

# Language Literacy Impacting on Mathematical Literacy: Challenges for Low-Proficiency ESL Learners

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## Editors' note:

*In recent years there has been an increasing interest in content teaching (i.e., using English as a medium of instruction for other subjects) and ESP, and some universities and colleges in Japan have been experimenting with such courses. Issues in content teaching and ESP also occur now at the secondary level, such as senior high schools with international courses of study.*

*The following article looks at some of the issues involved in content teaching with lower proficiency students in Malaysia, a multi-lingual Asian country where English is one of the principal languages, yet in reality, is not necessarily so widely used by considerable portions of the population. Rather than acquire it socially, many Malaysians learn English as a school subject, just as Japanese do.*

## Introduction

This article examines the challenges that second language learners faced in the learning of Mathematics in English in Malaysia. It focuses on the language difficulties these less-skilled language learners in urban schools faced when Mathematical questions are presented in a sentence format. Analyses of data revealed that having language proficiency is an advantage to be mathematically literate in the learning of Mathematics in English in Malaysia.

A semi-structured interview was used to answer these questions:

- (1) What are the language difficulties that less-skilled second language learners faced when mathematical questions are presented in a sentence format?.
- (2) How important is it for these learners to be proficient in the English language in the learning of Mathematics in English?

## The Policy

The role of English in the Malaysian Education System has seen a shift, from English as the language of instruction in all subjects in national schools to being taught as one subject only and now being used as the language of instruction in Mathematics and Science.

The New Education Policy (1971) had seen the gradual change in the use of the English language in the Malaysian Education system. All schools, national or national type, regardless of location would have to use Bahasa Malaysia (the national language) as the language of instruction in all subjects except for English. The whole process of this changeover was completed in 1980 when all subjects were taught in Bahasa Malaysia. 'English was only taught as a subject but it still holds its role as the second important language.' (Asmah, 1992)

In July 2002, the government introduced a new language policy. English would be used as the language of

instruction in Mathematics and Science for students enrolled in Primary One, Form One and Lower Six in 2003. In the next few years all secondary students will be using English in learning these two subjects.

In 2004, Mathematics and Science in English are taught to students in Primary One, Primary Two, Form One, Form Two, Lower Six, and Upper Six. The entire process of this changeover will be completed by 2008 when Mathematics and Science will be taught in English to all students in Malaysian secondary schools.

The rationale for this curriculum reform is based on the importance of English in Science and Technology. Since much of the knowledge in these two areas is published in English, access to such knowledge can be achieved if one knows and understands the language. English is considered important in the 'acquisition of knowledge in the top 20 per cent realm of knowledge such as high-value knowledge-intensive industry as well as academic work.' (New Sunday Times, November 17, 2002).

Mastery of English would also expand Malaysia's role in the global community of English speakers. The English language is spoken as the first and second language in over 40 and 60 countries respectively. It has three different communities of speakers: the first or native speakers of English (L1), speakers of English as a second language (L2) and speakers of English as a foreign language (EFL). The number of speakers of L1, L2 and EFL in the 1990s was estimated to be 375 million, 375 million and 750 million respectively.

Among the three groups, the number of people using English - especially as a foreign language - is expected to increase partly because the language is probably going to be used for international communication and not specifically to native speakers only. (New Sunday Times, November 17, 2002).

English is dominant in international politics and commerce. Its role is also being strengthened through such bodies as the United Nations, the World Trade Organisation and regional groupings such as the North American Free Trade Agreement, European Union, NATO, United Nation peace-keeping operations and the arms trade. (International Review Education, 2002, p.191). The language is also expanding in European Union (EU) member states and institutions (International Review Education 2001 p 191). Tertiary institutions in The Republic of Germany, for example, have started offering some post-graduate programs in English to meet market demand.

In Africa, knowing and being able to use the English language is an important criterion for upward mobility. Students need to pass English as a first or second language in the school-leaving examination to enter the English-medium training programs in professional fields.

The English language is regarded in South Africa as both a 'language of power and the language of educational and socio-

economic advancement; thus it is a dominant symbolic resource in the linguistic market.' (Bordieu, 1991 cited in Setati, M. retrieved from <http://www.pentech.ac.za/pil88/abstract12.html>). In India, English language proficiency is considered as an important element of 'one's cultural baggage, a resource that can eventually open doors into the world of professional employment in India and abroad.' (International Review of Education, 2002, p.372)

In Malaysia, a pass in English as a subject is compulsory for enrolment in tertiary institution programs. Public tertiary institutions in Malaysia such as Universiti Teknologi Mara (UiTM) use English as the language of teaching at diploma, first degree and post-graduate levels.

The change—from the use of Bahasa Malaysia to English in the teaching of Mathematics—is challenging for the teachers and students. This is because the teachers themselves may be limited in the extent to which they can express themselves effectively in English or even in content delivery; and learners are also limited in the extent to which they can understand the English language used (Johnson et.al. 1985) Thus both teachers and students not only must learn the language, they also need to acquire content knowledge.

As language is crucial for student access to knowledge (Dassah, M.O retrieved from

<http://www.pentech.ac.za/pil88/abstract12.htm>), one assumption here is that having proficiency in the language of teaching will be advantageous to students.

But what about those less-skilled second language learners? What kind of challenges will they face in learning Mathematics in English? The primary aim of this paper is to examine the problems faced by these second language learners in the learning of Mathematics in English especially when Mathematical questions are presented in a sentence format.

### Examining Trends

Educational reforms may manifest itself in many forms. A move from subject-centered to interdisciplinary curriculum (Teachers College Record, 2001 pp608); Hong Kong's Target-Oriented Curriculum (TOC) has been introduced to improve the quality of learning in local primary schools (International Review of Education, vol.43 (4): 349, 1997); improvement in the level of general education, extension of compulsory education from 9 to 11 years, decentralization of control over school curricula, and democratization of school management by The Russian Federation educational reforms during the end of Soviet Era (International Review Education 2003 pp.98) are just some of the reforms in place.

Malaysia has seen several educational reforms, among them the introduction of an additional language, new examination formats, new forms of assessments, the use of computers in schools, and now, the use of English in teaching Mathematics and Science.

In evaluating the effects of educational reforms the problems encountered by less proficient students need to be examined. Abrahams (retrieved from <http://www.pentech.ac.za/pil88/abstract4.htm>) investigated the performance of students when the same Mathematical questions are presented in a sentence format and traditional format. His findings showed that students under-performed when

Mathematical questions are presented in sentence format regardless of whether the latter were presented first or later.

Though one cannot attribute the weak Mathematics performance to language competence, it seemed to be a major variable in his study. Furthermore, contextual clues in a Mathematical passage are far less frequent than in other subjects such as English or history (Otterburn and Nicholson, 1977 and Earps (1971). In the Malaysian context, the lack of contextual clues in Mathematics passages and students' own proficiency levels in the English language may pose problems when mathematical questions are presented in a sentence format, especially for less-skilled second language learners

***Though one cannot generalize that to be mathematically literate one has to be proficient in the English language, the initial findings of this study indicate that learners' language proficiency has to be considered when teaching the less-skilled second language learners.***

### Purpose and Research Question

The purpose of this study is to examine the language difficulties less-skilled second language learners faced when Mathematical questions are presented in a sentence format instead of the traditional form.

### Procedure

An informal semi-structured interview was conducted over eight weeks of the school calendar to get feedback from the less-skilled learners of the problems they faced when Mathematical questions are presented in a sentence format. They were given the following questions which appeared in their Mathematics textbook, *Mathematics Form One Volume One* (Exercise 11. p.16).

### Exercise

Q4. Encik Zamri wishes to give RM600,000 to his eight children equally. Calculate the amount each child gets.

Q5. A hawker bought a large bag containing 411 tomatoes He packed them into packets of five.

a) How many packets did he make?

b) How many tomatoes were left?

These learners were asked these questions:

- Are there any language difficulties in the following problems? What are they?
- Do they understand the mathematical questions they read?
- Circle the words of which they do not know the meaning.
- Do they know the meaning of the words they thought they knew?

### Participants

The target students were the first batch of students who were learning Mathematics in English. These students learned Mathematics from Primary One up till Primary Six. in Bahasa Malaysia, their first language. Only the less-skilled second language learners were finally short-listed, comprising five male and five female students. The respondents' background information and their preference for the language to be used in the teaching of Mathematics, were also elicited.

### Results

The following were some of the language difficulties these second language learners faced when the question is in a sentence format:

#### 1. Do not know how to read.

Zaleha does not know how to read in English, has difficulty reading the questions posed; she is unable to follow the lesson in class because she does not know the English language. Zaleha was able to understand the Mathematical question if presented in a traditional format (using signs and numbers).

#### 2. Do not know how to read numbers in words.

Shahrul does not know how to read figures in words especially if it involves big figures such as RM 600,000 (whether it should be sixty thousand ringgit or six hundred thousand ringgit. Another student, Musa, also had to pause for a while to figure out '411' in words, especially the number "eleven" in English. Another student, Majid, also paused for a while to think how to say '411' in English. He started saying four hundred and stopped to think what 'sebelas' is in English. He was actually reciting from 'one... two... three' until 'eleven' before he could say 'four hundred and eleven.'

#### 3. Do not know how to spell the numbers in words

Mariam is having difficulty spelling the numbers in words and can only understand a little of what has been taught in Chapter One. She said her main problem in the learning of Mathematics is her poor command of the English Language.

#### 4. Do not know the meaning of the words.

In the above questions, the learners assumed that 'bought' is actually 'bawa' in Bahasa Malaysia (the equivalent of 'bring' in English); 'a hawkker' is a type of game; 'equally' is 'minus' and 'calculate' is 'multiply' or 'calculator'. Musa, who said he knew some words in the above question such as the words 'large', 'packet' and 'tomatoes'. However, when asked to tell the meaning of the words, he responded by saying that 'packet' is 'satu kotak' (a box) and 'large' is 'panjang' (long) in Bahasa Malaysia. The word 'tomatoes' he got correct as it is the same in Bahasa

Malaysia.

#### 5. Do not know how to say the words

This is a common problem among all the learners interviewed. When asked to read the questions they do not know how to say the words correctly and fluently. A word such as 'bought' is pronounced /bork/; large is 'lark' or /largi/; 'equally' is /equalai/; 'wishes' is given as /wish-hes/.

### Implications

The findings from this initial study show the need for content and language educators to help these less-skilled second language learners enhance their command of the English language.

Though one cannot generalize that to be mathematically literate one has to be proficient in the English language, the initial findings of this study indicate that learners' language proficiency has to be considered when teaching the less-skilled second language learners. We agree with the study conducted by Abraham that "if we want to improve the Mathematics performance of learners we should also address the language factors at school." (<http://www.pentech.ac.za/pil88/abstract4.htm>)

This initial study may be improved if other factors such as the attitudes of these less-skilled language learners towards the English language and also Mathematics are considered. The initial study could also be carried out with the other content subject, Science, that is taught in a second language.

### References

- Asmah Hj Omar (1992). *The Linguistic Scenery in Malaysia*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
- Carless, David R. (1997) *Managing Systemic Curriculum Change: A Critical Analysis of Hong Kong's Target-Oriented Curriculum Initiative*. *International Review of Education*, vol.43 (4): 349-366.
- Endo, Tadashi (2003) Decentralisation and Educational Reform in Siberia and The Russian Far East. *International Review of Education* vol. 49 (1-2) 97-109.
- Hoban, G. F. (2002). *Teacher Learning for Educational Change*. Philadelphia: Open University Press.
- Meister, D. G. & Nolan Jr, J., Out on a Limb on Our Own: Uncertainty and Doubt in Moving from Subject-Centered to Interdisciplinary Teaching. *Teachers College Record*. Volume 103, Number 4, August. 608-633.
- The New Straits Times*, 28th December 2002
- Phillipson, Robert. (2001) English For Globalisation Or For the World's People? *International Review of Education* Vol. 47 (3-4) 185-200.

### References from the Internet

- Abrahams M retrieved from <http://www.pentech.ac.za/pil88/abstract4.htm>
- Dassah, M.O retrieved from <http://www.pentech.ac.za/pil88/abstract12.htm>
- De Avilva, Edward, 1997 retrieved from <http://www/nce;a.gwu.edu/ncebepubs/resource/setting/index.htm>
- <http://www.pentech.acza/pil88/abstract4.htm>