Using of English in Teaching Mathematics and Science: Is the Performance Satisfactory?

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ABSTRACT

The policy of changing the medium of instruction in the teaching of Mathematics and Science from Bahasa Melayu to English is an important innovation affecting teachers of Mathematics and Science generally. It poses special challenges not only for teachers who have been trained in the Malay medium but also for those trained in English, whose professional experience has largely involved the use of Bahasa Melayu as the medium of instruction. This investigation seeks to find out the achievement of students after considering the impact of prominent independent variables such as environment, teaching methodology, and attitude. Analysis of the development in the state of Terengganu has been carried out by the distribution of questionnaire to teachers involved. Results of the correlation and multiple regression indicated that all the three factors are significantly associated towards students achievement. However teaching methodology indicated a low level of moderate correlation which is believed to be the immediate issue that needed to be addressed in the new system.

BACKGROUND OF STUDY

Nowadays, English is one of the most important languages and seems to be the main languages of the world. While considering to compete in the global market, moving along with rapid technological advancement, and meeting changes in societies' needs, wants and values will therefore demand everyone to have skills and knowledge about English language. Moving into the year 2002 represents a significant milestone in the history of education development in the country, which is, Science and Mathematics were to be taught in English (Foong, 2001). Realizing the importance, the government of Malaysia has stressed on the usage of English in the national education system. In fact back to the year 1993, The former Prime Minister repeatedly announced that all subject of science and technology should be taught in English. After several attempt and extensively debated, beginning January the 1 st 2003, the government introduced the teaching of Science and Mathematic from standard one up to standard six should be in English.

The implementation of teaching Science and Mathematics in English raised many issues and challenges to the teaching members not only at the primary and secondary school but to the academicians at the higher institution learning. Among the anxiety that needed to be addressed is because teachers and other teaching members are responsible to hold the success of the implementation in assisting the Ministry to realize the mission.

In order to improve English language among Malaysian, government take an initiative through the implementation of English language for subjects Mathematics and Science for primary and secondary school. After several years of implementation, issues and complaints about the proficiency of teachers received attention at the school board and by the general public. Statements in the newspapers concerning teachers who are incompetent demand the Ministry to strategically initiate policies in bringing the success of the implementation.

But, there are few controversies arise after implementing it to the students in school. One of the controversies is whether the students performance will increase after implement it. Do the rural students can adopt English as the second language in their lesson for subject Mathematics and Science? Besides that, how about the teacher's acceptance, whether they are willing to teach in English?

This paper attempts to discuss the scenario of student's performance after the implementation of teaching at the primary and secondary school for Mathematics and Science and English as a subject. The unit of analysis for the study focus on teachers who were given the responsibilities teaching the above subjects. The investigation seeks to uncover to what extent the teaching methodology, attitude and environment significantly influence the performance of students after the implementation of using English for Mathematics and Science subject. This research will be beneficial for teachers to improve their teaching methods and ways during their lesson to students.

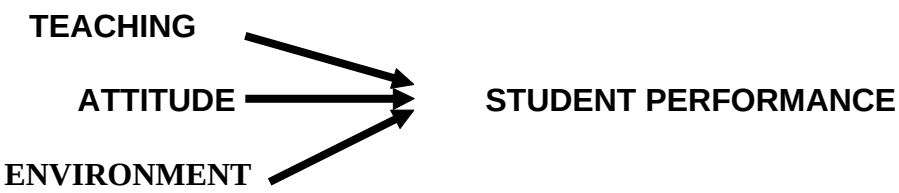
PURPOSE OF THE STUDY

The main purpose of the study is to investigate the students' performance after the implementation of Mathematics and Science subjects in english for primary and secondary school. Specifically this paper will provide an insight towards understanding the strength between variables and which among them significantly associated towards the performance of student at school. Further the discussion of the paper aimed to investigate as to what extent the identifiable variables such as environment, teaching methodology, and attitude indicated the strength of their relationship on performance of students.

SCOPE AND LIMITATION

Focusing the state of Terengganu as a case of our study, the investigation initially decided to investigate all the 7 districts by using stratified sampling . As the population of the study is large and the data collection activities were limited by budget availability, 3 district was chosen to represent the entire population. Among the districts selected were Kuala Terengganu, Dungun, and Marang representing the more developed, average developing and less developed district. The unit of analysis focused on teachers teaching subject in Mathematics, Science and English for the primary and secondary school.

THEORETICAL FRAMEWORK



From the above theoretical framework , it could be observed that the performance of students which is the variable of primary interest are subject to many elements that are found shaping the outcome of the performance. Thus our independent variable which consist of environment, teaching methodology, and attitude will be hypothetically tested in the study. Environment at school can affect the students' performance. It consists of environment in classroom, school and students home. For example, to what extent does the school authorities provide environment of using English language for announcement, have adequate reference books about the subject in English. Besides that, analysis concerning environment at their home also believed to provide considerable effect to the success of the implementation. Among the dimension included in the study is to what extent does the family encourage their children to speak in English at home or while they were together. Teachings also affect the performance of students. We can see from characteristic of teachers in term of experience and training, teachers teaching methodology, teaching facilities, and teaching materials such as books, CD Rom, Magazines and facilities. The concept on attitude include dimensions on teachers as well as students studying at various schools. Performance of students believed to be affected based on the attitude of teachers were also explored. Among the dimensions included concerned on whether the teachers are strict in their duties or teachers always put extra effort to improve teaching presentation. Besides that, from students attitude we can see to what extent students attentively concentrate during class and whether they complete their homework as scheduled. In relation to the above theoretical framework the following hypotheses were formulated to address the research question:

Hypothesis 1: There is a significant relationship between environment with performance of students

Hypothesis 2: There is a significant relationship between teaching with performance of students

Hypothesis 3: There is a significant relationship between attitude with performance of students

LITERATURE REVIEW

Environment

Environment refers to comfortable and attractive classroom that are able to stimulate learning and supporting classroom community development (Ahrentzen and Evans, 1989). In addition the presentable physical environment will strengthen the role of promoting students' achievement **(**Holliman and Anderson, 1986**).** Literature in recent years regarding research in classroom ecology showed relationship between students' seat location within the classroom and dependent variable such as course grade thus provide the undeniable importance of maintaining classroom environment.

Conducive environment is always vital in promoting effective learning. Walberg (1991), proposed that the definition of classroom environment should include elements that make classroom an inviting place to learn. Continuous efforts are therefore necessary in making students feel comfortable with their surroundings. Among the elements could be as basic as regulating the temperature and as elaborate as spicing up the room décor as well as maintaining maximum cleanliness in and outside the room. The art of environment creation not only involved educating, informing students of their responsibilities, and form a customized learning environment that will be assisting but also involved helping students to apply knowledge in practical ways. Thus the success of student learning will reflect a person to become a successful facilitator of education. A confident teacher, informed students, and tailoring of the program should increase student and teacher satisfaction and facilitate student learning. Always remember that what we do in the classroom is so much more than simple delivery of information.

Other than that, Hathaway (1983) concluded that quality classroom light is conducive to greater comfort and contentment; a more cheerful environment; more concentration and a greater desire to work; less fatigue and therefore fewer side-effects of fatigue, such as laziness, bad posture, nervousness, and lack of interest; and greater accuracy and neatness. There were other evidences on the theoretical and empirical work suggesting that home environment plays an important role in supporting learning climate.

Upon reviewing the literature it is justifiable to conclude that environment is the important element because environment will make the classroom as inviting place to stay for a whole time of study at school. Further, it will increase spirit of teaching for the teacher in deliver the knowledge to students. Physical environment that created in class will encourage students to learn in comfortable condition and influence them to study and motivate them towards achieving good grades.

Teaching

Teaching refers to numerous professional development strategies for science and mathematics teachers, which they describe as high quality professional development. Teachers can create their own style and methods in order to deliver lesson to the students. Loucks-Horsley & Matsumoto (1999) identified numerous professional development strategies for science and mathematics teachers, which they describe as high quality

professional development. The strategies can be roughly grouped into five categories: immersion, examining practice, curriculum development, curriculum implementation, and collaborative work.

Karapetrovic and Rajamani (1998) discuss a tool to measure a change in the student knowledge before and after an individual teaching delivery. In this manner, the number of factors contributing to the "knowledge transfer" is supposed to be limited to the instructor's contribution only (excluding such contributors as textbook reading, self- or peer groups induced education). However the relevancy of materials and textbooks as an important resources for teachers in assisting students should be always monitored. These resources many times served as one of the main instruments for shaping knowledge, attitudes and principles among the learned group (Noreen Nordin, 2002).

The need to understand students' effort in acquiring knowledge by other means such as taking notes from television support the learning process, but if it was over-used may end up losing its appeal. Similarly the emergence of the internet as a medium for teaching and learning discovered to be an important revolution in education. The use of this technology inspired the educators to apply new technique in teaching and learning (Rafiza A. Razak & Adelina Asmawi, 2004). Regardless of the thought and effort put into creating an impressive PowerPoint, seeing it everyday will dull its charm. Be sure to incorporate lab activities, videos, group study, and any other feasible teaching methods into the mixture. The students encountered the full circle of the teaching/learning process through learning by doing. The teacher worked as a facilitator by guiding each student in the right direction and learning at the same time.

Hargreaves and Cristou (2002) suggested that teaching methodology should be designed not only to validate the programs but to support learning by focusing on the teaching and learning process at the program level. It should further addresses the need for teaching and learning processes to be based on a common purpose and philosophy, designed to achieve good practice and to ensure continuous quality improvement in teaching profession.

Attitude

Referring to Greiml-Fuhrmann and Geyer (2003**)**, based on interviewing 40 students at commercial colleges, their finding suggested that good teachers should give explanations, answer questions, change their teaching methods, and should be interested in and show concern for their students and their learning progress. Good teachers should also be humorous, friendly, patient, and fair graders. Similarly, students in most setting prefer instructors to professionally respond their questions, to choose the most suitable teaching method, and to be friendly while interaction occurs in or outside classroom setting.

Based on the work by Winsted (2000) and Zeithaml et al. (1990), it was revealed that service providers will only be able to deliver service encounters that will satisfy customers if they know what their customers expect in general, and if they understand the critical employee behaviors and attitudes from a customer's point of view in particular. If instructors know what their students expect, they may be able to adapt their behavior to

their students' underlying expectations, which should have a positive impact on their perceived service quality and their levels of satisfaction. Brown's (2004) qualitative study indicated that competent instructor know their subject, are willing to answer questions, are approachable, and also have a sense of humor. In addition, they should be flexible enough to explain things in different ways, and to treat students as individuals.

METHODOLOGY AND DESIGN

A population of a complete group of people for the study covered teachers who teach English, Mathematics and Science as a subject for primary and secondary school at Kuala Terengganu, Dungun, and Marang. The identification of a sample is generated from population frame listed by The Department of Education in The state of Terengganu for the year 2006. Based on the population almost 18,000 teachers (UPEN 2005) approximately 4,500 were involved in teaching mathematic, science, and english, a sample of 501 was drawn following the suggested table by Sudman (1976). For the purpose of satisfying the generalization among teachers for the whole state of Terengganu the study choose cluster sampling method for getting a relevant data. This method using a group that have heterogeneous members are first identified, then some are chosen at random, all the members in each of the randomly chosen groups were studied.

Other procedures adopted was conducting personal interview on several selected respondents to obtain information on the issues of interest. We also interviewed teachers who were conducting classes for English, Mathematics and Science subjects. The interviews were found to be useful in order to obtain more information regarding the performance of students in their school and to further support the validity of our investigation.

The instrumentation by questionnaire is used in this study in order to collect the required data. Questions were divided into Structured Multichotomous and Likert Scales. The questions were divided into five sections Section A: demographic.Section B: measured Environment, Teaching, Attitude and Section C: Performance.

FINDING AND DATA ANALYSIS

Reliability of the measurement

For ensuring data for the study is reliable to be discuss, the reliability measures was conducted. Based on the suggestion by Nunally (1967), the coefficient of Alpha were found to be reliable and thus acceptable ass indicated by the value of 0.884 for the performance and 0.815, 0.847, 0.783 for environment, teaching, and attitude respectively.

Frequencies

Table 2: Frequency for Demographic

Items	Frequency	Percentage
Gender		
Female	357	71.25%

Male	144	28.75%
Age		
20-25	64	12.8%
26-30	169	33.7%
31-35	90	18 %
36-40	70	14%
41-45	70	14%
46-50	26	5.2%
50 and above	12	2.4%
Status		
Married	438	87.4%
Single	60	12 %
Others	3	0.6%
Teaching		
Primary	278	55.48%
Secondary	223	44.51%
Length		
less than 2 years	97	19.4%
2-5 years	125	25.0%
6-10 years	105	21.0%
11-15 years	77	15.4%
16-20 years	51	10.2%
More than 20 years	46	9.2%
Subjects		
Mathematics	214	42.7%
Science	218	43.5%
English	69	13.8%

The composition of teachers demonstrated the increasing trend of more female are entering into the teaching profession. Our investigation revealed that most of the respondents were represented by more female rather than male counterparts. Teachers from the female group was represented by 357 representing 71.25% and those from the male group was 144 which made up 28.75% of the total sample. From these findings, the sample suggested that on the average most of the teachers that indulged in this research were from the female groups.

In most social science studies especially those in education, there were trends indicated the role of the new generation in undertaking the responsibilities for certain teaching discipline. Our survey strongly suggest the development. As for the age group of teachers, most of teachers were on the age bracket between 26 - 30 (169 teachers), 31-35 (90 teachers) followed by the age of 36 - 40 (70 teachers), 41- 45(70 teachers), and 20-25 (64 teachers) which respectively representing 33.7%, 18%, 16%, 16%, 12.8% and the other small percentage were from those at the age of more than 40. Moving symmetrically with the age group, in term of years of service most of the respondents were serving within 2-5 and 6-10 years of working in the sector which represented by 125 (25%) and 105 (21%). Interestingly to note that there were quite a big number of our

respondents were very new with the teaching profession. There were 94 of them which is (19.4%) of the total sample investigated. Considering serving experience as an asset to the teaching profession respectively 15.4%, 10.2%, 9.2% are among those who had been working since 11-15 years, 16 to 20 years and more than 20 years.

The significant of teaching profession were usually reflected by most of those having their own family. Our finding displayed that 87.4 % of the teachers were married and a small percentage of them were still at their bachelorhood life. Our discussion believed that married teachers will provide more positive effect in building the performance of the students. We have the assumptions that these group of teachers despite of having their own commitment to their family would further strengthen their interest in shaping the positive values among the student. By having their own family not only promoting social stability but will generate other contingent effect on their focus, responsibility, attitude and performance for been a teacher toward building positive development among the students.

The teachers involved in our research were from the primary and secondary schools. Out of the groups 55.4% were those from primary school while 44.51% represented by the secondary school. Out of those responsible teaching in both primary and secondary school 42.7%, 43.5%, and 13.8% involved of teaching Mathematic, Science and English respectively. These figure further indicated that, the composition of teachers were assigned more towards teaching Mathematic and Science as been reflected in the school curriculum.

Table 3: Frequency for Training Programme

Items	Frequency	Percentage
Training Programme		
None	69	13.8%
Less than 5 times	257	51.3%
5 – 10	137	27.3%
More than 10 times	38	7.6%

For the training program, majority of the teachers has been attended the training programmes and only 13.9% teachers has never been attended any training programmes related to the subject taught. 51.3% has been attending less then 5 training programmes, 21.3% has been attending between 5-10 training programmes there were also others who were given a chance to have more then 10 times attending related training programmes.. This finding indicated that the issue of training is vital if the objective of improving teachers skills are to be related with the performance of the students. More initiative need to be strategically planned and implemented so that the relevancy of education in shaping the performance of the students is to be realized towards strengthening the human capital of the nation.

Correlation Analysis

Table 4: Correlation Analysis between Environment, Teaching Methodology, and Attitude with The Performance

Correlations

		menenv	menteac	menattd	menperf
menenv	Pearson Correlation	1	.337**	.430**	.396**
	Sig. (2-tailed)		.000	.000	.000
	N	501	501	501	501
menteac	Pearson Correlation	.337**	1	.674**	.312**
	Sig. (2-tailed)	.000		.000	.000
	N	501	501	501	501
menattd	Pearson Correlation	.430**	.674**	1	.429**
	Sig. (2-tailed)	.000	.000		.000
	N	501	501	501	501
menperf	Pearson Correlation	.396**	.312**	.429**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	501	501	501	501

**. Correlation is significant at the 0.01 level (2-tailed).

Our analysis indicated that the correlation between environment, teaching, and attitude towards performance were still important despite of the Pearson value (r) at 0.396, 0.312, and 0.429. The value indicated that there is a weak correlation between teaching and the performance; low moderate correlation between environment and the performance, and low moderate correlation between attitude as to the performance. However all of the construct found to be statistically significant at P value of 0.000 between all construct investigated.

The above correlation analysis demonstrated that all the three hypotheses formulated for the study were supported. The argument about the important of teaching methodology, the attitude of the teachers in undertaking the responsibility of teaching students, and the nature of environment within the classroom as well as outside the classroom are among the necessary construct that needed attention towards enhancing the performance of the students. Even though our correlation for the survey conducted in the state of Terengganu indicated the value from low to moderate correlation, these doesn't mean that they failed to contribute towards the performance. The strategies now is for the authorities concerned to look for alternative, to rectify any mismatch between what had been done from the date of the introduction of the new curriculum. Without proper rectification, better understanding of the development in the teaching profession, the intention of creating new knowledge frontier among the students will never be a success.

DISCUSSION AND CONCLUSION

Our discussion only focus on the frequency values of the selected teachers profile and analysis on the correlation between the three constructs and the performance of the students. Most of the literature for the study were extracted from previous work done in other countries of the world, several articles were selected from local seminars, conference proceedings and other research within the national context.

Considering environment as a construct was discovered to be significantly associated with the achievement of students at school. Through the review of the past literatures, most of the discussions explain that environment of school innovation is the successful exploitation of new ideas which is a vital ingredient for students' performance. Among the environment at school affecting the students' performance consists of environment in the classroom, in school compound and students' home. Looking further at the school environment does the school provide environment of using English language for announcement, what about adequate numbers of reference books about the subject in English? Besides that, environment at their home also affect such as are their family encourage their children to speak in English. We can see from characteristic of teachers in term of experience and training, teachers teaching methodology and teaching materials and facilities. Teaching materials for example books, CD Rom and others. Finally in this study, the researcher found that, attitude include of teachers and students attitude. Performance of students also affect from the attitude of teachers. For example whether the teachers are strict person or teachers always put extra effort to improve teaching presentation. Besides that, from students attitude we can see whether students give full attention during class and whether they complete their homework or not.

Attitudes is a person mental views, opinion and value about things. Attitude can also can be defined as feeling represent the effective thought involving the cognitive predisposition acts as the behavioral component. If lecturers know what their students expect, they may be able to adapt their behavior to their students' underlying expectations, which should have a positive impact on their perceived service quality and their levels of satisfaction.

If a teacher have a favourable attitude towards the subjects as well as the students, there would be an inclination of having a good participation among the parties involved. When confronting the attitude as a construct and linking it into the concept of behaviour, teachers who are involved should not underestimate the relevancy of the issue of self-interest. Among teachers which were able to inculcate their attitude about teaching mathematic and science in English were able to provide a strong predictive outcome as to its usefulness will therefore look for avenues in making the success of its importance. However the strength of the relationship should not exclude the moderating effect of social constraints. Our analysis demonstrated that more younger teachers were given the responsibilities of managing the teaching of mathematic and science in English. These new teachers were exposed to some negative attitude of the senior teachers. If these two groups were unable to create positive values as to the expected outcome of the new curriculum, the inconsistency of the attitude and existing belief system will create more social constraints. Inability to accommodate or matching each other role will therefore limit the success of the performance of the students.

Our analysis demonstrated that the correlation between teaching as a construct was not able to provide a strong impact on the performance of the student. On top of been exposed to teachers' training, a teacher will never be adequate in providing an effective knowledge and skills to the students. What more if these students are still at the beginning stage of understanding and maturing new ideas and concepts in the classroom. Providing more training to teachers even though seems to provide the ultimate solutions, still need to consider other moderating effects. Among other moderating factors are the needs to understand the capacity of the learned group which should be strategically explored. It is therefore necessary to get a clear indication of the status among the different subgroup that should be treated and monitored differently according to their capacity to learn. The government should preach the appropriate and reasonable dimensions of training to the entire teachers responsible for teaching Mathematics, Science and English as the subjects if the results are to be significant. This is to make sure that they become more confident to deliver their lesson in English without corrupting Malay language in the teaching process. The preaching of training concept should not only be in the form of classroom training but other methodology such as attending conferences, seminars, and workshop will add up into the list of sustaining higher quality profile of the teachers.

The idea of innovativeness and creating their own style of teaching is another alternative that should be considered in the teaching profession. Through innovativeness it could generate the feelings of comfortableness and cheerfulness in the classroom setting while eliminating boredom and monotonous. The success of creativity and innovation have been discovered to be working well if these strategies were to be attached with adequate teaching facilities. Our research revealed that, tools for teaching were inadequate and for some schools they are obsolete. Computers were found to be inadequate. Majority of the classrooms were not fixed with projectors. Teachers are using their own ideas like teaching in Malay. Other facilities like CD-ROM, music, reference books, and visual aids were still poorly provided. Without seriously addressing these issues the learning process continue its momentum at the expense of the inability for the students to understand the subject matter at the fullest capacity.

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