN THE TALK OF PRIMARY SCHOOL
MATHEMATICS AND SCIENCE TEACHERS**

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By

RAZIMI ZAKARIA

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirement for the Degree of Masters of Science**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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Faculty : Educational Studies

The of teaching Mathematics and Science in English or *Pengajaran dan Pembelajaran Matematik dan Sains dalam Bahasa Inggeris (PPSMI)* at the primary school levels in Malaysia was implemented in 2003. However, the lack of adequate proficiency in the language among the teachers of these subject areas became a central issue in the implementation. Questions were raised on how teachers and students coped with teaching and learning the subjects in English, strategies employed by Mathematics and Science teachers to deliver the lessons in English and the role of first language in the teaching of Mathematics and Science in Malaysian classrooms.

The purpose of the study was to explore the role of codeswitching in the talk of Mathematics and Science primary school teachers. This research was undertaken to investigate the categories of teacher talk where codeswitching occurred, the functions of codeswitching in these categories and teachers' perceptions on the use of their first language when teaching Mathematics and Science.



Qualitative inquiry was selected as the methodology for this study as it was deemed the most appropriate for exploring the role of codeswitching in the talk of Mathematics and Science primary school teachers. Data were generated and gathered through interviews with five teachers from three government schools in Kelantan. The participants were selected based on purposive sampling. The data collection methods to achieve the purpose of this study were in-depth interview and non-participant observation. The classroom observations and interviews were video-taped using a camera recorder, transcribed verbatim and analysed manually.

Emerging themes from the classroom data were used to develop the Table of Codeswitching Categories to facilitate analysis of codeswitching in teacher talk. Teacher utterances were transcribed, coded and tally counts were made to generate frequency distributions of talk types. The distributions were later compared with the frequencies of codeswitching that occurred in the respective categories. The quantitative analyses demonstrated the categories of teacher talk in which they were inclined to codeswitch when teaching Mathematics or Science. Qualitative analyses were obtained from forms of descriptive narrations to illustrate the functions of codeswitching in the talk of *PPSMI* teachers. Data from teacher interviews were transcribed and the themes that developed during the analysis were highlighted. Input from the interviews provided information on the teachers' background and their choice to codeswitch when teaching Mathematics or Science to their students.

The findings revealed that teacher talk dominated the interaction climate in the classrooms and codeswitching was a coping strategy in the Mathematics and Science teacher's talk to



deliver the subject content. It was found that the teachers frequently codeswitched to their first language when giving explanations, mainly for the purpose of explaining meanings of English words or phrases and clarifying lesson content. Lesson difficulty and types of classroom activities were found to influence the amount of codeswitching in teacher talk. Less codeswitching occurred in the classrooms if the lesson content was simple and learning comprised more repetition activities. Questioning was done mainly for the purpose of asking for translation of English words or phrases. Analyses of interview data revealed that students' understanding of the lesson content was the main concern of Mathematics and Science teachers. Ensuring students' understanding of the meaning of English words, phrases and concepts was the main source of teachers' decision to codeswitch during the lessons.

In summary, the findings of this research showed that the use of codeswitching in the talk of the teachers was primarily to facilitate and ensure understanding of the lesson content among the students. The findings of this research give insights to practitioners in ESL about the roles of codeswitching in the content-based classrooms as well as to raise their awareness of the benefits and drawbacks of codeswitching in classrooms.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan ijazah Sarjana Sains

**PERANAN PENUKARAN KOD DALAM PERTUTURAN GURU MATEMATIK
DAN SAINS DI SEKOLAH RENDAH**

Oleh

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Pengajaran and Pembelajaran Sains dan Matematik dalam Bahasa Inggeris (PPSMI) telah diperkenalkan dan dimulakan di sekolah rendah di Malaysia pada tahun 2003. Isu utama yang dihubungkan dengan implementasi ini tahap kemahiran guru matapelajaran tersebut dalam bahasa Inggeris. Persoalan timbul tentang bagaimana guru dan pelajar mengendalikan pengajaran dan pembelajaran matapelajaran tersebut dalam Bahasa Inggeris, strategi yang digunakan oleh guru Matematik dan Sains untuk mengajar dalam Bahasa Inggeris dan peranan bahasa pertama dalam pengajaran Matematik dan Sains di sekolah-sekolah di negara ini.

Kajian ini bertujuan untuk mengkaji peranan penukaran kod dalam pertuturan guru Matematik dan Sains di sekolah rendah. Ia dijalankan untuk mengkaji kategori-kategori dalam pertuturan guru yang melibatkan penukaran kod, fungsi penukaran kod dalam kategori pertuturan guru dan persepsi guru terhadap penggunaan bahasa pertama semasa mengajar Matematik dan Sains.



Pendekatan kualitatif telah digunakan sebagai pendekatan penyelidikan kerana ia dianggap paling sesuai dengan soalan, tujuan kajian dan fenomena yang dikaji. Data telah dikumpul dan dianalisis daripada lima orang guru yang bertugas di tiga buah Sekolah kerajaan di Kelantan. Peserta telah dipilih melalui proses persampelan bertujuan. Kaedah pengumpulan data ialah melalui temu bual dan pemerhatian. Salinan transkripsi rakaman video pemerhatian pengajaran guru di dalam bilik darjah dan temubual dengan guru-guru yang terlibat telah dihasilkan dan dianalisis secara manual.

Tema-tema yang terbit dari data yang dipungut semasa pemerhatian pengajaran guru di bilik darjah telah digunakan untuk menghasilkan Jadual Kategori Penukaran Kod yang digunakan untuk menganalisis penukaran kod dalam pertuturan guru. Salinan transkripsi pertuturan guru dihasilkan dan dikodkan serta pengiraan kekerapan dilakukan untuk menjana taburan kekerapan jenis-jenis pengucapan yang terdapat dalam pertuturan guru semasa mengajar. Taburan kekerapan ini kemudiannya dibandingkan dengan kekerapan penukaran kod yang berlaku dalam kategori-kategori yang telah ditentukan dalam Jadual Kategori Penukaran Kod pertuturan guru. Analisa kuantitatif mempamerkan kecenderungan guru untuk menukar kod dalam kategori-kategori pertuturan yang tertentu. Analisa kualitatif yang membincangkan fungsi penukaran kod dalam pertuturan guru PPSMI dinyatakan dalam bentuk deskripsi naratif dalam kajian ini. Perbincangan maklumat yang diperolehi melalui temu bual guru adalah berdasarkan tema-tema yang terbit semasa penganalisisan data temu bual. Maklumat latar belakang dan punca guru memilih untuk menukar kod semasa mengajar Matematik atau Sains juga diperolehi melalui input yang diperolehi melalui data temu bual.

Dapatan kajian menunjukkan bahawa guru mendominasi interaksi di dalam bilik darjah dan penukaran kod merupakan satu strategi guru untuk menyampaikan isi kandungan pelajaran kepada pelajar. Analisis data menunjukkan guru PPSMI paling kerap menukar kod semasa memberi penerangan, terutamanya semasa menerangkan makna perkataan atau frasa bahasa Inggeris dan semasa menjelaskan isi kandungan mata pelajaran kepada pelajar. Tahap kesukaran isi kandungan mata pelajaran juga mempengaruhi punca guru menukar kod semasa mengajar. Penukaran kod kurang berlaku jika isi kandungan mata pelajaran mudah dan aktiviti pembelajaran cenderung kepada aktiviti mengulang. Guru-guru juga kerap bertanyakan soalan untuk mendapatkan terjemahan perkataan atau frasa bahasa Inggeris. Analisis data temu bual juga menunjukkan bahawa keprihatinan guru terhadap pemahaman pelajar satu punca guru menukar kod semasa mengajar. Kefahaman pelajar tentang makna perkataan atau frasa bahasa Inggeris yang digunakan dan konsep yang diajar merupakan punca utama guru menukar kod semasa mengajar.

Dapatan kajian ini merumuskan bahawa fungsi utama penukaran kod dalam pertuturan guru adalah untuk membantu dan memastikan kefahaman pelajar akan isi kandungan mata pelajaran yang diajar. Hasil kajian ini diharap dapat memberi pemahaman tentang peranan penukaran kod serta kebaikan dan kelemahan amalan penukaran kod di dalam bilik darjah kepada guru-guru yang mengajar dalam konteks bahasa Inggeris sebagai bahasa kedua.

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I certify that an Examination Committee has met on date of viva voce to conduct the final examination of **Razimi Zakaria** on his **Master of Science** thesis entitled “**Role of Codeswitching in the Talk of Primary School Mathematics and Science Teachers**” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the student be awarded the Master of Science (TESL).

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

RAZIMI BIN ZAKARIA

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LIST OF ABBREVIATIONS

L1	First language
L2	Second language
<i>PPSMI</i>	<i>Pengajaran Sains dan Matematik dalam Bahasa Inggeris</i> (English for the teaching of Mathematics and Science)
T	Teacher
S	Student
Ss	Students
<i>SPM</i>	<i>Sijil Pelajaran Malaysia</i> (Malaysian Certificate of Examination)
<i>UPSR</i>	<i>Ujian Penilaian Sekolah Rendah</i> (Primary School Examination)
ESL	English as a Second Language
<i>EL</i>	English Language
<i>BM</i>	<i>Bahasa Melayu</i> (Malay language)
<i>BI</i>	<i>Bahasa Inggeris</i> (English language)



CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The Teaching of Mathematics and Science in English or *Pengajaran Matematik dan Sains dalam Bahasa Inggeris (PPSMI)* was implemented in Malaysian primary schools in 2003. Before the implementation of English in the Teaching of Mathematics and Science *PPSMI* or, the medium of instruction for these subjects was the Malay language or *bahasa Melayu*. The conversion was seen as a way to help students to access scientific and technological knowledge in English. The Malaysian government stressed that mastering the English language was central to mastering knowledge in science and technology. It was also viewed that that the standard of English among Malaysian school leavers has declined and resulting in poor marketability for employment among the school leavers (Rohani Ibrahim and Azali Mohamad, 2005).

The Malay language became the medium of instruction in all Malaysian public schools in 1982 and universities in 1983. As a result, the present workforce in Malaysia is mainly educated in the Malay medium and most of the current Malaysian teachers are products of education and training in the Malay medium.



The move to convert the medium of instruction of Mathematics and Science from the Malay language to English was made in the year 2002 when the then Prime Minister, Mahathir Mohamed, recommended to the cabinet that it was timely to enhance the proficiency of Malaysian school leavers as he perceived that the main problems of fresh graduates inability to secure jobs was due to their poor command of the English language. Hence, upon his recommendation and approval by the Cabinet, *PPSMI* was implemented at all national schools in 2003. *PPSMI* was carried out in stages and in the first year of its implementation, only the first year primary and secondary school and form six students were to learn the subjects in English. These first batches of primary and secondary one students were to continue their Mathematics and Science education in English until the end of their schooling years and the subsequently, the following batches of students subjected to learn the subjects in English as well. Following that year, English became the official medium of instruction for Mathematics and Science in all Malaysian national schools (Ministry of Education, 2002).

Teachers of Mathematics and Science were reported to react positively towards the conversion of the medium of instruction from the Malay language to English. Pandian and Ramiah (2004) found that 76.1% of teachers in their study felt the move was timely and necessary. The results reflected the collective perception of 67 Form One Mathematics and Science teachers teaching in urban, semi-urban and rural areas of Perak. They agreed that English is the language of knowledge and significant findings in Science and technology are in English, therefore, there is a need for students to learn Mathematics and Science in English.



The teachers in Pandian and Ramiah (2004) study also expressed feelings of shock and inadequacy in coping with the implementation. Feelings of inadequacies resulted from the teachers' training background since they received their teaching training mainly in the Malay language. A brief recollection of Malaysian education history revealed that the last time English was used in Mathematics and Science classrooms was about twenty years ago. Since 1983, the Malay language has become the main medium of instruction in all Malaysian schools (Ministry of Education, 2008).

The re-implementation of using English as the medium of instruction in Mathematics and Science in 2003 has raised a number of issues concerning the policy. Pandian and Ramiah (2004) found that the main problem encountered by teachers was in explaining concepts in English and 81% of the teachers in their study resorted to using the Malay language to give explanations when facing difficulties explaining in English. Another reason given for the use of the Malay language among the teachers was because of their concern for the students' ability to understand the subjects in English. The Mathematics and Science teachers were found to codeswitch during their teaching in order to ensure clarity and understanding of the subject content among the students.

1.2 Statement of Problem

Proficiency issues concerning delivery of the subjects and receiving knowledge in a language other than the Malay language have become a thorn in the flesh in the implementation of *PPSMI*. Academicians and researches in English language teaching in



Malaysia have expressed deep concerns over this matter. Vethamani (2007) expressed his concerns on ways Mathematics and Science teachers cope with teaching the subjects in English when their proficiency in the language was inadequate. He doubted that Mathematics and Science teachers can deliver the content well in the medium as he observed cases of English teachers who were designated to teach the subjects in schools without proper training, pedagogical qualifications and language skills could not teach the subject competently. Teachers who were not well-trained to teach in English would have problems to deliver the subjects in the target language. Ad hoc and short term training were not sufficient to equip them with the adequate skills to teach in English and consenting to teachers who were not proficient in English to teach in the language would only result in lowering the standards of English among the students (Vethamani 2007, Nair 2008).

Teachers who are not proficient to use English may resort to using the Malay language when teaching Mathematics and Science. It is not easy for teachers who are not trained in English to suddenly use English to teach as the use of the Malay language has rooted deeply in Malaysian classrooms for more than two decades. Pandian and Ramiah (2004) found that teachers were prone to use their L1 when teaching Mathematics and Science and it was difficult for them to communicate elements of scientific and mathematical discourse to their students. Most of the teachers (81.8%) in their study admitted resorting to their L1 when facing difficulties to explain concepts in English.

The use of other language instead of English in the teaching of Mathematics and Science is viewed as detrimental to the purpose of *PPSMI* implementation. It was mentioned earlier



that the use of English in Mathematics and Science was to harness the standards of English among Malaysian students. Suhaimi Ibrahim (2005), the president of Peninsular Malay Students Union (GPMS) stressed that Mathematics and Science teachers needed to be sufficiently skillful to deliver the subjects in English as to achieve the goals of *PPSMI*.

The teachers' low English language proficiency and their use of mother to deal with insufficient skills to teach the subjects in English pose a problem in *PPSMI*. In English language education, there has never been a peaceful co-existence between schools of thought that advocate total use of the English with those whom support the use of L1. On one hand, the use of speakers' L1 is viewed as negative in developing proficiency of the English language but on the other hand, research has shown that the use of L1 may not necessarily be detrimental in the process of learning. Sert (2005) noted that the alternate use between languages may not necessarily reflect a blockage or deficiency in language use. He claimed that alternating between two languages can be considered as a useful strategy in classroom interaction provided that the purpose was to make meaning clear and transfer knowledge in an efficient way.

Weschler (1997) stated that learners constantly asked themselves "What does _____ mean in _____" and translated meanings or answers in their L1 either orally or mentally. Getting the right meaning and understanding is imperative as abruptions in knowledge transfer will only lead to poor teaching and learning. Gorgorio and Planas (2001) cautioned that discontinuities in understanding new words and meanings can only result in a wide variety of cultural conflicts and disruptions in the learning process.



The crux of the problem in *PPSMI* is the teachers' proficiency and it was found that one of the ways for Mathematics and Science teachers to deal with their proficiency problem in the English language was to codeswitch to their L1 when teaching the subjects. The use of languages other than English in teaching Mathematics and Science is worrying because it may defeat the purpose of *PPSMI*. On the other hand, researches have shown that the use of native language can support learning where it helps to make meanings clear. Clarity and continuity in meaning is important to ensure understanding and avoid conflicts in classrooms. Hence, the conflicting views regarding the use of alternate language in Mathematics and Science classrooms must be examined so as to understand whether the use is reflective of teachers' insufficient skills in the target language or it is one of teachers' language strategies to support learning.

1.3 Research Objectives

In order to explore codeswitching between English and the teachers' L1 in the teaching of Mathematics and Science, this study sought to enquire into the role of codeswitching in Mathematics and Science teacher talk.

Thus, the objectives of this research are to find out:

- i. the categories of teacher talk where codeswitching occur
- ii. the functions of codeswitching in the categories of teacher talk



- iii. teachers' perception on the use of their L1 when teaching Mathematics and Science

1.4 Research Questions

In relation to the research objectives, these questions are posed to find out the role of codeswitching in the talk of Mathematics and Science teachers:

- i. What are the categories of teacher talk where codeswitching occur?
- ii. What are the functions of codeswitching the functions of codeswitching in the categories of teacher talk?
- iii. What are the teachers' perceptions on the use of their L1 when teaching Mathematics and Science?

1.5 Scope of the Study

This study focuses on the alternate use of English and the L1 of the Mathematics and Science teachers in their classrooms. This study is carried out to understand the concerns related to the roles of codeswitching in the talk of the teachers. The focus on codeswitching



among these teachers will bring about understanding of the role of teachers' L1 and English in teaching Mathematics and Science in terms of forms and functions of its use as well as perceptions of their codeswitching during teaching these two subjects.

The focus of this study is primarily on the teachers because teacher talk is central in disseminating knowledge in the classroom. Furthermore, reviews of research show that conversations in the classrooms are dominated by teachers. Nonetheless, student talk is also taken into consideration for analysis when it influences utterances produced by the teachers.

1.6 Theoretical Background to the Study

Theories explain the underlying motives and actions behind teachers' classroom practices and children's behaviours in learning. Children's learning takes many forms of courses, either by imitations and observations or formal instructions. In schools, learning is a formal activity that takes place in lessons, and most lessons are verbal encounters organized by teachers. Among the many elements that build up teacher practices, talk takes the central place because it reveals the agenda of the lessons, the application of knowledge of the teachers, behaviours of the speakers (Edward & Westgate, 1994) and it is through talk knowledge is disseminated, children's learning is assessed, education experiences are provided and behaviour of children are controlled (Mercer, 1995).



Talk is central in the process of educating and the concern regarding talk in classrooms is to understand how language is used and organized in teaching and learning. Therefore, understanding the theory underlying communication between teachers and students is paramount because it affects classroom learning and without communication, teaching and learning is impossible. Much research suggests that teaching effectiveness is intrinsically related to the way one communicates (Simonds & Cooper, 2007).

In lieu of teaching effectiveness and its relation to talk in the classrooms, the Russian psychologist Vygotsky developed a theory of cognitive development which has become a powerful force of influence in education today. One of the most important contribution of Vygotsky' theory in education is the notion that learning is determined by particular circumstances in which learning takes place and by the contributions of other people involved. Vygotsky's theory, however, does not provide a direct relationship in explaining how language is actually used to teach and learn. It was the work of Brunner, whose idea was in line with Vygotsky's notion of development, came up with the concept of 'scaffolding' that connected the role of language to teaching and learning. Scaffolding is a broad concept applied by many in the field of psychology and education to describe 'support' or 'intervention' of a competent individual, be it an adult, peer or a teacher, to help a learner who is actively involved in some specific task but is not quite able to manage the task alone (Mercer, 1995).

Situating the role of codeswitching in the talk of teachers in relation to Vygotsky's notion of other people's contributions in influencing learning and Brunner's notion of

