WINDS OF CHANGE: TEACHING SCIENCE AND MATHEMATICS IN ENGLISH - A PERSPECTIVE FROM THE SCHOOL

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Background

The standard of English Language proficiency amongst Malaysians who have been educated in the medium of Bahasa Melayu has been a topic of debate since the 1980s. Although, the Ministry of Education had launched a number of ELT programmes to raise the standard of proficiency, these programmes appeared to have had a minimal effect on standards of proficiency. Concern has been voiced over this issue throughout the 1990s (Pillay 1995). In the new millennium, the pressures of globalisation and the need to have a work force that is competent in English to compete in the era of Science and Technology has given this issue a new urgency and once again brought this issue to the forefront. Many suggestions had been put forward including having an EST English Language examination at SPM level.

In June 2002, a dramatic shift in the Malaysian Educational Policy was announced. The Minister of Education informed the public that from January 2003, Science and Mathematics will be taught in English in standard One, Form One and Lower Six in all fully aided government schools. The rationale for this decision was that most Science based courses in the universities were highly dependant on reference materials that are published in the English language. Hence, it was felt that it was better for students to be equipped to study these subjects if a change in the medium of instruction was effected.

The Debate

The announcement immediately sparked off a heated debate in the newspapers with regard to this apparent turn around in the policy. Bahasa Melayu has been the medium of instruction and many Malay nationalists saw this new initiative as affecting the status of the language. Headlines such as –" *The issue is not a matter of loving English more and Bahasa Melayu less"* (New Straits Times, 10th August), "*Bahasa Melayu nothing but a pipe dream"* (New Straits Times, 21st August). The Chinese community was as equally vociferous in its opposition to the change in the medium of instruction. Chinese based political parties initially took a hardline stand against the policy i.e. *"Gerakan says No to English"* (New Straits Times, 18th August). The debate at times turned rather heated with the government calling on parties involved not to: *"Do not turn it into a racial issue"* (New Straits Times, 7th August) or "*Abdullah: Don't politicise English Language usage issue"* (THE STAR, 18th August). As the various organisations grappled with issue of whether to introduce the teaching of Science and Mathematics in English in Tamil and Chinese medium schools, the government went ahead with its plans to ensure preparations went ahead.

The Policy in National school and schools using Tamil as a medium of instruction

The issue appeared to have been resolved with the issue of two professional Service Circulars dated 27th November 2002. The Ministry of Education Circular Number 11/2002 deals with the teaching of Science and Mathematics in all government schools and schools using Tamil as the medium of instruction. The circular states that it is compulsory to use English as the medium of instruction to teach Science and Mathematics in Standard One and in Form One in 2003 onwards. In Lower Six, the

subjects that will be taught in English are as follows: Physics, Biology, Chemistry, Mathematics S and T, Pure Mathematics and Computer Studies.

Examinations

From 2003 till 2007 public examinations in primary and secondary national schools will offer examination papers for Science and Mathematics in both English and Bahasa Melayu. For schools using Tamil as the medium of instruction, the examination papers for Science and Mathematics will be offered in English and Tamil. In the interim years students will be allowed to use both Bahasa Melayu and /or English when answering the questions and in Tamil schools they will be allowed to use Tamil or English. In the year 2008 all examinations papers for Science and Mathematics for National type and Tamil schools will only be offered in English.

The Policy in schools using Mandarin as a medium of instruction

Circular 12/2002 outlines the policy with regard to schools, which use Mandarin as a medium of instruction. The policy states that beginning in 2003, 180 minutes will be allocated for the teaching of Mathematics. Out of the 180 minutes, 90 minutes would be taught in English and 90 minutes would be taught in Mandarin. Where Science is concerned, 300 minutes has been allocated to teach Science in the primary school. Out of this 180 minutes would be taught using Mandarin and the 120 minutes would be taught in English. This would be in effect till year 3 of the primary school i.e. 2005. The proportion of time to be allocated in years Four to Six is to be decided later.

Examinations

From 2003 till 2007, the examination paper for science and Mathematics would be offered in both Mandarin and English. Students can answer questions using Mandarin or in English or they can answer questions using both Languages. The Language that is to be used for the UPSR paper in 2008 will be decided later.

IMPLICATIONS

"The Twilight years" (Years Two- Five)

The immediate question that faces most schools, parents and students is what happens in the "twilight years" i.e. students who are in Forms two till five in 2003. The examination paper will be in English and Bahasa Melayu but the medium of instruction; textbooks and other materials are in Bahasa Melayu. Further, all these students will be taught the Science subjects in English once they reach form Six or Matriculation. So does it make sense that they continue study in Bahasa Melayu, when eventually they will have to undergo a change in the medium of instruction when entering higher education? According to the Circular 11/2002, schools are encouraged to teach science and mathematics in all other years based on resources and capabilities that each school has. How then do schools make the decision?

In my view, this will depend on various factors. First of all, schools must assess the competency of their Science and Mathematics teachers to teach in English. Secondly, they must also assess the competency of their students in the English language. Thirdly, schools must research into what type of resources would be available, if they decide to switch the medium of instruction. As far as the Ministry of Education is concerned, textbooks for Year one of primary, Form One and Lower Six would be available in English. But the ministry is silent about textbooks for other forms. The most

likely scenario is that there will be no official textbooks but schools may have to rely on private publishers exploiting the gap. Schools then would have to source relevant materials in English to supplement the existing texts, which are in Bahasa Melayu.

The other important question that schools have to face is the effect of such a change in the medium of instruction on examination results in the interim years. No one at this juncture can predict whether the students will be able to adjust to learning these subjects in English after they have spent one to four years studying then in Bahasa Melayu. Issues ranging from correct use of terminology, spelling and correct instructional language, are not so easily resolved.

In my view, these are decisions that schools have to take in consultation with parents because no school head wants to be held responsible for a decline in examination performance. If a school decides it has the resources to undertake teaching forms Two –Five in English, parents must agree not to blame the school if performances are not up to expectations. Only then can a school go forward in such venture.

Examinations

As the examination papers are to be offered in both languages, is the Examination Syndicate ready to undertake this venture? The question as to whether there are enough officers competent in English to undertake the preparation of such examinations is not clear. Further, the range of options given to candidates to answer either in Bahasa Melayu or English or both languages, raises the issue as to whether they are enough Bilingual markers to undertake the task. If there are not enough markers, then some form of system must be formulated to ensure that markers who have a good competency in English mark the papers of students who opt to answer questions using the English Language.

Distribution of Human Resources

It cannot be denied that there is an uneven distribution of Science and Mathematics teachers who are competent in English. Currently, some urban schools are better placed to take advantage of the Ministry's policy of allowing schools to teach Science and Mathematics in English at all levels, if they have the manpower and resources. There is concern amongst head teachers that various officials will seek to move certain teachers in order to ensure there is a fairer distribution of the available human resources. Is this to be considered "poaching" or "redistribution" of human resources? As a head teacher, I am concerned because the movement of teachers will effect the planning in schools. From the point of view the District Director of Education or the State Education department, the smooth implementation of the policy will depend on whether schools are evenly resourced What ever decisions are taken, I hope that they will be taken in consultation with the schools heads.

Resources

In the national budget for 2003, the Prime Minister announced that RM 5 billion would be allocated between 2002-2008, for the implementation of the policy to teach Science and Mathematics in English. All teachers from national schools teaching these two subjects and English would be given a laptop computer to use. All Standard One, Form One and Lowe Six classes will be equipped with a LCD projector, a screen and a trolley with speakers and an UPS system.

The Ministry of Education has also prepared materials for use in Standard One, Form One and Lower Six. Each school will be given a launching grant of RM $5,000 to $15,000 to acquire additional materials.

However issues of maintenance and security have not been adequately addressed. The cost of maintaining this equipment is high. Many headteachers are concerned as to who will bear the cost of maintenance as we expect in the initial stages, there will be problems as teachers get used to handling and using the equipment. The other great concern is security. Most schools are not adequately provided for in terms of security. There are a number of schools, which do not have a twenty four-hour security system in place. Hence, it is vital that as more expensive equipment comes in, the Ministry of Education needs to ensure that there is a better security system in place in schools.

The other issue that needs to be raised is whether there is the necessity of equipping schools with all these hardware. Often, it is easy to acquire hardware but not that easy to acquire suitable software. Institutions sometimes make the mistake of acquiring hardware without making adequate provision for acquiring software. Further, the issue of actual use in the classroom needs to be looked into. Take a Mathematics class for instance. A mathematical solution to a problem needs to be explained in such a way so that the students see the steps being taken towards solving the problem with the teacher explaining it as it is done. Would it be better to use the white board or the computer? Similarly, in the language classroom many activities could be accomplished with sets of good materials and training to extend the use of
the language in the classroom. It is my hope that the use of hardware would not deteriorate to that of a panacea to cover up a host of problems that we could expect with the implementation process of this policy.

Training of Teachers

The training of teachers is an important issue for the successful implementation of the policy. Undoubtedly, there is a range of proficiency levels amongst the teachers. Hence the training must cater for the differing levels of proficiency. There is also a need to think of support systems for the group of teachers who might be in the non-starter group. For this group, I would suggest a component on Social English to help them get started in using the language with their colleagues. Secondly, the materials in the modules should be linked to existing syllabus items in the school curriculum, in the initial stages. This is to build confidence in teachers in using the English to teach. It would be a good idea to involve Science and Mathematics teachers who are competent in English in building the training materials as ELT trainers may not have the required expertise in the specialist fields.

Teachers in my school have expressed the need for list of terminology and basic instructional Language to help them in the initial stages. Perhaps, several modal lessons could be developed to help teachers get started.

One thing that concerns school is with regard to the timing of the training. Up this juncture we have no information as to nature or timing of the event. I would like to suggest a mixture of on site as well as centralised training to take place. The idea of on site training is to use the English Language teachers in the school, get used to the idea that they too are involved and have a part to play in mentoring their colleague in this transitional phase. Also in smaller groups, greater attention can be paid to teachers who need more help in improving their proficiency. I would also suggest a follow-up and follow through model, where the teachers who have undergone the initial training be called back to attend follow up courses to gauge the gaps and reinforce their language skills.

Creating a School Language Culture

Schools should also play a part in creating a "School Language Culture", where a positive environment towards English is used. Language classes, peer microteaching should be carried out so that the teachers can get used to using English. We should also set up classes for Laboratory

attendants, so that they will be able to read and carry out instructions to set up laboratory experiments. In our haste to focus on teachers directly affected by the change, let's not forget the other teachers in the school. I am of the view that schools should start language classes for teachers who interested in improving their command of the English Language. These teachers could then be used as resources to extend the use of English in the school environment.

Issues of Equity and Access

One of the issues that need to be addressed is the issue of equity of access. As the policy to teach Science, Mathematics and technology related courses in English reaches the Upper Secondary level, we find that there will be inequality with regards to the number of subjects that will be taught in English between the Humanities and Science streams. A Science stream student will be taught at least five subjects in English whereas the Arts students will only have two subjects taught in English. How will this affect the students' ability to master the language? Then as the student moves on to tertiary institutes, the gap will further widen because most of the social sciences subjects will be using Bahasa Malaysia as the medium of instruction, whereas disciplines which are Science based will be more or less wholly taught in English. Will this create a "language divide between those who from the Arts and the Sciences? How can this divide be overcome so that "employability" is increase for those who have had less exposure to English?

Inequality of access also comes through socio-economic and class distinctions. The upper and middle class families are better resourced and have better family environments to take advantage of this shift in policy. These classes are definitely in a better position to ensure that their children have access to materials and tutorial support. Will this policy lead to a greater divide between the classes?

In some ways urban schools are in a better position to implement the policy because its resources in terms of personnel could be better. There is greater likelihood of finding a greater number of teachers who are competent in English in urban schools than in rural schools. Further, urban schools have greater access to monetary resources that could help complement the school budget in acquiring materials and extra support during the years of implementation.

Last, but not least one must accept the reality, that students in urban areas have greater exposure to the use of the English than their counterparts in rural areas. The challenge facing rural schools hence is great. But if the retraining of teachers is done well and support systems properly built, then there is a possibility of closing the gap

Conclusion

In this paper, I have tried to outline some of the issues arising from the implementation of the policy to teach Science and Mathematics in English. The paper was written from the perspective of a school principal having to deal with the changes it will bring to schools. In some ways there are more questions than answers at this juncture because many aspects and implementation issues have yet to be clarified. It is hoped that this paper contributes to the discussion through the issues raised.

Reference

Pillay, H. (1995). *Fragments of a Vision: A Case Study of English Language Curriculum Implementation in five Secondary schools in Malaysia.* University of East Anglia. Unpublished PhD thesis.