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An Analysis on the Selected Factors Contributing to Science and Mathematics Achievement Among Secondary Students in Two SEAMEO Member Countries

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Abstract

This paper sets out to examine critically the effects of selected factors contributing to science and mathematics achievement among 8th grade students in Malaysia and Singapore. The Trend in International Science and Mathematics Study (TIMSS) 2007 database was utilized to explore a) if there were correlations between students receiving additional support and/or gaining exposure from academic related enrichment activities at home and schools with their science and mathematics achievement and, b) How well do the knowledge/skills gained from the use of technological tools and Internet contribute towards their science and mathematics achievement among Malaysian and Singaporean Grade 8 students. The sample consists of 4,466 students from Malaysia and 4,599 students from Singapore who participated in the TIMSS 2007 assessment. This study will provide some insights on why some students perform better than others in science and mathematics by highlighting the effect of additional support and/or exposure from academic related enrichment activities at home and schools, and the knowledge/skills gained from the use of technological tools and internet on students' science and mathematics achievement.

Keywords: Academic related enrichment activities; technological tools; science and mathematics achievement; TIMSS 2007

Abstrak

Kertas kerja ini bertujuan untuk meneliti secara kritikal kesan faktor terpilih yang menyumbang kepada pencapaian sains dan matematik dalam kalangan pelajar gred 8 di Malaysia dan Singapura. Pengkalan data TIMSS tahun 2007 digunakan bagi mengenal pasti a) jika terdapat hubungan antara pelajar yang menerima sokongan tambahan atau mendapat pendedahan dari aktiviti pengayaan akademik yang berkaitan di rumah atau di sekolah-sekolah dengan pencapaian sains dan matematik dan, b) Sejauh manakah pengetahuan/ kemahiran yang diperolehi dari penggunaan alat-alat teknologi dan Internet menyumbang ke arah pencapaian sains dan matematik dalam kalangan pelajar gred 8 Malaysia dan Singapura. Seramai 4,466 pelajar dari Malaysia dan 4,599 pelajar dari Singapura yang mengambil bahagian pada tahun 2007 penilaian TIMSS ini. Kajian ini akan memberikan pandangan mengenai mengapa sesetengah pelajar melakukan yang lebih baik daripada yang lain dalam bidang sains dan matematik dengan menonjolkan kesan sokongan tambahan dan/atau pendedahan dari akademik aktiviti pengayaan yang berkaitan di rumah dan di sekolah-sekolah, dan pengetahuan/kemahiran yang diperolehi daripada penggunaan alat teknologi dan internet dalam bidang sains dan matematik dengan dan pencapaian pelajar.

Kata kunci: Aktiviti pengayaan akademik yang berkaitan; alat teknologi, pencapaian sains dan matematik; TIMSS 2007

Background:

The Trends in International Mathematics and Science Study (TIMSS) are an ambitious international large-scale assessment studies, involving more than 60 countries around the world. Sponsored by the International Association for the Evaluation of Educational Achievement (IEA), its core mission is investigate student learning of mathematics and science and the way in which educational systems, schools, teachers, and students influence the learning opportunities and experiences of individual students.

Purpose:

This study sets out to examine critically the effects of selected factors contributing to science and mathematics achievement among 8th grade students in Malaysia and Singapore.

Sample:

The samples of students for this study were drawn from the dataset of Malaysian and Singaporean Grade 8 students who participated in TIMSS 2007. The number of Grade 8 students from Malaysia was 4466 (male = 2104, female = 2362) and from Singapore was 4599 (male = 2353, female = 2246)

Design and method:

The dependent variable in this study was students' achievement scores on eight items in the survey instrument from the TIMSS 2007 questionnaires. The response on 15 items in the TIMSS 2007 survey questionnaires pertaining to the additional supports and knowledge/skills gained from the use of technological tools and internet in their academic related enrichment activities at home and schools were used as the independent variable. Figure 1 shows the TIMSS 2007 survey instrument pertaining to additional support and knowledge gain from computer and internet usage towards science and mathematics achievement.

Results:

1. Student gaining additional support and/or exposure from enrichment activities related to academic work at home and schools.

Data analysis indicated a moderate correlation existed between have a calculator at home (BS4GTH01), have study desk/table for use at home (BS4GTH03), have a dictionary at home (BS4GTH04) and spend time using the internet before and after school (BS4GPLCG) with their science and mathematics achievement in both countries.

2. Students gaining knowledge/skills gained from the use of technological tools and Internet

Students' responses to the questionnaires indicated there were moderate correlation found between have a computer at home (BS4GTH02), have an internet connection at home (BS4GTH05), use of computer in science and mathematics lesson (BS4SHCOM/BS4MSHCOM), use of computer at home BS4GCHOM, use of computer elsewhere (BS4GCELS), use of computer at school (BS4GCSCH), and use of computer for science and mathematics schoolwork (BS4SCSWS/BS4MCSWS) with the science and mathematics achievement for both Malaysian and Singaporean Eighth Grade students.

■1.0 INTRODUCTION

Student learning is influenced by various contextual factors such as school resources, teacher characteristics, student attitudes and home environment. To improve student achievement, it is important to understand the educational and social contexts in which students learn and how these relate to their achievement. (Mullis, Martin, Ruddock, O'Sullivan, Arora, and Erberber, 2005). This study focused on educational resources for enhancing student learning opportunities (i.e. have a calculator at home, have a study desk/table for use at home, have a dictionary at home, spend time before or after school playing computer games, using computer and internet) from academic related activities at home and schools

■2.0 USE OF TECHNOLOGY IN HOME AND CLASSROOM

Due to the rapid growth of computer technology, the traditional methods of teaching can no longer be the only method to capture the interest of children (Aufderheide and Firestone, 1992). As a result, the usage of technology can be use to help teachers understand the different learning styles of each and every child they teach (Kumar and Vigil, 2010). It has been proven that using such technology as one of the teaching method can effectively give students the opportunities to engage in basic drill and practice, simulations, investigation or communication activities that matches their individual needs and abilities (Baby, 2001).

Different methods that are based on technology can be use in classroom to make things easier for teacher's duties as well as improve the quality of education (Starcic and Istenic, 2001). Students can now type on computers or any IT related devices to take notes and do their homework instead of using an ordinary notebook, thus making the reading of student work easier. Besides that, technology can also be used by teachers to make learning in the classroom more interactive, interesting and enjoyable for students through the use of applications such as PowerPoint presentations, animations, and videos (Patter, Jr., 2009)

How ICT is utilized in the school setting is crucial in providing students with the skills to participate in a knowledge society (Ainley, Banks and Fleming, 2002). In order to deal with the perpetually low science achievement of students, educators are searching for ways to increase authenticity in the science and mathematics classroom. According to Obliger (2004), there is an obvious indication that showed students developing a different set of attitudes and aptitudes as a result of growing up in an IT and media-rich environment.

■3.0 USE OF ICT IN LEARNING AND INSTRUCTION

Information and communication technologies (ICT) can be considered a key component of modern societies and lives. Nowadays, many individuals have integrated these technologies into their daily activities, not as an extraordinary activity but to create new paths for ordinary and not so ordinary activities to be accomplished (Gustavo, 2010). The integration of ICT components, multimedia and internet access into education system in school has already made its way for the purpose of used as teaching materials and passing information to students. Previous studies showed that with the use of technology like computers and ICT, a positive impact on student's achievements in the subjects they learned can be carried out more efficiently.

ICT was considered as one of a vast number of variables influencing a student's performance. It has rapidly acquired an important place in society and is used progressively more as a learning tool in all forms and at all levels of education (Wang, 2008; Demiraslan and Usluel, 2008). Researches done previously has proved that there were indeed improvement in the teaching and learning process with the usage of ICT and internet trend in schools. These schools not only supplied with computers for the teaching and learning process, but also came with fully equipped internet

connections. With such unlimited access of information searching, students can then use and obtain resourceful information more rapidly and easily, especially when doing their homework or assignments given.

Many studies have been conducted on a diversity of educational technologies to verify their impact on learning outcomes. For example, the research conducted in 2009 by Kay and Knaack investigated the effectiveness of using learning objects to improve teaching and learning process. They pointed out in their studies that learning objects are interactive web-based tools that can provide visual aids and that by using these learning objects, the learners' processing and understanding of specific concepts can be enhanced. The importance of ICT elements being integrated into the teaching and learning processes becomes more significant because it was seen to be able to increase student's ability to understand difficult concept that are hard to explain. Such outcome automatically increases student's achievements in the subject taught.

ICT by its very nature comprises tools that promote and support independent learning and knowledge construction. ICT becomes more constructive in student's learning processes, and as more and more students use computers as information sources and cognitive tools (Smeets, 2005), the influence of the technology on how they learn will continue to increase. Beauchamp and Parkinson (2005) stated in their studies that more students took greater responsibility for their own learning when ICT was used in the curriculum, including in science.

4.0 HOME COMPUTER USE

Several research found that students' use of a computer at home has been found to be, for the most part, positively related to student achievement (Attewell and Battle, 1999, Bebell and Kay, 2010). Wenglinsky (1998) found that students' use of a home computer was positively related to their academic achievement. There is also evidence to suggest that home computer use is positively related to school persistence among high school students (Fairlie, 2005). Fairlie's study of data from the Computer and Internet Usage supplement to the September 2001 Current Population Survey found a relationship between home computer ownership and school enrollment. Focusing on respondents between the ages of 16 and 18 who had not yet graduated from high school, Fairlie found that a greater percentage of children with home computers were still enrolled in school. After controlling for socioeconomic indicators, the percentage of children with home computers who were enrolled in school was slightly greater than the percentage of children without home computers, indicating a possible relationship between the use of a home computer and graduation rates.

The positive relationship between students' use of a home computer and achievement is not necessarily due to the use of the home computer for schoolwork. Students use home computers most often for recreational purposes. Fairlie (2005) found that the four most frequent uses of computers at home were for accessing the Internet, playing games, sending and receiving email, and using a word processor. There is also evidence to suggest that students who have computers at home adapt more easily to technology-rich environments (Ching, Basham and Jang, 2005).

It is possible that students' use of computers at home can inform the effective use of technology in the classroom. A study has found that student uses computers more regularly at home compared to when they are at school (Mumtaz, 2001). In Mumtaz study, she conducted a research on students at three different primary schools in the United Kingdom and reported that they spent more time playing games on their computer than any other activity. The different perceptions of students on the use of computer at home and at school were conspicuous. About 85% of the students reported that they like playing games on their home computer, while 92% reported feeling bored when using the computer at school for typing notes (Mumtaz, 2001).

In another study done by Bebell (2005) also showed that students tend to use a home computer to play games and these findings lead to possible strategies to engage students in the classroom through the use of computers. Teachers can benefit from these strategies by using games to promote the learning process in the classroom, particularly among primary school students. For example, the study conducted by Wenglinsky in 1998 showed a positive effect on students' achievement when using educational games among fourth grade students during the teaching and learning processes in classroom. Another study done in 2009 that uses video games in Science classes in four different high school also proved that students' level of engagement was significantly higher in the project classrooms than the control classrooms (Annetta *et al.*, 2009).

In this study, the interest is given to the additional support and knowledge and skills obtained from 8th-grade students from academic related enrichment activities at home and schools with their science and mathematics achievements. Based on these variables, researcher will determine whether there is a relationship between students receiving additional support and/or exposure from academic related enrichment activities at home and schools with their science and mathematics achievement. Besides that, researchers will also identify how well the knowledge or skills gained from the use of technological tools and internet does in contributing toward the science and mathematics achievement among Malaysian and Singaporean Grade 8 students. The technological tools in this study is limited to the usage of computers and internets at home and at schools, as well as the time spent in using the internet before or after school.

5.0 METHODOLOGY

The aim of this study was to explore the relationships between Malaysia and Singapore Grade 8 students receiving additional support and gaining knowledge/skills from the use of technological tools from academic related enrichment activities at home and schools and their science and mathematics achievement. This study used data drawn from the Trend in International Science and Mathematics Study (TIMSS) 2007 to address the following research questions:

1. Are the factors of gaining additional support and/or exposure from enrichment activities related to academic work at home and schools contributing to the science and mathematics achievement of Singaporean and Malaysian Grade 8 students?
2. How well do the knowledge/skills gained from the use of technological tools and Internet contribute towards the science and mathematics achievement among Singaporean and Malaysian Grade students?
3. Are there any differences between students receiving additional support and/or gaining exposure from academic related enrichment activities at home and schools with their science and mathematics achievement among Malaysian and Singaporean Grade 8 students.
4. Are there any differences between the knowledge/skills gained from the use of technological tools and Internet towards the

science and mathematics achievement among Malaysian and Singaporean Grade students?

6.0 SAMPLES

There were about 425,000 students from 59 countries participated in TIMSS 2007 assessment. This study used data drawn from the Trend in International Science and Mathematics Study (TIMSS) 2007. The number of eight-graders from Malaysia was 4,466 (male = 2,086, female = 2,380) and Singapore was 4,599 (male = 2,355, female = 2,244) (IEA, 2009a).

7.0 MEASURES

7.1 Response/Dependent/Outcome Variables

The five plausible values for the 8th grade Science achievement scores and the five plausible values for the 8th grade Mathematics achievement scores on the TIMSS 2007 were defined as the dependant variable. These values are multiple imputations of the unobservable latent achievement for each student (Wu, 2005). Due to insufficient item being administered in each specific content area (IEA 2009a), TIMSS 2007 has developed these plausible value as a computational approximation to get a more constant and accurate estimations of students' ability. The science and mathematics achievement scores were reported on a scale from 0 to 1000, with the TIMSS scale average set at 500 and standard deviation set at 100 (Olson, Martin, and Mullis 2008). The models for each of the five plausible values were run using Statistical Packages for the Social Sciences (SPSS) version 17 as plug-in along with IEA International Database (IDB) analyser Version 2.0 (IEA 2009b). This produces their average values and correct standard errors (SE).

Item No.	Item	Types of responses				
Students received additional support from enrichment activities related to academic work at home and school						
		Yes	No			
1.	Do you have a calculator in your home?					
2.	Do you have a study desk/table for your use in your home?					
3.	Do you have a dictionary in your home?					
		No time	Less than 1 hour	1-2 hour	More than 2 hour but less then 4 hours	4 or more hours
4.	On a normal school day, how much time do you spend before or after school playing computer games?					
The knowledge and skills gained from the use of technological tools and internet						
		No time	Less than 1 hour	1-2 hour	More than 2 hour but less than 4 hours	4 or more hours
5.	On a normal school day, how much time do you spend before or after school using the internet?					
		Yes	No			
6.	Do you have a computer in your home?					
7.	Do you have an internet connection in your home?					
8.	Do you ever use computers?					
9.	Do you use a computer at home?					
10.	Do you use a computer elsewhere?					
11.	Do you use computer at school?					
		Every or almost every lesson	About half the lesson	Some lessons	Never	
12.	In your science lessons, how often do you use computers?					
13.	In your mathematics lessons, how often do you use computers?					
		Every day	At least once a week	Once or twice a week	A few times year	Never
14.	How often do you use for your mathematics schoolwork?					
15.	How often do you use for your science schoolwork?					

Figure 1 TIMSS 2007 survey instrument pertaining to additional support and knowledge gain from computer and internet usage towards science and mathematics achievemen

7.2 Manipulated/Independent/Predictor Variables

The independent variables in this study are students received additional support from enrichment activities related to academic work at home and school and the knowledge and skills gained from the use of technological tools and internet. There are 4 items used as a measurement for additional support and 10 items used in this study focused on the usage of technological tools and internet in the student's home and school (whether or not student uses a computer, where student uses it and frequency with which student uses a computer in mathematics and science).

Table 1 Correlation between students' gaining additional support and knowledge gain from computer and internet usage towards science and mathematics achievement

	Correlation			
	Malaysia		Singapore	
	Science	Mathematics	Science	Mathematics
1. Do you have a calculator in your home? (BS4GTH01)	0.1966 (SE 0.0262)	0.1973 (SE 0.0236)	0.1330 (SE 0.0185)	0.1449 (SE 0.0214)
	Correlation			
	Malaysia		Singapore	
	Science	Mathematics	Science	Mathematics
2. Do you have a study desk/table for your use in your home? (BS4GTH03)	0.1522 (SE 0.0250)	0.1396 (SE 0.0252)	0.2201 (SE 0.0189)	0.2116 (SE 0.0193)
3. Do you have a dictionary in your home? (BS4GTH04)	0.1727 (SE 0.0251)	0.1583 (SE 0.0248)	0.1682 (SE 0.0246)	0.1407 (SE 0.0242)
4. On a normal school day, how much time do you spend before or after school playing computer games? (BS4GPLCG)	0.008 (SE 0.0265)	0.0837 (SE 0.0250)	0.0782 (SE 0.0191)	0.0848 (SE 0.0207)
5. Do you have a computer in your home? (BS4GTH02)	0.2559 (SE 0.0289)	0.3357 (SE 0.0251)	0.2634 (SE 0.0177)	0.2362 (SE 0.0155)
6. Do you have an internet connection in your home? (BS4GTH05)	0.2685 (SE 0.0312)	0.3357 (SE 0.0251)	0.3495 (SE 0.0174)	0.3229 (SE 0.0164)
7. In your science lessons, how often do you use computers? (BS4SHCOM)	0.0915 (SE 0.0281)	0.1368 (SE 0.0263)	0.0643 (SE 0.0242)	0.0760 (SE 0.0244)
	Correlation			
	Malaysia		Singapore	
	Science	Mathematics	Science	Mathematics
8. In your mathematics lessons, how often do you use computers? (BS4MHCOM)	0.0634 (0.0341)	-0.0121 (SE 0.0322)	0.0905 (SE 0.0235)	0.0680 (SE 0.0221)
9. Do you ever use computers? (BS4GUSEC)	1.0000 (SE 0.000)	1.0000 (SE 0.000)	1.0000 (SE 0.000)	1.0000 (SE 0.000)
10. Do you use a computer at home? (BS4GCHOM)	0.2280 (SE 0.0318)	0.3188 (SE 0.0273)	0.2959 (SE 0.0208)	0.2763 (SE 0.0177)
11. Do you use a computer elsewhere? (BS4GCELS)	0.0230 (SE 0.0253)	0.0111 (SE 0.0242)	0.0069 (SE 0.0176)	0.0243 (SE 0.0201)
12. How often do you use for your mathematics schoolwork? (BS4MCSWM)	0.0388 (SE 0.0275)	0.0151 (SE 0.0255)	0.0670 (0.0241)	0.1088 (SE 0.0240)
13. How often do you use for your science schoolwork? (BS4SCSWS)	0.0452 (SE 0.0320)	0.0293 (SE 0.0260)	0.1984 (SE 0.0225)	0.1928 (SE 0.0219)
	Correlation			
	Malaysia		Singapore	
	Science	Mathematics	Science	Mathematics
14. On a normal school day, how much time do you spend before or after school using the internet? (BS4GUSIN)	0.0885 (SE 0.0334)	0.1501 (SE 0.0300)	0.0475 (SE 0.0183)	0.0378 (SE 0.0183)
15. Do you use computer at school? (BS4GCSCH)	0.0252 (SE 0.0407)	0.0157 (SE 0.0411)	0.1231 (SE 0.0189)	0.1395 (SE 0.0182)

Table 2 Regression analyses predicting science and mathematics achievement among Malaysian and Singaporean Grade 8 students

	Malaysia				Singapore			
	Science		Mathematics		Science		Mathematics	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
1. Do you have a calculator in your home? (BS4GTH01)	-52.81	10.16	-45.73	7.43	-34.85	17.38	-56.13	16.86
2. Do you have a study desk/table for your use in your home? (BS4GTH03)	-20.88	5.97	-13.55	5.36	-39.57	5.69	-35.66	4.98
3. Do you have a dictionary in your home? (BS4GTH04)	-59.34	12.15	-44.93	10.57	-73.24	18.22	-42.45	15.87
4. On a normal school day, how much time do you spend before or after school playing computer games? (BS4GPLCG)	-10.64	1.82	5.83	1.44	-11.55	1.30	-10.28	1.32
5. Do you have a computer in your home? (BS4GTH02)	-31.07	4.64	-35.35	3.92	-32.36	8.18	-21.75	7.84
6. Do you have an internet connection in your home? (BS4GTH05)	-39.44	5.72	-40.63	4.48	-92.36	6.76	-78.40	6.01
7. In your science lessons, how often do you use computers? (BS4SHCOM)	-2.54	2.36	-4.44	1.86	7.70	2.58	8.01	2.42
8. In your mathematics lessons, how often do you use computers? (BS4MHCOM)	11.34	3.35	4.43	2.65	15.37	3.06	12.60	2.66
9. Do you ever use computers? (BS4GUSEC)	0.00	2142.69	0.00	2169.59	0.00	1988.68	0.00	1953.76
10. Do you use a computer at home? (BS4GCHOM)	-46.91	5.72	-53.33	4.83	-114.81	9.39	-96.74	7.50
11. Do you use a computer elsewhere? (BS4GCELS)	-9.54	4.10	-7.80	3.39	-0.30	3.70	-2.55	3.81
12. How often do you use for your mathematics schoolwork? (BS4MCSWM)	10.34	2.19	5.08	1.95	11.16	2.88	2.53	2.66
13. How often do you use for your science schoolwork? (BS4SCSWS)	-10.09	2.83	-3.20	2.05	-25.51	2.65	-16.79	2.39
14. On a normal school day, how much time do you spend before or after school using the internet? (BS4GUSIN)	2.83	2.08	4.78	1.68	-3.25	1.48	-3.23	1.36
15. Do you use computer at school? (BS4GCSCH)	-21.06	6.14	-13.19	4.95	-23.71	4.08	-23.20	3.58
Multiple correlation, R^2		0.12		0.16		0.20		0.18

8.0 RESULT

1. Are the factors of gaining additional support and/or exposure from enrichment activities related to academic work at home and schools contributing to the science and mathematics achievement of Singaporean and Malaysian Grade 8 students?

Malaysian and Singaporean Grade 8 students' science achievement.

Table 1 shows the correlation between students' gaining additional support and knowledge gain from computer and internet usage towards science and mathematics achievement. For Malaysian samples, data analysis indicated a moderate correlation is found between 'have a calculator at home' 0.1966 (SE 0.0262), 'have study desk/table for use at home 0.1522 (SE 0.0250) and 'have a dictionary at home'0.1727 (SE 0.0251) with their science achievement. For Singaporean samples, data analysis indicated a moderate correlation is found between 'have a calculator at home' 0.1330 (SE 0.0185), 'have study desk/table for use at home 0.2201 (SE 0.0189) and 'have a dictionary at home' 0.1682 (SE 0.0246) with their science achievementFor Malaysian samples, data analysis indicated a moderate correlation is found between 'have a calculator at home' 0.1966 (SE 0.0262), 'have study desk/table for use at home 0.1522 (SE 0.0250) and 'have a dictionary at home'0.1727 (SE 0.0251) with their science achievement. For Singaporean samples, data analysis indicated a moderate correlation is found between 'have a calculator at home' 0.1330 (SE 0.0185), 'have study desk/table for use at home 0.2201 (SE 0.0189) and 'have a dictionary at home' 0.1682 (SE 0.0246) with their science achievement.

Malaysian and Singaporean Grade 8 students' mathematics achievement.

For Malaysian samples, data analysis indicated a moderate correlation is found between 'have a calculator at home' 0.1973 (SE 0.0236), 'have study desk/table for use at home 0.1396 (SE 0.0252) and 'have a dictionary at home' 0.1583 (SE 0.0248) with their science achievement. For Singaporean samples, data analysis indicated a moderate correlation is found between 'have a calculator at home' 0.1449 (SE 0.0214), 'have study desk/table for use at home 0.2116 (SE 0.0193) and 'have a dictionary at home' 0.0848 (SE 0.0207) with their mathematics achievement.

2. How well do the knowledge/skills gained from the use of technological tools and Internet contributes towards the science and mathematics achievement among Singaporean and Malaysian Grade students?

A second correlation analysis was used to determine if a relationship existed between knowledge/skills gained from the use of technological tools and Internet and the science and mathematics achievement of Singaporean and Malaysian Grade 8 students. Students' responses to the questionnaires indicated a weak correlation existed between 'use of computer at school' (BS4GCSCH) and 'use of computer for science schoolwork' (BS4SCSWS) in Singaporean Grade 8 students. However, a moderate correlation is found between 'use of computer at home' BS4GCHOM, have a computer at home (BS4GTH02) and 'have an internet connection at home' BS4GTH05 towards students' science and mathematics achievement in both countries.

3. Are there are any differences between students receiving additional support and/or gaining exposure from academic related enrichment activities at home and schools with their science and mathematics achievement among Malaysian and Singaporean Grade 8 students?

Table 2 shows the regression analyses predicting science and mathematics achievement among Malaysian and Singaporean Grade 8 students. The regression analysis was used to determine if there are any differences existed between students receiving additional support and/or gaining exposure from academic related enrichment activities at home and schools and the science and mathematics achievement of Malaysian and Singaporean Grade 8 students. Students' responses to the questionnaires indicated that student receiving additional support (i.e calculator, study desk/table, dictionary and playing computer games) showed statistically significant predictive effects on science and mathematics achievement for both Malaysian and Singaporean Grade 8 students, with $R^2 = 0.07$ and 0.08 (science) and $R^2 = 0.08$ and 0.07 (mathematics).

4. Are there any differences between the knowledge/skills gained from the use of technological tools and Internet towards the science and mathematics achievement among Malaysian and Singaporean Grade students?

The regression analysis was used to determine if there are any differences existed between knowledge/skills gained from the use of technological tools and Internet and the science and mathematics achievement of Malaysian and Singaporean Grade 8 students. Students' responses to the questionnaires indicated that students gained knowledge from the use of technological tools and internet (i.e have computer, have internet connection, use computer in science and mathematics lesson, use of computer in science and mathematics schoolwork and use of computer at school) showed statistically significant predictive effects on science and mathematics achievement for both Malaysian and Singaporean Grade 8 students, with $R^2 = 0.12$ and 0.18 (science) and $R^2 = 0.16$ and 0.18 (mathematics).

9.0 DISCUSSION

This paper sets out to examine critically a) if there were correlations between students receiving additional support and/or gaining exposure from academic related enrichment activities at home and schools with their science and mathematics achievement and, b) How well do the knowledge/skills gained from the use of technological tools and Internet contribute towards their science and mathematics achievement among Malaysian and Singaporean Grade 8 students.

The first research question was focussed on students' receiving additional support and its relationship to their science and mathematics achievement. Data analysis indicated a moderate correlation is found between 'have a calculator at home' (BS4GTH01) and 'have study desk/table for use at home (BS4GTH03) and 'have a dictionary at home' (BS4GTH04) with their science and mathematics achievement in both countries. Students who indicated they received additional support in enrichment activities related to academic work at home and schools were likely to perform well in science and mathematics.

The second research question was focused on the relationship between students' gaining knowledge/skills from the use of technological tools and internet towards their science and

mathematics achievement. Students' responses to the questionnaires indicated a weak correlation existed between 'use of computer at school' (BS4GCSCH) and 'use of computer for science schoolwork' (BS4SCSWS) in Singaporean Grade 8 students. However, a moderate correlation is found between 'use of computer at home' BS4GCHOM, have a computer at home (BS4GTH02) and 'have an internet connection at home' BS4GTH05 towards students' science and mathematics achievement in both countries. In other words, Students who gaining knowledge/skills in enrichment activities related to academic work at home and schools were likely to achieve better in science and mathematics.

The regression analysis was used to determine if there are any differences existed between students receiving additional support and/or gaining exposure from academic related enrichment activities at home and schools and the science and mathematics achievement of Malaysian and Singaporean Grade 8 students. Students' responses to the questionnaires indicated that student receiving additional support (i.e calculator, study desk/table, dictionary and playing computer games) showed statistically significant predictive effects on science and mathematics achievement for both Malaysian and Singaporean Grade 8 students, with $R^2 = 0.07$ and 0.08 (science) and $R^2 = 0.08$ and 0.07 (mathematics).

The regression analysis was used to determine if there are any differences existed between knowledge/skills gained from the use of technological tools and Internet and the science and mathematics achievement of Malaysian and Singaporean Grade 8 students. Students' responses to the questionnaires indicated that students gained knowledge from the use of technological tools and internet (i.e have computer, have internet connection, use computer in science and mathematics lesson, use of computer in science and mathematics schoolwork and use of computer at school) showed statistically significant predictive effects on science and mathematics achievement for both Malaysian and Singaporean Grade 8 students, with $R^2 = 0.12$ and 0.18 (science) and $R^2 = 0.16$ and 0.18 (mathematics).

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