

Investigating Student's Experiences of Learning Sciences and Mathematics in English Medium Instruction: A Case Study

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Abstract

The purpose of this study is to investigate the students' experiences of learning science and mathematics in English medium instruction in Malaysia. In addition, this study also intends to explore the students preferred language as medium of instruction in learning science and mathematics and why they preferred this language. The design of research used is a qualitative design which applied interview as a data collecting method. There are four participants involved as a sample which came from different level of study. Based on the findings of this study, the researchers were able to conclude that most of the interviewed students, who are from urban area, have a positive perception of learning science and mathematics in English medium instruction. They believe that it is better to implement English as a medium of instruction in teaching and learning science and mathematics. Therefore, the researchers recommend that there is a need for further study to conduct larger sample of research so that it may provide further insight into the research questions.

1. Introduction

In the twenty-first century, many countries are increasingly dealing with rapid social, economic and political changes that take place in their societies as a result of technological innovations and the process of globalization. These nations often turn to their educational system to help prepare their youth and citizens for the challenges that they must face. Towards this end, ministries and local school boards are becoming increasingly aware of the need to reform educational practices to make them congruent with the realities and demands of a new age. Thus, in order to prepare a new generation for the demands of this new era, many programs have been introduced. For instance, the adoption of English as the medium of instruction (EMI) has been sweeping across the education landscape worldwide (Chang, 2010).

Furthermore, education in Malaysia has gone through tremendous changes over the years. One of the major changes, implemented in January 2003, is the teaching and learning of Science and Mathematics, which had formerly been taught in Bahasa Malaysia (BM), Malaysia's national language, in English for the primary and secondary school levels. The policy is popularly known by its Malay acronym, PPSMI (Pengajaran dan Pembelajaran Sains dan Matematik dalam Bahasa Inggeris which in English parlance mean English as the language of instruction for Mathematics and Science) (Tan, 2009). The implementation of this policy has a crucial role to play in developing

students who are competent in the English language so that they can keep pace with the rapid advances in science and technology, which is important as English is the language of technology (Nor, Aziz, & Jusoff, 2011). For example, huge information about science and mathematics is available through the internet in English

1.2 Statement of the Problem

In the 21st century, the challenge of globalisation demands that the people of Malaysia to become more knowledgeable, skilled, disciplined and emphasise quality. The presence of the English language nowadays is often identified with the very process of globalization: the increased flow of ideas, commodities, information, capital, and people across the boundaries of states. The status of English as a "global language" seems to be a condition of the globalizing era in which people all over the world are interconnected through new communicational technologies and the global system of market economy. In 2003, forty-six years after independence, the Malaysian government reintroduced English as a medium of instruction in public primary and secondary schools (though it has since reverted to a policy that will mandate the teaching of these subjects in Bahasa Malaysia from 2012) (Rubdy, Tupas, Villareal, David, & Dumanig, 2011). Hence, Science and mathematics in lower secondary subjects have been taught in English. When English language has been used as a medium of instruction in schools, the proficiency of the English language is a must for students to understand what their teacher's teaching. Because, language plays an important role in communication, thinking and is a tool for the process of teaching and learning between teachers and students. Students use language to communicate and to understand subject concepts. Language influences students' thought by moulding perception and structuring ideas. However, students as a learner have been facing some problems when the medium of instruction changes from their native language (Malay language) to another one (English). For instance, students face difficulties in following the classroom lectures and understanding the textbook. Some of students find it difficult to ask or respond to questions in the classroom due to lack of proficiency in the new language of instruction. As a result of these problems, many students tend to get confused, lose confidence and question their intellectual capabilities.

Since 2003, the government has been managed to implement the new policy against all oppositions, but the controversy over the policy was escalating while students and teachers in

public schools were struggling to accommodate the new linguistic norm. In the early 2009, the opposition to the new policy and the growing frustrations about the result of its implementation was expressed in mass demonstrations on the street of Kuala Lumpur. Finally, in July 2009, the Minister of Education announced that the government would scrap the policy of teaching science and mathematics in English and, in 2012, schools would start teaching them in the national language.

However, while the political pressure forced the government to reverse its policy, the reversal is not welcomed by all Malaysians. For example, some of the inner-city school students felt ambivalent (hesitant) about the idea of “going back” to the old policy. According to them, “going back” would only prove that they had been doing pointless struggle adapting to a unsystematically designed policy with errors. The most vocal oppositions to the reversal of the policy, however, came from English-speaking professionals and intellectuals and the parents of the Malay/English bilingual schools in upper-middle class suburban areas. The parents who supported the policy of teaching science and mathematics in English are now asking the government to give them a choice to continue in English while allowing rural and inner-city schools to go back to Bahasa Malaysia (Choi, 2010).

Therefore, it is essential for this research to explore students’ viewpoints and experiences of learning science and mathematics in English medium instruction in order to gather deeper information and to help students to overcome their problems. It is hoped that the findings of this study would help justify the decision the policy makers have with regard to English for Teaching Mathematics and Science.

While there is a wealth of research on the teachers’ perspective of teaching science and mathematics in English, there is little information on student perspectives of learning science and mathematics in English. Similarly, very little qualitative research has been founded by the researcher on students’ experiences of learning science and mathematics in English medium instruction and within the context of an urban area. Therefore, the researchers have chosen to conduct their research on investigating the learners’ (who directly involved in implementation of this policy) experiences of learning science and mathematics in English medium instruction. This includes exploring in-depth their feeling and experience, their difficulties in the process of learning science and mathematics in English medium instruction.

1.3 Purpose of The Research

The purpose of this study is to investigate the students’ experiences of learning science and mathematics in English medium instruction in Malaysia. Their feeling and experience about learning science and mathematics in English medium instruction, their difficulties that they encountered in their English medium instruction of science and mathematics will be investigated. In addition, this study also intends to explore the students preferred language as medium of instruction in learning science and mathematics and why they preferred this language.

1.4 Research Question

This study is anchored on a central research question which is followed and supported by several sub-questions. This was done because Creswell (2007) contended convincingly that qualitative researchers should endeavour to reduce their study to a single, overarching research question (also known as central research question) to be followed by several sub-questions. He went further to assert that for qualitative researchers to be able to achieve this feat, they should state the broadest question they could possibly pose about the research problem (Creswell, 2007:108). Consequently, the central research question (overarching question) to be addressed in this study is-

1. What are the experiences of students regarding learning Science and Mathematics with English language as a medium instruction?

1.4.1 Sub-Question

a. What do the students feel and experience while learning Science and Mathematics with English language as a medium instruction?

b. What are the difficulties the students encounter in their English medium instruction of Science and Mathematics?

c. What is students preferred language as medium of instruction in learning Science and Mathematics and why?

2. Literature Review

Malaysia has a blue print called Wawasan 2020 [Vision 2020] that intends to move Malaysia towards a knowledge economy (K-economy). With this in mind, government planners have set in motion aggressive efforts to develop the pre-requisites of such an economy, namely an adequate supply of skilled human resources, a strong base in Science and Technology and the building up of technological infrastructure (Badaruddin, 2002). In order to achieve this level of development, policy makers are confronted with the fact that English is

becoming more and more important as a language for disseminating scientific and technological knowledge, accessing global economic opportunity and maintaining competitiveness Tan (2009).

As a consequence, there are different perceptions and arguments among the people of Malaysia from different races on the implementation of English medium instruction policy. Some people argued that why did the government decide to introduce English to the teaching of science and mathematics, not to history or religious education classes? Government officers, as well as some scholars of language policies, provide utilitarian and pragmatic explanations, arguing that the knowledge in the field of science and technology is mostly produced in English, thus English is the best language to access the knowledge.

Deputy Minister Fong argues that both language-Malay and English- should exist side by side. He said "we should recognize the different roles played by languages. One is to do business, the other to establish an identity." However, most conservative educators worry that a policy of bilingualism runs the risk of both languages being understood and spoken poorly. The poor standard of English among university students and also only a small number of students from rural areas are totally conversant in Malay (Michael, 1993).

Since the early 1970s until 2002, every subject, except for English and People's Own Language (Malay, Chinese, Tamil), was taught in Bahasa Malaysia. Despite the recent introduction of English to science and mathematics classes, Bahasa Malaysia is still the primary language of instruction in schools. Students who want to proceed to colleges and universities in Malaysia have to pass SPM (*Sijil Pelajaran Malaysia*: the Malaysian Certificate of Education) conducted in the national language. Therefore, the mastery of the language and the accumulation of knowledge in the language are crucial for students' social advancement through education.

A study conducted by Choi (2010) introduced one teacher's experiences. In this study, a Malay-educated Chinese who taught mathematics, tells how difficult it was for most Malay-educated teachers to make the language transition. With surprising honesty, she told several English-educated and English-speaking teachers about the struggles she was going through. When she attended school, most classes were in the national language. Although she managed to learn how to communicate in English and even used English in classes, most of her knowledge in mathematics and her experience of teaching were in Bahasa Malaysia. She admitted that, without the

help of English-educated senior teachers, it would be really hard for her teaching in English. Every morning, she had to ask English teachers how to pronounce new English words. But when she used English terms such as "subtraction" and "parallel equation," she still felt her tongue was tangled and twisted.

There is another research that was conducted by Ales Puteh on the topic of "The Language Medium Policy in Malaysia: A Plural Society Model?" in 2010. The researcher argued that lovers and supporters of the English language including Malay leaders (and even perhaps its traditions) believe that everything can be solved through the use of the English language in everyday life. This is a victory of the colonials over their colonized 'children'. They seem to be oblivious to the fact that many of the major countries in this world do not use English as their everyday language, nor as the communicational language in Mathematics and Science subjects.

The researcher further claims that in actual fact there is nothing special about the English language with respect to the level of education of a student and in scientific discovery and advancement. This is especially obvious in the scientific field, as the number of important researchers and scientists who have made important discoveries are not dominated by native English speakers, or English trained individuals. For example, the current joint Nobel Peace Prize winners for Chemical Engineering are Koichi Tanaka from Japan, John Fenn from the United States and Kurt Wuehler from Switzerland. Tanaka is 43 years old and is the fourth winner from Japan in the past three years(Puteh,2010).

However, some professionals and intellectuals who came from English-speaking and the parents of the Malay/English bilingual schools in upper-middle class suburban areas strongly support the policy of teaching science and mathematics in English medium instruction. The parents who supported the policy of teaching science and mathematics in English are now asking the government to give them a choice to continue in English while allowing rural and inner-city schools to go back to Bahasa Malaysia (Choi, 2010).

It is very normal to have different attitude and opinion among the people once implementing the new policy especially in multi-cultural and multi-racial countries like Malaysia. But we have to understand the important point that the English language is not superior to anything. The most important thing is our grit to improve our potential ability. Of course we cannot ignore the importance of English in this new era that has been changed

tremendously by science and technology. The more language we learn, there are more doors that will be opened for us. That means, by learning English and other languages (Arabic, Japanese, Mandarin etc.) we can improve our knowledge and skills to stand firmly in this competitive world

3. Methodology

Methodology is a way of thinking and studying social phenomena (Corbin & Straus, 2008). Qualitative research is characterized by allowing researchers to identify a wide range of understandings, meanings, and values by which individuals make sense of their everyday experiences (Straus & Corbin, 1998). The qualitative researchers typically focus on a relatively small, purposeful sample for collecting information rich-insights (Patton, 2002).

The method use to facilitate this study is a case study which is a qualitative study. This design was chosen as the aim of the study to explore and investigate the students' experiences of Learning Science and Mathematics in English Medium Instruction. The data collection utilized interview method which is the most suitable to get the useful information as the aim targeted for this study.

The steps of running the study are very important to being followed for example; the research problem should choose to focus on a developing research questions. Starting from a broad topic, such as English language as an instructional medium of learning science and mathematics, then narrowing the field to the students' experiences who live in urban area can lead to a variety of potential research questions (Corbin & Straus, 2008).

3.1 Sample and Sampling Technique

The targeted samples were students who study in urban areas in Selayang and Batu Caves. This area consists schools which have practices English as an instructional medium in learning science and mathematics for several years. The period of practicing the English as an instructional medium in learning science and mathematics is enough to get deeper information.

This study is qualitative and thus purposeful sampling was utilized. This kind of sampling can allow one to select people who can best help to understand the phenomenon in focus (Creswell, 2007). The samples for this study consist of four students who experienced learning English in science and mathematics among population in selected areas. They are from different level of study purposely to get as much variety information for this study. The period of exposure to the practices will bring the different perception and ideas.

The interviewees involved two female students and two male students from different level whom are 11 years old, 14 years old , 16 years old and 19 years old.

3.2 Data Collection

There are many ways and methods to handle the study. The interview is the most common form of data collection, especially when the study related to education. By using qualitative design in the process of collecting data, it allows researchers to learn from the participants and the recording of data as the study proceeds. As the study is qualitative design, it involves the purposely sampling where the sample chooses from the information gather from the other sample. This kind of sampling can allow one to select people who can best help to understand the phenomenon in focus (Creswell, 2007). The interview question was structured to ensure the data collected was depth enough and useful.

In this regard, the interview was made at the home to make the participant comfortable since they are all students and some of them are young. The interview session took about 10 minutes for each participant. Before the interview session researcher get to know the family and get permission from their parents. The researcher explained the aims and objectives of the study and acknowledged the participants' readiness and involvement. Before the session started there is some introduction to know the background of the participant. This session is important to ensure the questions asked suitable and able to respond. Researchers then ask the interview questions one by one to get the depth information. Researchers use the MP3 recorder to record the interview session. Henceforth, the responses were transcribed and arranged according to the themes.

4. Discussion and Finding

This research carried by using a qualitative design which the process of data collection utilized the interviewing method. This method is suitable to the aim and objective of the research to investigate the students' experiences of learning science and mathematics in English medium instruction in Malaysia. Four participants involved gave different responses in the interview sessions. Their responses were transcribed and suited to the selected theme.

Based on the purposes of the research which are :
1) To discover students feeling and experience about learning science and mathematics in English medium instruction. 2) To investigate their difficulties that they encountered in their English

medium instruction of science and mathematics. 3) To explore the students preferred language as medium of instruction in learning science and mathematics, the interview questions structured to gather the information needed. To fulfil the objectives, the sample of questions such as: "I would like to know your experience and opinion about learning math and science in English. Have you experienced learning math and science in English medium instruction?", "Between Malay and English language, which language you prefer and feel comfortable to use? Could you please compare your past and current experiences in learning science and math in two different languages? And among these two languages which language you feel easier for you to understand science and math?" and "if you are given opportunity to choose one language between Malay and English as a medium of instruction in learning math and science which one (language) you prefer?". Those questions get different responses from all four participants.

The first participant, who is 19-year old, has a positive attitude about learning sciences and mathematics in English and prefers to continue the policy of teaching and learning science and mathematics in English medium instruction. The sample of response from the participant is: "a new way of learning besides all the other subject which in Malay, it was a nice of a piece when in math and science which were in English", "actually I have been proficient in English, when I was little. So most of the time I have trouble of no understanding it when it taught in Malay." and "I must prefer it to be English, because, honestly, in today's world, I mean if you are not going into teaching you child math and science in English, they are going just to be confused with all these new terms when they come out, so my advice, give the world starts". Those responses show the first participant prefer to learn science and mathematics in English.

Second participant is 16 years old. A sample of the responses from this participant: "The teacher gives an option start from form 4", "so the teacher will arrange a meeting with students and ask us to fill the form that shows our choice of choosing which language in teaching science and math. Based on the result, it will be conducted in Malay or English medium instruction." "So all subjects, including biology, physics, if the majority chooses English, then teacher will conduct it in English", "I feel easier if it's taught in English, because I am accustomed to learn it in English since standard 1".

This participant is quite passive in the interview session. The responses recorded is quite difficult to transcribe because of lack of

information. However some responses are useful. This participant also comfortable and prefer to learn science and mathematics in English.

The third participant is a 14 - year old. In the interview session, this respondent given some information, such as "it is very inconvenient when the policy change. Because since the first few years which have been learning it via English, but now the government change it to Malay". This participant also in the category who practicing English in everyday communication. Obviously she prefers to learn science and mathematics in English. There are no difficulties in this practice because by learning these subjects in English it will be easier to get the information from wider sources since most of the references use English as a medium.

The last participant who is the youngest among other participants is studying in standard 5. She had been experiencing learning science and mathematics in English for several years before the policy changed when she was in standard 4. She is also the one who practices English as a communication medium. The responses that researcher record from the interview session such as "When the first time the medium of instruction changed from English to Malay, I felt difficult, after that, day by day I feel ok, by practicing English we know how good our language.

This participant, compared to other three participants, does not really care about the medium of instruction either it is in English or Malay. She found that it is quite difficult to learn those subjects in Malay after practice it for several years in English. However, she said the medium of instruction is not the matter whether her achievement is good or not.

5. Conclusion and Recommendations

This study is to investigate the students' experiences of learning science and mathematics in English medium instruction in Malaysia. The design of research used is a qualitative design which applied interview as a data collecting method. There are four participants involved as a sample which came from different level of study. Their experience was recorded and transcribed based on the responses from the interview session. Each session of the interview took about 10 minutes with each participant. The question asked was structured based on the aim of the research. These questions structured to get the useful and informative responses. After the interview session, the responses which recorded by the MP3 was transcript. Then the transcription was studied and review the purposed of evolutions and focus on the research questions. The key of questions was

identified together with a theme and pattern to bring it together to reach the conclusion.

Based on the findings of this study, the researchers were able to conclude that most of the interviewed students who are from Urban area, have a positive perception of learning science and mathematics in English medium instruction. They believe that it is better to implement English as a medium of instruction in teaching and learning science and mathematics. Because, based on their experiences, they perceive that they have not faced difficulties in learning science and mathematics in English. Therefore, the researchers recommend that there is a need for further study to conduct larger sample of research so that it may provide further insight into the research questions. Moreover, future studies may use students from different school districts and locations to increase the generalization of the research. Lastly, although students are the main object of implementation of English as a medium of instruction, it is equally important to understand how teachers are implementing the policy in the classroom and using it to guide instruction. Hence, for future study, it would be significant to examine how teachers are interpreting and implementing policy regarding English language learners—specifically, how teachers are understanding, interpreting, and implementing English as medium of instruction which affect students' academic performance in Malaysia.

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