

TEACHERS' COMPETENCY IN THE TEACHING OF MATHEMATICS IN ENGLISH IN MALAYSIAN SECONDARY SCHOOLS

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Abstract Teachers play an important role in delivering new knowledge and skills to students. They are regarded as excellent and competent teachers by parents based on the excellent academic achievement of the students. With the implementation of the teaching of Science and Mathematics in English (PPSMI) through the integration of ICT in 2003, teachers' competency in teaching the subject is put to test. This is so because many of our teachers today have had very little exposure to the subjects in English. Many were taught the subjects in Malay and were even trained to teach the subjects in Malay. Many too have little experience of using ICT in their teaching. To ease the problem with regard to the language and ICT, the Ministry of Education has introduced several meaningful programs aimed at preparing the teachers and boosting their confidence in teaching the subjects. A research involving 575 teachers was conducted throughout the country to examine the effectiveness of the programs organized by the ministry and to gauge whether or not the trainings given were adequate and relevant to the needs of the teachers to teach the subjects in English. Questionnaires, which comprised of structured items to elicit information with respect to facts, perception, opinion and attitudes of the respondents towards PPSMI were administered to the teachers. The data were analysed using *Statistical Package for Social Sciences (SPSS)* software. The findings reveal that the implementation of the teaching of Mathematics in English in schools was at a satisfactory level (53.4%). The respondents also agreed that they have improved their command of the English language and that their level of confidence to teach Mathematics in English have also improved. Finally, recommendations for further study were suggested so as to further improve the teaching of Mathematics in English.

INTRODUCTION

Schools play a variety of important social, custodial and organisational roles in communities and with schools come teachers who have the primary obligation to help students to learn how to recognise and solve problems, comprehend new phenomena, construct mental models of those phenomena, and, given a new situation, set goals and regulate their own learning. Parents on the other hand gauge the competency of teachers based on the academic performance of their children. In today's competitive era where good grades seem to be the yardstick of a child's intelligence and to many, are the academic goals of both parents and children, teachers' competency is put to test. Competency is seen here as the ability of the teachers to deliver knowledge using the necessary medium, be it the language or the tools. In this paper competency will be treated from three different strata, namely, the competency to use the English language to deliver the content, the competency to integrate ICT in the teaching of the subject and the competency to apply, utilize and exploit the teaching aids supplied by the Ministry of Education for the teaching of the subject, in this respect, Mathematics.

As of 1970, students enrolled in primary schools in Malaysia were taught all subjects, except the English language in Bahasa Melayu. Only those who started schooling in 1969 and before, who were in an English-medium education had the privilege of being taught some subjects, which include Mathematics, in English. With the very limited number of English-medium schools in those days, it is not surprising that the majority of the below 40 year-old teachers teaching Mathematics in schools today, are those who had been taught the subject in Bahasa Melayu in their primary, secondary and even tertiary education. In short these teachers have had very little exposure to the subject, in this sense, Mathematics, in English and to the majority, they have very little exposure to using the language in their daily lives.

Information Communication Technology (ICT) is also a fairly new phenomenon in the school context in Malaysia. It started taking roots in the Malaysian education system only recently when

the SMART School system was first introduced in the late 1990s. Since the number of SMART Schools in the country was rather small in its early days, only a very limited number of teachers in the country have had the experience of integrating the technology in the classroom while the majority of them are still in the dark as far as using the technology in the classroom is concerned. Some may argue that for many of the younger teachers, they should have at least used ICT while pursuing their tertiary education. This may be true but using it as part of a medium to assist them in completing assignments is not the same as using it as a medium to disseminate knowledge, of which teachers teaching Mathematics and Science in schools today have to adopt.

With the change in the medium of instruction in the teaching of Mathematics in primary and secondary schools in Malaysia from Bahasa Melayu to English language introduced in 2003, and, with the integration of ICT in the teaching of the subject, teachers' competency in delivering and disseminating knowledge in the subject is put to test. This is so because in many cases, many of the teachers who have been assigned the task to deliver their teachings in the English language, have had little exposure to the English language itself both in their learning of the subject during their primary and secondary education, and in the process on learning how to teach the subject during their tertiary education. As a result of this, many teachers who have been entrusted with the responsibility to teach Mathematics in English language in schools using ICT are faced with a dilemma. First of all, they lack the language to deliver the content to the students for reasons stated above. Secondly, they are not familiar with the terminologies and mathematical terms in the English language due to minimal exposure to learning and teaching mathematics in the English language. Thirdly, many have had little exposure, if any, in integrating ICT in their teaching and last but not least, although the software for teaching the subject is being supplied by the ministry, using these teaching aids effectively in the classroom may become a big problem to many who have had very little experience of even handling the hardware. This is so because, in the teaching of Mathematics, it is not as simple as just starting the program and letting it play to the end but it involves stopping and pausing the program at the right places and elaborating the steps in solving the mathematical problems and equations. Apart from that, to make the teaching more effective teachers should be able to apply the content of the teaching to everyday situations, to explain steps in solving the problems, and to do these, teachers need none other than a good command of the language of instruction, in this respect, the English language, the ability to integrate ICT in their teachings and the knowledge to apply, utilize and exploit the teaching aids supplied by the Ministry of Education to make the learning experience of the students as effective as possible.

Inability to deliver the content effectively due to lack of expertise in the language and lack of skills in using the technology may have detrimental effects on the students. These may lead to some multiple effects, which may include testing the students' endurance leading to lack of concentration among them thus resulting in lack of interest in the subject which will eventually cause poor performance in the subject. Given time, the good ones will no doubt become better but the not-so-good-ones or the poor learners will suffer. As a result of this, parents' trust too may diminish.

The above are the questions we wish to unveil the answers to in this study and it is hoped that the results will shed some lights to the parties concerned so as to make the teaching of Mathematics in Malaysian schools as effective as it should be for the betterment of the future generation.

RESEARCH METHODOLOGY

The data for the research were collected from six different zones in both West and East Malaysia and each zone was represented by a particular state. For the northern zone, data were collected from respondents in the state of Kedah, Western zone from Selangor, Southern zone from Johor, and Eastern zone from Kelantan. The two states in East Malaysia each represented a zone, namely the Sarawak and Sabah zones.

A total of 575 respondents who are teachers involved in the teaching of Science and Mathematics in English (PPSMI) in secondary schools participated in the research. The respondents were selected using the purposive sampling method. Questionnaire was used as the instrument for data collection. The questionnaire was constructed and designed by the researchers themselves using the model introduced by Stufflebeam (1966), known as the CIPP Model, as a guide. It was built based on the objectives of the research, in line with what was proposed in the adopted model. A four-level Likert Scale (1967) was used in the research as a form of measurement of the respondents' responses and they are represented as follows: 1 represents *Disagree* (24% and less), 2 represents *Somewhat Disagree* (25% - 49%), 3 represents *Agree* (51% - 74%) and 4 represents *Strongly Disagree* (75% - 100%).

The responses given by the respondents were collected and later analysed using SPSS (*Statistical Package for Social Science for MS Windows Release 10.05*) software. The statistical analyses used in the research were frequencies and percentages. The reliability (Alpha Cronbach) level of the questionnaire is 0.9224. The analysis of the results of the research is shown in Tables 1 to 4.

FINDINGS

Language is a very important tool used by teachers to deliver knowledge, instruction and skills to students. The ability of teachers to use language effectively in their teachings will not only help students to understand the subjects better but also will lead to many other positive traits such as it will raise interest amongst the students on the subjects themselves, students' attitude towards the subjects will be positive, thus resulting in higher motivation to learn more, and the end result will be none other than better grades in the subjects. In this study three aspects of teaching ability as reported by the respondents of the study have been discussed. They are:

- i. Teachers' speaking ability
- ii. Teachers' reading ability
- iii. Teachers' writing ability

i. Teachers' speaking ability

Table 1 shows that 17.4% and 38.6% respondents strongly agree and agree respectively on the statement that they have the spoken ability teach Science and Mathematics in English, whereas 42.9% do not agree to this statement. This finding is considered as a big setback for the implementation of the teaching of Science and Mathematics in English because quite a high percentage of the respondents admitted to lack of ability to teach Science and Mathematic in English. This problem could be associated with other factors, such as their inability to speak and pronounce words correctly (Item 1), lack of knowledge of the English grammar (Item 2) and their inability to effectively use transitional marker in the teaching of Science and Mathematics (Item 8). It was also found that there are a number of respondents who could not deliver their ideas during the discussion sessions (Item 15), some were unable to discuss experimental results (Item 12), and explain the experiments and problem-solving procedures systematically in Science and Mathematics (Item 14). However, majority of the respondents as illustrated by all the items in Table 1 have shown very positive indication towards the implementation of the teaching of Science and Mathematics in English.

Table 1: Percentage and frequency distribution of the teachers' spoken ability in English in the classroom

No.	Items		Disagree	Somewhat Disagree	Agree	Strongly Agree
1.	I am confident with my pronunciation of English terms in my teaching.	(K)	5	152	309	108
		%	0.9	26.4	53.6	18.8

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2.	I am able to use good English grammar.	(K)	19	248	236	72
		%	3.3	43.1	41.0	12.5
6.	I am able to explain processes of Science/ Mathematics in English.	(K)	9	148	292	118
		%	1.6	25.7	50.8	20.5
8.	I am able to use transitional markers in my teaching of Science/ Mathematics in English	(K)	5	168	295	69
		%	0.9	29.2	51.3	12.0
9.	I am able to ask questions in English.	(K)	-	68	366	139
		%	-	11.8	63.7	24.2
10.	I am good in using English in my teaching.	(K)	14	233	222	100
		%	2.4	40.5	38.6	17.4
11.	I am able to explain features of objects in English.	(K)	10	144	316	99
		%	1.7	25.0	55.0	17.2
12.	I am able to discuss results of experiments in English.	(K)	21	152	282	93
		%	3.7	26.4	49.0	16.2
13.	I am able to give oral instructions in English.	(K)	5	69	372	121
		%	0.9	12.0	64.7	21.0
14.	I am able to give details on steps of Science / Mathematics in English	(K)	9	116	331	111
		%	1.6	20.2	57.6	19.3
15.	I am able to give opinions in English.	(K)	14	186	269	102
		%	2.4	32.3	46.8	17.7

ii. Teachers' reading ability

Reading is a very important skill that teachers should have so as to gather information and knowledge from various resources to be included or to supplement their teachings. As shown in Table 2, the majority of the respondents either agreed (61.9%) or strongly agreed (22.6%) whilst only 15.2% of them either disagreed or somewhat disagreed that they can understand scientific and mathematical terms in English (Item 3). This is due to the fact that some of the respondents teaching the subjects are non-optionists where they have been trained for example to teach the English language but due to their good command of the language, have been assigned to teach Mathematics in English.

The findings also found that the majority of the respondents agreed that they knew how to search for information from reference books written in English (Item 4) and access materials in English from the internet (Item 5). However, 23% of the respondents disagreed that they could access materials from the internet. This could be due to the lack of computer with internet facilities in

some schools rather than incompetency of the respondents to use the internet to access information.

iii. Teachers' writing ability

Planning of a lesson before teaching is a must in order to produce a good and effective lesson for the students. Teachers have to plan his/her teaching, examination questions and some of the important teaching notes. All of these activities require good writing skills to enable teachers to carry out their duties systematically and meaningfully, and for the students to understand the message and content of the subjects effectively. The results of the research revealed that 90.7% of the respondents were able to write what they have planned in English (Item 19), 82.2% of the

Table 2: Percentage and frequency distribution of the teachers' reading ability in English to gain information for classroom use

No	Items		Disagree	Somewhat Disagree	Agree	Strongly Agree
3.	I understand Science/ Mathematics terms in English.	(K) %	1 0.2	86 15.0	356 61.9	130 22.6
4.	I am able to use reference books in English	(K) %	6 1.0	49 8.5	349 60.7	170 29.6
5.	I am able to access materials in English from the Internet.	(K) %	12 2.1	120 20.9	297 51.7	140 24.3

respondents were able to prepare their teaching notes in English (Item 18). They also agreed that they can write good teaching instructions in English (Item 17) and prepare examinations question in English (Item 16). However, there are some respondents (20.5%) who admitted not having the ability to prepare the examination questions in English and 15.8% respondents were unable to prepare teaching notes in English for their students. These groups of respondents should be exposed to various programs in order to help them upgrade their knowledge and skills in teaching Science and Mathematics in English.

Table3: Percentage and frequency distribution of the teachers' ability to write in English

No	Items		Disagree	Somewh at Disagree	Agree	Strongly Agree
16.	I am able to prepare question papers in English.	(K) %	8 1.4	110 19.1	334 58.1	121 21.0
17.	I am able to give written instructions in English.	(K) %	7 1.2	80 13.9	361 62.8	124 21.6
18.	I am able to prepare teaching notes in English.	(K) %	8 1.4	91 15.8	356 61.9	117 20.3
19.	I am able to prepare LessonPlans in English.	(K) %	4 0.7	48 8.3	374 65.0	148 25.7

Improvement sometime after teaching Science and Mathematics in English

Finally, the study indicated that the majority of the teachers surveyed felt that their confidence level in teaching Science and Mathematics in English improved (Item d1) sometime after the implementation of teaching Science and Mathematics in English. They expressed their feeling of comfort in teaching the subjects in English (Item d2), they reported on having the ability to ask questions and respond to students' questions spontaneously (Item d3 and d4). They were also able to explain mathematical contents correctly and systematically (Items d5, d13 and d 14), and to search for information from several resources (Items d7 and d8). The study also found that the majority of the respondents (Items d6, d9, d10, d11 and d12) were able to teach in English. However there are still more room for improvements since there are still a number of respondents

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who were unable to teach the subjects in English. The respondents also agreed that mastering the teaching of Science and Mathematics in English could improve their professionalism in education.

Table4: Percentage and frequency distribution of the teachers' opinions sometime after the implementation of the teaching of Science and Mathematics in English

No	Items		Disagree	Somewh at Disagree	Agree	Strongly Agree
d1.	Confident to teach in English	(K)	9	92	277	186
		%	1.6	16.0	48.2	32.3
d2.	Comfortable to teach in English	(K)	24	139	261	139
		%	4.2	24.2	45.4	24.2
d3.	Ability to answer spontaneously in English	(K)	12	121	294	136
		%	2.1	21.0	51.1	23.7
d4.	Ability to ask students spontaneously in English.	(K)	6	97	321	140
		%	1.0	16.9	55.8	24.3
d5.	Ability to explain Science and Mathematical concepts in English.	(K)	16	118	314	116
		%	2.8	20.5	54.6	20.2
d6.	Ability to prepare notes in English.	(K)	10	94	343	114
		%	1.7	16.3	59.7	19.8
d7.	Ability to access information in the English language from the internet.	(K)	22	129	276	133
		%	3.8	22.4	48.0	23.1
d8.	Ability to gain information in English from other resources.	(K)	10	80	309	156
		%	1.7	13.9	53.7	27.1
d9.	My English language becomes better.	(K)	9	84	328	141
		%	1.6	14.6	57.0	24.5
d10	Fluency in speaking of English.	(K)	16	140	287	119
		%	2.8	24.3	49.9	20.7
d11	Ability to discuss in English.	(K)	16	161	278	109
		%	2.8	28.0	48.3	19.0
d12	Ability to understand English articles.	(K)	7	71	350	136
		%	1.2	12.3	60.9	23.7
d13	Mastery of Science and Mathematics in English.	(K)	10	70	351	133
		%	1.7	12.2	61.0	23.1
d14	Ability to use scientific and mathematical terms precisely in English.	(K)	6	84	345	125
		%	1.0	14.6	60.0	21.7
d15	Improve professionalism in the Educational field.	(K)	10	61	329	157
		%	1.7	10.6	57.2	27.3

CONCLUSION

The findings of this study indicate that the majority of our respondents have sufficient level of confidence in their teaching of mathematics using English language. They can explain very well the processes and details of steps in mathematics. They are confident in asking and answering questions. The majority of our respondents are very confident in preparing question papers and writing instructions in English. They also have no problems in preparing teaching notes and

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lesson plans in English. This means that they are better in producing written work rather than the spoken ones.

However, about forty percent of them are not good in using English in their teaching. They have problems in expressing ideas during discussions and having some difficulties in expressing opinions in this language. Many of them are also not able to use good English grammar.

It is now very clear to us that a number of life-long programmes need to be carried in order to improve teachers' commands of English.

ACKNOWLEDGEMENT

We would like to express our gratitude to the Ministry of Science, Technology and Innovation for providing us an IRPA research grant No: 74261 to carry out this research and the Ministry of Education for giving us permission to get teachers and students involved in this research. We would also like to thank Universiti Teknologi Malaysia for all the facilities given to us throughout this project.