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ETEMS: THE IMPLICATIONS ON LEARNERS

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INTRODUCTION

The ETeMS (or English for Teaching Mathematics and Science) was introduced in Malaysian public schools in 2003 with the main objective of enhancing the English language proficiency of Malaysian learners. This is because much has been said about the deteriorating level of English skills among Malaysian learners. It was felt that learners' English was better off when English was the medium of instruction in schools in the 1960's. When the national language, Bahasa Malaysia was made the medium of instruction in 1970, some quarters perceived this as the regressing point where the use of English language is concerned. Tun Dr Mahathir, the then Prime Minister, mooted the use of English in the teaching and learning of Mathematics and Science subjects, with the noble intention of producing Malaysians who are more linguistically competent and consequently, spearheading development and progress in education. Therefore, one of the ways of seeking knowledge would be through reading vast amounts of information which is mainly readily available in English, the lingua-franca.

However, the move has sparked off some debate within certain departments. It is argued that non-proficient learners are negatively affected by this regulation. Learners who do not have a strong command of the language are said to be on the losing end as they find it difficult to cope with the language. Consequently, these learners are said to have fared badly in Mathematics and Science. If this is

true, then, it is feared that non-proficient learners will perform badly academically due to their deteriorating performance in Mathematics and Science subjects, apart from their already poor performance in the English subject.

A number of studies have been carried out to investigate how far these assumptions and views are true. Studies have been done on teachers involved in the ETeMS programme in order to get their views on the challenges faced due to this instruction (Salbiah et al, 2002; Norazman et al, 2006). However, till this day, it is not clear what the learners actually feel about having to learn these tough subjects in a second language, or in some settings, a foreign language.

Hence, this study was undertaken with the main objective of determining the effects and implications of this regulation on a group of Malaysian learners. The researchers felt it was imperative to gauge the feelings of the learners themselves as they are the ones directly affected by the regulation. Thus it is crucial to investigate what the learners feel about this issue, as the Ministry of Education will soon be making a decision on whether the regulation persists or otherwise, to ensure that we will not be taking a step backward if we are already making improvements, since the move was introduced.

In this study, the researchers attempted to seek answers to the following research questions:

- 1 Do the learners feel that their performance in Mathematics and Science has improved as a consequence of learning these subjects in English?
- 2 Has the learners' English proficiency improved as a result of the greater exposure to the English language, since Mathematics and Science subjects are now taught in English?
- 3 What are some of the challenges faced by learners in learning Mathematics and Science subjects in English?

It is hoped that the findings of this study would help the authorities concerned to make an informed decision on the policy

pertaining to the use of English in teaching and learning Mathematics and Science subjects.

TEACHING AND LEARNING MATHEMATICS AND SCIENCE IN ENGLISH

Background of ETeMS

The declining standard of English usage by students has set a chapter in the training of teachers to teach core school subjects in the English language particularly in Malaysia. ETeMS (English for Teaching Mathematics and Science) has been introduced as a platform to train teachers to teach teachers of Mathematics and Science (MST) in English. This effort is taken to help teachers understand how language is best used in the content area so that they can deliver their lesson effectively to students. It is also a mechanism used by the Government to encourage teachers to develop their English language competence so that they can teach the subjects with greater confidence.

The announcement to teach Mathematics and Science in English in 2002 and implemented in 2003 has motivated the Teacher Education Division to upgrade the language proficiency of Mathematics and Science teachers so that they can conduct their lessons in English successfully in class. Five-pronged strategies have been adopted in the training program. These strategies are Interactive phase 1, Interactive phase 2, Self Instructional package for self-directed studies, web based and buddy support system. The interactive phases were meant for grouping teachers together to allow interaction with each other thus forming a favourable community. Teachers who were proficient were identified and became trainers. The self instructional package, grammar books, dictionaries with CD-ROMs and web-based portals were made available for those who needed further language support. The buddy system that was conceptualised on the belief that teachers learn best from each other

was also part of the assistance given to teachers who cannot be reached by the Teacher Education Division.

Why teach Mathematics and Science in English?

The knowledge of English that students derive from Mathematics and Science helps to develop students' language competency. Being competent in the English language is an added advantage for students. For one, they would be able to perform internationally. This is based on the fact that English is used as a medium of instruction by many countries in the world. Being competent users of English also means that they are able to gain access to the resources in the Internet since most of the Internet resources are written in the English language. This sets the foundation for students to become independent learners in the future.

The new language policy introduced in the teaching of the two core subjects aims at upgrading the nation's capability to play a bigger role in technological advancement. ETeMS therefore prepares teachers to develop students who are very competent in the English language so that they can keep pace with the rapid advances in science and technology, as English is considered to be the language of technology.

Teachers teaching these core subjects in the English language are indirectly required to understand how language is used in the content area to enable them to deliver their lessons effectively. They become the 'resource persons' for students who consistently need help to cooperate with, understand concepts and do things that they cannot do on their own. Good understanding of how language is used in the content area provides access to learning. It is in fact a window to develop students' understanding of many specialist forms of language which they need as they progress in the education path.

Complexity of language in Mathematics and Science

A report prepared by the Australian Department of Education highlights

the complexity of the language in Mathematics and Science. It states that the language of Mathematics is complex and is not similar to everyday language. It consists of specialist vocabulary, precisions and the use of symbols. Students learning Mathematics have to identify the word function before they are able to identify how mathematical problems can be solved. They also have to verbalise mathematical statements, putting words into symbols and graphs. They also have to work with lengthy descriptors and dense mathematical concepts. The report also states that teachers tend to make a lot of assumptions that students are able to understand the words despite the fact that some words may be too complex for students to understand on their own.

The report also states that the language used for Science subjects comprises of a large vocabulary of technical terms, which have to be clarified to the students. In relation to the above, ETeMS training programs should not only focus on grading teachers' language competency but also focus on strategies to help teachers deal with the language complexity of Mathematics and Science.

Development in language across curriculum

The concept of teaching through English, not in English is advocated by David Marsh, a British educator and leading expert on Content and Language Integrated Learning, when he addressed how Mathematics and Science can be best taught to teachers attending the Third TED-ELTC (Teaching Education Division-English Language Teaching Centre for the Teaching of Mathematics and Science) Conference 2007, organised by the Education Ministry's Teachers Education. Marsh emphasised that teaching through English means making students conceptualise the lesson in English. This is possible when English becomes the medium of instruction. Besides receiving instruction in the English language, teaching through English also allows students to receive instructions and think in their mother tongue and while solving the problems in the English language. Though the concept has invited controversies, it has proven to be successful in some countries.

The future of ETeMS

Though some quarters felt the teaching of Mathematics and Science should be taught in the national language, the conclusion drawn from the Malaysian English Language Teaching Association (MELTA) National Colloquium on the teaching of Mathematics and Science in English (Dec. 2007) shows that the present policy of teaching these subjects in English should be continued. The participants of the colloquium agreed that there is a need to continuously improve students' English and learning these core subjects in the English language is a worthwhile strategy to meet the objective.

Reverting to teaching Mathematics and Science in the national language may cause the country to be unheard of, in the international platform. In fact, it only results in students failing to perform globally because of the language barrier. In line with this, concerted efforts have to be taken to ensure that the aim of teaching Mathematics and Science is successfully achieved. These include designing more effective strategies in preparing teachers who are supposed to bring the change with adequate language and teaching skills, improving classroom instructions, enhancing teacher-student interactions, monitoring teachers' and students' progress with better mechanisms and encouraging specialisation among teachers. More user-friendly handbooks should be provided to the teachers involved to help them overcome their problems. Engaging content specialists as trainers and providing motivational incentives are also among the suggestions given by the participants of the colloquium as solutions to overcome related challenges.

RESEARCH METHODOLOGY

The study was conducted in a boarding school in Johor. This school has charted a number of achievements in the academic performance of students in SPM examinations, at the national levels, in recent years.

For instance, the school produced the highest number of students getting all A's in the SPM several years ago. The subjects of the study are Form Four students of the school. The study was conducted at the end of 2006, whereby these students have had about four years of learning Mathematics and Science in English.

The research instrument used was questionnaires, with fifty sets of questionnaires distributed to male and female students from ten different classes, all comprising learners of with similar levels of academic ability. These learners enrolled in the boarding school after achieving excellent results in their P.M.R. (Penilaian Menengah Rendah).

Thus, the subjects of the study were high-achievers academically but were not necessarily proficient in English, although they all scored A's in English at the P.M.R. level. These respondents came from diverse family backgrounds; with parents working in different professions such as managers, accountants, teachers, labourers and drivers. These fifty subjects who participated in the study were selected at random, from the ten different Form Four classes.

Of 50 questionnaires sent out, 44 were returned. The questionnaires were a combination of four-point Likert-scale items and open-ended items. The items were related to the learners' perceptions of how learning Mathematics and Science in English had affected them academically.

In the questionnaires, the term 'Mathematics' was taken to mean both the Additional Mathematics and Mathematics subjects while the term 'Science' denotes the three Science subjects taken by Form Four learners, i.e. Physics, Chemistry and Biology. This explanation was included in the questionnaire given to the Form Four learners.

FINDINGS OF THE STUDY

The implications of ETeMS on Learners' Performance in Mathematics and Science

One of the benefits of Mathematics and Science being taught in English is that the explanation of concepts comes off easier when illustrated in English. Sixteen of the 44 (36.4%) respondents felt that it was easier for them to understand the mathematical and science concepts if they are explained in English compared to the national language. This is probably due to the familiarity with the terms used in English as they had been studying these subjects in English for four years. Not only did these students feel it was easier to study these subjects in English, six of them also revealed that their academic performance in Mathematics and Science subjects had improved as a result of studying these subjects in English.

These findings show that if a student is equipped with a good command of English, the explanation of scientific concepts is easy to follow when it is delivered in English. In the national language, the explanation of scientific concepts sometimes becomes a bit long-winded. Sometimes, the text in the national language is a literal translation of the original text which is initially conveyed in English. Hence, it is not surprising that the explanation is clearer in its authentic form. Thus, learners with excellent English would be the ones who get to appreciate the language and visualise the content of the text.

Although some learners felt positive about learning Mathematics and Science in English, there were some students who were not too happy with the move. Nine of the 44 (20.45%) students complained that their performance in the Mathematics and Science subjects had deteriorated since the subjects were taught in English. They attributed this to the fact that their lack of proficiency in English had made it all the more difficult to understand the explanations of science concepts in English. Inaccurate comprehension of facts and information was formed as a result of their imperfect English.

It appears then that the number of learners who performed worse (i.e. nine of 44 subjects) outnumbered those who performed better (i.e. six of 44 subjects) in Mathematics and Science after

the regulation to teach these subjects in English was introduced. This possibly indicates that the academic performance of students in Mathematics and Science subjects, had deteriorated for some, after this move was made. This happened despite the fact that all these respondents have a good command of the English language, considering they had all obtained A's in the English language paper in PMR.

The Implications of ETeMS on Learners' Language Proficiency

On whether the students felt that their English language had improved as a result of the greater exposure to the language now that Mathematics and Science subjects are also taught in English, the findings can be expected. The findings are almost unanimous in which 43 of the 44 respondents admitted that their command of the language has definitely improved.

The only respondent who declared that her English did not improve despite the greater effort to teach students in English appeared to be a student who has a strong dislike for the language. The respondent stated that she did not like learning Math and Science in English and that she felt it has been a problem and a big disadvantage for her. She also felt that the teaching of these subjects should be conducted in the national language and text books for these subjects should also be written in the national language.

On whether the students' grades in English exams had improved as a consequence of this regulation, 21 of 44 (47.7 %) respondents stated that their English grades had improved. They related this to the fact that the move to teach Math and Science in English had offered them more opportunities to learn the language. If prior to the introduction of this regulation in schools, learners were only exposed to learning the language during English lessons, now, the move has offered them greater exposure to the language. Not only are they are now learning English in English classes, but they are also gaining more familiarity with the language that is used to teach Mathematics, Additional Mathematics, Physics, Chemistry and

Biology lessons as well. Thus, the increased exposure has definitely led to increased performances in their English exams.

Students' Level of Enjoyment of Learning Mathematics and Science in English

25 of these 44 students (56.8%) revealed that they enjoyed learning Mathematics and Science in English while 9 (20.5%) confessed that they did not like learning these subjects in English and would have preferred, the national language instead as the medium of instruction for these subjects. One respondent did not respond to this questionnaire item on whether he liked Mathematics and Science being taught in English. This probably meant that he was indecisive and did not mind either language be used as the medium of instruction for the Mathematics and Science subjects.

On whether the students felt it was easy or difficult learning Mathematics and Science in English, 25 out of 44 (56.8%) admitted it is actually difficult while 16 (36.4%) felt that this was an easy task. Two respondents, however, could not decide if it is easy or difficult learning Mathematics and Science in English, while one respondent stated that it is both an easy and difficult task. This shows that the students had mixed feelings on this issue. However, there was a higher number of students who perceived learning Mathematics and Science in English as difficult as opposed to those who viewed it as easy. Nonetheless, students who confessed to this being a tough chore admitted that they were able to take the challenges in their stride because they wanted to prepare themselves for bigger challenges which lie ahead, such as equipping themselves with good language skills to study abroad.

Causes of difficulty in learning Mathematics and Science subjects in English

When asked for the factors that made learning these subjects in English difficult, 19 learners of the 44 subjects (43.2 %) were of the

opinion that they were hindered by their own lack of proficiency in English. An equal number of learners, i.e. 19 of them felt that learning these subjects in English had been tough because their teachers did not have a sufficient level of English language proficiency to make the lessons easy for them. This shows that the learners attributed the difficulty in learning Mathematics and Science subjects in English to their own limitations, and those of their teachers.

CONCLUSION

This study concludes that 36.4% of the learners found it easier to understand the mathematical and science concepts in English compared to the national language. Very few learners; i.e. 6 out of 44 learners, felt that their Mathematics and Science grades had improved as a result of learning these subjects in English. In fact, 20.5 % of the learners complained that their Mathematics and Science grades had taken a plunge due to this regulation to teach Mathematics and Science in English.

On a more positive note, a majority of the learners, i.e. 47.7 % revealed that their English proficiency had improved with this move. This is a positive finding as almost half the respondents' English had improved as a result of this national policy. Another positive impact of this gesture introduced by the Education Ministry was that most learners (56.8%) enjoyed learning Mathematics and Science in English. Only 20.5% of the subjects would have wanted to revert to the former scenario in classrooms where Mathematics and Science subjects were taught in the national language.

On whether learning these subjects in English have been an easy task, the respondents had mixed reactions. Most (56.8%), however, found learning Mathematics and Science in English, a daunting task. Those who viewed it as a challenge attributed the difficulty to two factors: their and their teachers' lack of proficiency in English.

RECOMMENDATIONS

Because learners' English had generally improved, we feel that this regulation to teach Mathematics and Science subjects in English should be retained. This study also found that most learners had enjoyed learning Mathematics and Science in English and would have preferred to learn these subjects in English, compared to the national language. This provides more reason to continue teaching these subjects in English.

However, these recommendations are useful in so far as the learners are good learners with a sufficient level of English proficiency. Where learners in rural schools are concerned, we feel that more studies should be carried out to determine if this move is viable and for that, more investigations need to be done to assess the real problems and challenges faced by learners and teachers in such schools.

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