



## **Problems in the Teaching of Science and Mathematics in English : A Study in the Field of Special Education**

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### **ABSTRACT**

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*This paper will look into the problems faced by teachers of special education in the implementation of the Teaching of Science and Mathematics in English (TeSME) programme. Discussions were carried out with a few of the lecturers in the college to verify the veracity of the statements made with regards to special education. Visits were also made to four schools (two schools for the visually impaired, and another two schools for the hearing impaired) and discussions were held with the school teachers and the administrators about the challenges and issues in implementing TeSME.*

### **Introduction**

A simple study was carried out to find out the problems faced by teachers and administrators when implementing the recent directive to teach Science and Mathematics in English. The following is the report of the study.

### **Objective of the Study**

The main objective of the study was to find out the problems faced by teachers in the implementation of the directive to teach Science and Mathematics in English. Areas selected for study included:

- (a) the main problems faced by the teachers and students in the actual teaching-learning process



- (b) the suitability of the audio-visual aids and texts that were provided
- (c) the extent of support given in the implementation
- (d) the steps the teachers had undertaken to overcome teething problems
- (e) the steps teachers took to overcome problems

### **Methodology**

The main sources of information for the study include:

- (a) my experience as an educator in the field of special education for the last seventeen years in schools, education department and teacher training college
- (b) discussions with colleagues
- (c) informal interviews with both Science and Mathematics teachers as well as administrators of four special education schools, namely two schools for the blind and two for the deaf and
- (d) informal discussions with an officer of the Special Education Department, Ministry of Education

### **Validity and Reliability Issues**

To ensure the validity of the study, a few consultative sessions were carried out with working colleagues who have many years of experience in the field of special education to get their views on issues related to the study and to verify facts that I was not fully certain of. References were also made to various published sources to verify the accuracy of the facts given. An important point to bear in mind at this point is that certain facts mentioned may not correspond to your own knowledge and understanding of special education. Reliability is not an issue here because apparent inaccuracies and discrepancies will inevitably arise given the fact that a number of concepts in special education are still subject to different interpretations. A cursory comparison of the practice of special education in different schools and among the different states may reveal differences and inconsistencies in the actual system of implementation.

### **Scope of the Study**

The findings of the study were the result of discussions with educators in the four schools for special education, two schools for the deaf and two for the blind. However, it should not be viewed that these findings are unique only to these schools and thus could



not be generalised to other schools. On the contrary, the findings could be representative of other schools because of the common thread of teaching approach used in all schools, that is, the use of Braille in the teaching of the blind, and Total Communication in the teaching of the deaf.

The introduction of the Teaching of Science and Mathematics in English compounded the many problems faced by the schools of special educations. The study attempts to identify and discuss these problems.

### **Limitations of the Study**

The study was only confined to four schools and as such would certainly lacked the depth and comprehensiveness that would have made the findings more valid and more representative. An important aspect was not explored such as observing the actual teaching-learning process in progress which would probably have added greater insight and dimension to the study. The reason for this circumscription was basically time constraint. There was little time to conduct the study, and it was done at a time when the school holidays were just about to start. In addition, there was the bureaucratic process of applying for permission from the relevant authorities to carry out a more formal and in-depth study. Being informal, the current findings are not supported by quantitative data which would have lent more credence to the study.

Special education encompasses a number of specialized areas. A special educator would be an expert in his own area of specialization but may still be quite unfamiliar in the other areas of disabilities. Although I received a lot of information from the educators of students with visual impairment, my somewhat limited knowledge of this area constrained my understanding of all the information that was given to me.

I have also left out one specialized area that is now under the purview of special education, and that is remedial education. Its inclusion would have certainly widened the scope of study. Time constraint was again the main reason why this area was not included in the study.



## **BACKGROUND INFORMATION**

### **Characteristics of Special Education**

Special education is education provided to students with disabilities. A disability faced by a student in any form will inevitably result in a number of constraints being imposed on the teaching-learning process, thus requiring the application of a system of education that differs in form and often times purpose from that used with mainstream students. Educational programming has to take into consideration the different educational needs of this group of students resulting from their disabilities. Education thus acquires a uniquely different flavour as an appropriate educational programme for any individual student has to be planned and designed based on an assessment of the needs of that particular student. Overcoming or minimizing the obstacles to the teaching-learning process requires the application of teaching approaches and strategies that differ from that used in mainstream education. For optimum learning to take place, it is necessary to seek the expertise and involvement of professionals from various fields of disciplines, to make use of technological aids and devices, to modify the learning environment and to constantly monitor the on-going progress made by the students.

### **Special Education in Malaysia**

In Malaysia, special education is provided for three categories of students, namely students with visual impairment, students with hearing impairment and students with learning difficulties. Students with learning difficulties are a heterogeneous group receiving education in the same programme. Amongst them could be slow learners, students with mild to moderate mental retardation, students with autism, students with mild cerebral palsy and students with emotional problems. These students manifest behaviours that interfere with learning, such as inattention, poor memory span, hyperactivity, aggressiveness, indifference, tantrums, impulsivity and an inability to think and to strategize. Only those students deemed to have acquired sufficient daily self-help skills not to require constant monitoring from teachers are selected for inclusion in the special programmes planned and implemented for them in the public schools.

Students with disabilities receive their education under different types of programmes. They could be educated in either special schools or special classes integrated within a normal school. At the moment, special schools only cater to students with visual or hearing impairment while special classes cater to all three categories of students. A



number of students with visual impairment also receive their education within the mainstream with resource help from teachers. For students with learning difficulties, inclusion in the mainstream for a limited number of students is carried out based on their academic performance as evaluated by their teachers. Within the mainstream are also found a group of students who do not have handicapping conditions but are nevertheless slow academically manifested especially in their low-level acquisition of the 3 R's. Remedial classes, usually based on a pull-out model, are provided in all primary schools for this particular group of students.

Besides the public schools, other agencies also provide special education, early intervention and rehabilitative and other services needed by people with disabilities. Children with disabilities of a degree severe enough to interfere with daily self-help skills receive their services provided by the Welfare Department or non-governmental organizations instead of in the public schools. A popular alternative to the public schools is the community-based rehabilitation programmes that are funded and supported by the Welfare Department.

## **PROBLEMS ARISING FROM THE TEACHING OF SCIENCE AND MATHEMATICS IN ENGLISH**

### ***A. PROGRAMME FOR STUDENTS WITH LEARNING DIFFICULTIES***

It was not necessary to interview teachers serving in the programmes for students with learning difficulties to find out their problems in teaching Science and Mathematics in English. This is because the very nature and characteristics of this programme make this a non-issue as far as this particular special programme is concerned.

The Education Act (1996) allows a lot of leeway in the education of children with learning difficulties. The focus of education for this particular group of students is to help them acquire skills that will enable them to function independently in future, and perhaps to be able to contribute to the development of the nation. Although the aspirations of the national curriculum are espoused, the law specifically allows modifications to the curriculum to suit the special needs of the students taught. In practice, these modifications translate into

- (a) the inclusion of subjects in the areas of self-help skills, prevocational skills and recreational and rehabilitative activities



- (b) non-inclusion of many subject topics and lowering of the level of the contents and skills in all the subjects taught, including core subjects like Bahasa Melayu and Mathematics
- (c) shortening of the time allocated to the teaching of the subjects
- (d) an additional two years of education

The flexibility allowable in the implementation of the curriculum would mean that there is no necessity to teach Science and Mathematics in English, although the teachers would be encouraged to if a student demonstrates ability. It would indeed be very odd if these two subjects were taught in English, given that many of the students have not even mastered the very basics of Bahasa Melayu to enable them to speak, read or write to their age level. In fact, a quick check of the subjects included in the timetable of the various programmes serving students with learning difficulties will in all probability reveal that Science is not even taught in most of these programmes.

In summary, the issue of problems arising from the implementation of the teaching of Science and Mathematics in English is irrelevant to the programme of students with learning difficulties simply because teachers do not need to teach the subjects in English, as allowed by the law.

## ***B. PROGRAMME FOR STUDENTS WITH VISUAL IMPAIRMENT***

### **Teaching Students with Visual Impairment**

The major feedback from the teachers with regards to the problems of teaching Science and Mathematics in English is the compounding difficulty to the existing approach used in the education of students with visual impairment. A teaching approach that is already difficult and problematic in its application now has to embrace the additional problems caused by the new policy.

### **Teaching Approach**

In the education of students with visual impairment, Braille and print enlargement are the media to get across printed information. Braille is basically a coded writing system using raised dots to enable students to finger-read the information on paper. Incorporated into the Braille system are contractions representing certain common words, syllables, prefixes and suffixes for speedier reading and writing. Print



enlargement is merely the enlargement of print using a bigger font size, or with the aid of an instrument like the magnifying glass. It is used for those students with enough residual vision to still use sight as a means to receive and process visual information.

### **Problems Using Braille as a System of Communication**

In order to use the Braille system efficiently, the codes and the contractions have to be learned thoroughly, and be applied constantly. One of the existing problems in teaching students with Braille as the written medium is that there are a number of teachers and students who themselves have yet to be 'fluent' in Braille, so much so that a certain school has seen it fit to carry out additional Braille classes for the students. There are students who can produce Braille but who have problem understanding the words through finger-feeling. This major hurdle comes from just mastering the Braille system in Bahasa Melayu.

When teachers have to teach Science and Mathematics in English, both teachers and students have now to learn another set of Braille codes, and that is the Braille system in the English Language. In many ways, the two systems are similar but a number of difficulties will also arise as a result. One of the main problems will be relearning of the meanings as represented by similar codes shared by both the English and Bahasa Melayu Braille systems as illustrated below:

| <b>Representation</b> | <b>Meaning in Bah. Melayu</b> | <b>Meaning in English</b> |
|-----------------------|-------------------------------|---------------------------|
| a                     | atau                          | a                         |
| b                     | bahawa                        | but                       |
| c                     | contoh                        | can                       |
| d                     | dengan                        | do                        |

Another confusion which is commonly encountered is the use of the contractions and abbreviations used. Contractions and abbreviations are features used to facilitate the writing process in Braille. However, if the teachers and students have to use two Braille systems, uncertainty or mistakes in the application of the abbreviations would result. For example the word 'bina' could be contracted in two different ways, depending on whether one is contracting it using the English or the Bahasa Melayu version of Braille.



My colleague in college described the difficulties in the use of Braille as “the tip of an iceberg.”

To train students to be really fluent in the use of both Braille systems would require a long process of re-teaching and patient explanations and guidance from the teachers, that is, if the teachers themselves are also familiar with both the systems.

### **Lack of English Language Proficiency**

Related to the problem of mastering two different Braille systems is the problem of language proficiency of the teachers and students. To teach Science and Mathematics effectively in English would require that the teachers and students themselves be proficient in the English language. The teachers interviewed mentioned the urgent need to upgrade the English language proficiency of the Science and Mathematics teachers. One of the views put forth is that when the teachers are proficient in English, the science or maths lesson would be taught efficiently and creatively. In reality, The Teaching of Science and Mathematics in English is hampered by the teachers' and students' lack of English proficiency and the unfamiliarity with the use of English Braille system. A pragmatic and practical solution is employing an eclectic teaching approach using both English and Bahasa Melayu.

### **The Slow Learning Process**

The teaching-learning process in the education of students with visual impairment is already fraught with problems that are hampering the learning process to a significant degree. Teachers find the process of teaching problematic and that of learning rather slow. Any change of requirements in the implementation of the current curriculum, such as requiring Science and Mathematics to be taught in English would only add to the existing problems and slow down the teaching-learning process even further. Teachers and students now have to contend with the current problems as well as to master additional skills or make further adjustments to cope with the demands of the new requirements.

### **Learning Concepts**

Unlike the language subjects, Science and Mathematics pose unique problems in learning for students with visual impairment. This is because these two subjects



inevitably require the use of diagrams and other graphic representations to convey specific concepts. Understanding is to a large extent dependent on, or helped by visually looking at the graphic representations. For instance, a sighted person will by looking at a diagram given and following verbal explanations given by the teacher knows exactly how the internal organs of the human body look like. However, to understand the same concept, the student with visual impairment will have to rely on verbal explanations from the teacher, and his haptic feel of the diagram that has been modified to enable the sense of touch to differentiate the various organs. Even then, the teacher can never really know how much the student has fully grasped the concept, or how accurate his conceptualization is. After all, if a person has never really seen green in his life, can he really know what green is no matter how well the explanation is presented? A lot of Science and Mathematics contents have to do with understanding concepts and getting concepts across to someone who does not have the sense of sight is an extremely difficult and tedious affair. To overcome this problem, some teachers explain the same concept individually rather than in a group by letting each and every student feels a diagram and explaining the concept. In fact, certain conceptual topics just do not lend themselves to teaching without the use of sight and have to be left out. Experiments conducted to observe chemical reactions or *Electricity* would be examples of topics difficult to teach in Science while *Plan and Elevation* would be a difficult topic in Mathematics. These topics are sometimes just superficially explained or left out entirely by the teacher.

### **Students with Multiple Disabilities**

Students with visual impairment are hindered in their learning not just by their disability with sight but also by other types of disabilities as well, not least of which is low cognitive ability. Thus, all the students' disabilities have to be addressed at the same time. The teaching-learning process which is already difficult and tedious enough for a single disability is further weighted down by the additional considerations. One does not have to be very imaginative to know the Herculean task of educating a deaf-blind student. A high percentage of the students with visual impairment are also cognitively slow, thus requiring knowledge and application of a remedial teaching approach. Even with Bahasa Melayu as the medium of instruction, the teaching-learning process has proven to be a tedious and difficult journey, what more if the medium of instruction is now in English.



### **Absenteeism**

To learn effectively, learning has to be continuous and not come in starts and jumps. One of the problems encountered by teachers is the frequent absenteeism among the students. This problem is associated with special day schools at the primary level where the students have to find their way to school every day. Most of the students depend on their parents to bring them to school, and if for whatever reasons, the parents are not able to do so, the students will be absent from school. This makes learning a disjointed rather than a continuous process. Lessons that have already been taught have to be re-taught for the benefit of the students. This slows down the teaching-learning process considerably as those students who have already been taught have to sit through the same lessons again instead of progressing to new ones. This was cited by a teacher as one of the reasons for her not being able to complete the syllabus.

### **Knowledge Retention**

One of the difficulties commonly faced by teachers in the education of students with visual impairment is the students' poor information retention ability. Information disseminated is quickly forgotten and has to be repeated to enable students to remember what has been taught. The ability to see will enable a student to use visualization as a strategy for information recall, but with this vital sense of learning lacking or not functioning at all, information is not as easily categorized and systematically arranged for ease of recall. One relevant question posed by a teacher is whether he should teach until the students have fully understood what has been taught, or whether he should just teach to complete the topics in the syllabus. Many teachers do not complete the syllabus because of this unusually difficult circumstance associated with the teaching of students with visual impairment.

### **Non-Academic Activities**

A common characteristic of special education as practised in Malaysia is the amount of time that is devoted to non-academic activities. There is a tendency on the part of the authorities to demonstrate the various skills and capabilities of students with disabilities, especially to those not involved in the field of special education. Directives are aplenty from the state education departments, or the Special Education Department of the Ministry of Education to the special schools and programmes to participate in various kinds of contests, cultural performances, recreational and sports carnivals and social or



self-esteem building camps. Feedback from the teachers teaching students with visual impairment indicated that these activities are disruptive to the teaching-learning process. A lot of time is spent in preparing for an event to be held which otherwise would be more usefully employed in teaching the students. Often the same teachers or students are involved in all or most of the events to be carried out. The problem with these non-academic activities is that the special schools and programmes cannot refuse to participate as it would be going against official directives. So they participate obediently albeit with general reluctance.

### **Teachers Not Trained in Science**

Many special education teachers are not trained in the teaching of Science and Mathematics. In fact, there is little focus on the special pedagogy of Science and Mathematics instruction during the preservice teacher training course but rather the main focus is on the general methodology of teaching students with disabilities. The lack of content knowledge among the teachers as a result of non-specialization in the subject areas, and to a lesser extent, not having specific teaching methodology in the areas of Science and Mathematics have resulted in poor teaching quality. At the lower levels of instruction, the teachers may not face too much difficulty in grasping Science and Mathematics concepts even if they are not subject specialists as the level of difficulty is still manageable. However, when it comes to the higher levels, these teachers found it difficult not only to understand Science and Mathematics concepts but also the specialized techniques to impart the concepts to students.

These teachers who were not trained to teach Science and Mathematics resorted to teaching Science and Mathematics as they had learnt when they were in school as students. In fact, in one of the schools in the study, the teacher requested for a transfer out of the school as he did not like teaching maths because of unfamiliarity with the contents. Compounding this problem is the fact that unlike the mainstream schools where there is a wider selection in terms of the number of teachers that can be chosen to teach Science and Mathematics, in schools for the blind the choice is somewhat limited as most of them are visually impaired themselves and this would automatically disqualify them from teaching other subjects.



### **Text Production**

As support for the implementation of the teaching of Science and Mathematics in English, the Ministry of Education did send the texts necessary for use in the schools. However, a major problem that arose was that the books were sent rather late. In the use of texts for students with visual impairment, books cannot be utilized by the students until the normal print has been converted into Braille. Anyone familiar with the brailing process will know how time-consuming and tedious the conversion process is. This problem is compounded by the fact that it is the teachers who teach the subjects who have to carry out the brailing themselves. An added difficulty is that Science and Mathematics texts have diagrams and graphic representations which require more refined and specific skills in production than just normal brailing. The delay in the delivery of books caused the students to go for a long time without texts and one can only guess at the adverse effect this had on learning. A fact that was pointed out with regards to the production of texts was that when texts are changed or revised or when the students move to higher forms in subsequent years, the new texts will have to be brailled and the time-consuming process of brailing will once again be repeated.

### **Audio-Visual Aids**

On implementation of the policy of teaching Science and Mathematics in English, a variety of audio-visual aids were given to the schools to facilitate the move. These aids may have been very useful to mainstream students, but to students with visual impairment there are a number of limitations to the usefulness of these aids. For students with visual impairment, any teaching aid that requires the use of sight will immediately pose an obstacle to its use. Many of the CD's sent are visually rich, and this is as it should be. However, for students with visual impairment, an audio-oriented presentation or product would be of much more use as information input for them is mainly through the use of hearing. To enable a more comprehensive understanding of what is visually presented, teachers would supplement with further oral explanations to the audio explanations already given. One of the comments made by the teacher-in-charge of the Resource Centre in one of the schools I visited was that the audio-visual materials that were given were more visual than audio, and she would have preferred it if the audio element had been more.



### **Steps Undertaken to Overcome Problems**

Teachers of visual impairment have proactively thought up and applied creative measures to overcome some of the more pressing problems faced. Some of these solutions include:

- (a) enlisting the help of volunteers and parents to produce the modified diagrams and other visual representations that are used to teach students with visual impairment. This has eased the burden of work for the teachers and freed up a lot of valuable time.
- (b) creating modified diagrams and other graphic representations that can be reused over time, instead of for a particular time when there is a need.
- (c) coming in early before school hours to provide extra tuition and coaching to their students. This to a certain extent has alleviated the time constraints caused by the disruptions to the teaching-learning process, and the slow teaching-learning process itself.
- (d) organizing remedial classes to improve proficiency in the use of the Braille systems. This was carried out in one of the schools that realized that the students themselves were not proficient in Braille.

### ***C. PROGRAMME FOR STUDENTS WITH HEARING IMPAIRMENT***

The feedback from the two maths and science teachers from the two schools of hearing impairment is the main focus of discussion here, with constant references to common facts or widely accepted truths about the disability of hearing impairment and the education of students with hearing impairment.

Many of the problems arising from the teaching of Science and Mathematics in English in the education of students with hearing impairment parallel that of the programme for students with visual impairment. One of the main problems stems from the compounding difficulty to the existing problems of teaching students with hearing impairment.

### **Problems with the Approach to Teaching**

The approach used in the teaching of students with hearing impairment in Malaysia is known as Total Communication. Using this approach, the teacher signs and speaks at the same time when communicating with the students. However, to facilitate communication further, the teacher can resort to drawing, writing, finger-spelling, as well as facial expressions or body language to help convey the message that needs to be communicated.

Teachers use the Hand Codes of the Malay Language (Kod Tangan Bahasa Melayu) as the basis for signing. For teaching purposes words are signed and occasionally finger-spelt exactly as they are spoken. One who is not familiar with the sign language could very well deduce that signing is an efficient substitute for talking as a means of communication. However, any teacher of students with hearing impairment will be able to elaborate the numerous shortcomings inherent in this method of communication. First of all, there is a shortage of the number of signs that are being used, even for the very basic words. Words with abstract meanings are especially difficult to sign, or may have no sign equivalents. Then there are the various terms and references specific to school subjects that have no sign equivalents. Teachers overcome this problem by recasting, rephrasing and reducing the language forms of the sentences used to a very basic level. As a result, when communicating with students with hearing impairment, the same words and phrases get repeated over and over. Communication is also strewn with a lot of explanations for concepts or the contents that are being conveyed. Miscommunication is not uncommon, or communication can even be short-circuited because of the difficulty of getting the right message across. Even when simplifying the language to a level where signing is no longer a problem, there is still the problem of making the students understand what is being communicated because the language mastery of the students is very low.

What are the complications that will arise if teachers have to teach Science and Mathematics using English? First and foremost, teachers themselves have to learn another sign language system and this can be very difficult as fluency in signing only comes with constant practice and fluency in the language itself. Many people have the impression that there is a common sign language system and that for as long as a person knows signing, he will be able to communicate in sign language with any person



with a hearing impairment. This is a fallacy as different countries use different sign systems. To be able to learn up the American Sign Language, the system that is used here in Malaysia, a person has first of all to be fluent in the English language. After all, the signs represent words in the English language. Feedback from the teachers of the two schools for students with hearing impairment indicated that the English proficiency of the teachers was a problem that needed to be addressed urgently.

### ***Lack of Language Proficiency***

Understanding a second sign language system for students with hearing impairment does not pose much of a problem as they are quick in learning new signs. However, what constitutes a major problem is their inability to adequately master formal language systems be it English, Bahasa Melayu or any other language. One of the main challenges faced by students with hearing impairment is to acquire language to a level that will enable them to perform well academically. It is generally acknowledged that failure in examinations on the part of students with hearing impairment is not due to low cognitive ability but rather to poor language acquisition. How can students acquire academic information and facts from written texts when their language ability is for the most part limited to the sporadic understanding of the meanings of individual words, and not even basic underlying language structures? How can academic information and facts be conveyed by them through the written word when they have extreme difficulty in stringing words together to form meaningful sentences? Despite this generally known weakness, teaching methodology and practices have still not reached the stage where the majority of students with hearing impairment are being helped to the extent of mastering language adequately to perform satisfactorily in their academic pursuits. Few are able to pass the national examination to further their education after Form Three and so have to find other avenues to continue with their lives.

Compared to other subjects, Science and Mathematics may in fact be easier subjects for students with hearing impairment. The reason for this is that the visual representations and diagrams are able to facilitate easier understanding as concepts can be presented and conveyed without the use of too much language. Cognitively, students with hearing impairment without other accompanying disabilities are able to grasp concepts just as well as their hearing peers. Failure to comprehend the language used to convey the concepts, or to use language to convey their comprehension is the major culprit for



students failing their examinations. To overcome the language barrier to learning for students with hearing impairment, examination questions are moderated in that the same questions are posed but the language used is simplified. For instance, questions like “All the following statements are true, **except** ....” would probably be rephrased to make it more direct. Or “Which one of the following .....

” would in all probability be replaced with the much simpler “Choose.....” Feedback from the teachers interviewed indicated that this measure of moderation has brought about positive and encouraging results. The use of English to teach Science and Mathematics will unquestionably make learning more difficult as students will now have to contend with another language system.

### **Similarity of Problems with the Programme for Visual Impairment**

Other than the communication and language problems, the teachers of the two schools for the deaf also encountered problems similar to the ones discussed by the teachers in the two schools for the blind concerning the implementation of the teaching of Science and Mathematics in English. Basically, educating the deaf has its own set of unique problems which hamper the teaching-learning process making overall achievement far from satisfactory and the new policy will merely compound this difficulty. The problems are:

- (a) students with other disabilities
- (b) poor information retention
- (c) the prolificacy of non-academic activities
- (d) teachers not trained in the subject areas

### **Textbooks and Audio-Visual Aids**

When there is a book, there must be language. And when one talks of the problem of deafness, one always talks about the extremely poor language ability of a person who is hearing-impaired. If students have difficulty understanding written Bahasa Melayu, a language which they are exposed to and use all the time, how much more difficult will it be for them to understand written English. Science and Mathematics textbooks written in English will be that much more difficult to understand than textbooks in Bahasa Melayu.



Whereas students with visual impairment are hampered in their understanding of contents presented in the audio-visual aids provided for the teaching of Science and Mathematics because of inability to discern the visuals, students with hearing impairment are hampered similarly by their inability to listen to the audio explanations.

So, while teachers of students with visual impairment orally explain what they see of the visuals that accompany the audio explanations, teachers of students with hearing impairment sign their interpretations of the audio explanations that come together with what is visually presented. Any which way, the audio-visual aids are not as useful as they could have been, and certainly do not serve their purpose the way they do for students without a disability in either the sight or hearing mechanism.

### **Steps Undertaken to Overcome Problems**

Certain practices specific to special education are carried out as measures to overcome some of the problems commonly encountered in the teaching-learning process of hearing impairment education. The measures include:

- (a) completing Primary One over two years instead of one in accordance with the legal provision of an additional two years of education either at the primary or secondary level. Feedback indicated that this has provided the students more time to strengthen their language base, as well as enabling the syllabus to be completed on time. However, this would still leave four more years when the syllabus has to be completed within a year.
- (b) using teachers who are fluent in English to teach Science and Mathematics since he would already be proficient in both the language and the signs for English
- (c) simplifying the language when signing or using simpler alternatives to explain concepts and abstract contents to circumvent the difficulty of explaining in sign language



### **SUGGESTIONS FOR ALLEVIATING OR OVERCOMING PROBLEMS**

Some of the suggestions put forth by the teachers and administrators in alleviating the problems encountered include:

- (1) conducting courses in English language proficiency for the teachers teaching Science and Mathematics. The Ministry of Education, the state education departments or the teacher training colleges can look into this aspect.
- (2) providing audio-visual aids and textbooks that are more suited to the needs of special education. Instead of the normal printed texts, perhaps texts brailled in English could be sent to schools and programmes for students with visual impairment. The audio-visual aids should also be modified to be more in line with their needs. As for students with hearing impairment, texts written in simpler language could be produced with a lot more diagrams and graphics. Audio-visual aids could perhaps include an interpreter signing what is being explained in the visuals.
- (3) standardizing Braille codes or hand codes used for the terms and references specific to Science and Mathematics in order to minimize the confusion that could arise because of the different Braille codes and manual signs that could be used for the same word.
- (4) giving priority to the intake of students who have background in English, Science and Mathematics for the special education courses in the teacher training colleges. At the moment, most of the students are lacking in this credential. For both the courses in hearing and visual impairment, a lot more emphasis should be placed on the methodology for teaching Science and Mathematics.
- (5) providing more teaching hours to the subjects of sign language in English and also Braille in English in the special education courses. The number of hours in the syllabi devoted to the mastery of these two skills is just not enough for the teachers undergoing training to become proficient in their usage.



## CONCLUSION

Feedback from the special education practitioners in the education of students with visual and hearing impairment indicated there are a number of obstacles in the way of effective teaching and learning. This is in the nature of the teaching approaches applied which come with their own unique characteristics, and also shortcomings. Education for these students with disabilities is fraught with problems making the teaching-learning process a rather slow and tedious one. The requirement to teach Science and Mathematics in English would only compound these existing problems by making these teaching approaches more complicated and making lessons even more difficult to comprehend. Teachers are also lacking in two important qualifications that would help with the teaching of Science and Mathematics in English, and that is basically English language proficiency and subject area familiarity. The textbooks and audio-visual aids that were provided did not take into consideration the special needs of the students, and as such there were limitations to their usefulness.

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