

Assessing Geographic Literacy among Form Four Students in Malaysian Secondary Schools

Menilai Literasi Geografi dalam Kalangan Pelajar Tingkatan Empat di Sekolah Menengah di Malaysia

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Abstract

This paper reports the empirical findings of a study aimed at investigating the links between geographic literacy and formal education among form four students in Malaysian secondary schools. A quantitative research method was employed using a set of questionnaires with multiple-choice questions designed to test the respondents' geographic literacy in three domains; knowledge, skill and value. The respondents were 1,031 Form Four students aged 16 in national schools in Malaysia. Descriptive and inferential statistics were used to identify the link between literacy level and variables such as gender and school location. The study found that the geographic literacy among form four students in Malaysian secondary schools is at a moderate level (55%). No gender differences were noted, however, school location (urban or rural) have shown significant differences for 10 out of 36 questions. The findings from this study indicated an urgent need to evaluate current practices of teaching and learning as well as assessment of geography education in Malaysian schools in order to improve geographic literacy of students considering the role of the formal education system in this matter.

Keywords geographic literacy, geography education, geography knowledge, geography skills, geography values, Malaysian secondary schools

Abstrak

Artikel ini melaporkan penemuan bagi kajian empirikal yang bertujuan untuk menyiasat hubungan antara literasi geografi dan pendidikan formal dalam kalangan empat pelajar sekolah menengah di Malaysia. Kaedah penyelidikan kuantitatif iaitu dengan menggunakan satu set soal selidik dengan pelbagai pilihan soalan yang direka untuk menguji literasi geografi responden dalam tiga domain; pengetahuan, kemahiran dan nilai. Responden terdiri daripada 1,031 orang pelajar Tingkatan Empat berusia 16 tahun di sekolah kebangsaan di Malaysia. Statistik deskriptif dan inferens digunakan untuk mengenal pasti hubungan antara tahap celik dan pembolehubah seperti jantina dan lokasi sekolah. Hasil kajian mendapati bahawa literasi geografi dalam kalangan pelajar Tingkatan Empat sekolah menengah di Malaysia berada pada tahap sederhana (55%). Tidak terdapat perbezaan jantina, bagaimanapun, lokasi sekolah (bandar atau luar bandar) telah menunjukkan perbezaan yang ketara bagi 10 daripada 36 soalan yang dikemukakan. Penemuan kajian ini menunjukkan bahawa keperluan mendesak untuk menilai amalan semasa pengajaran dan pembelajaran serta penilaian pendidikan geografi di sekolah-sekolah Malaysia bagi meningkatkan literasi geografi pelajar dengan mengambil kira peranan sistem pendidikan formal dalam hal ini.

Kata kunci literasi geografi, pendidikan geografi, pengetahuan geografi, kemahiran geografi, nilai geografi, sekolah menengah Malaysia

INTRODUCTION

Eve, Price and Counts (1994), and Henry (1994) defined geographic literacy as the ability to demonstrate knowledge about a place and see meaning in the arrangement of things in space. They further added that geographic literacy involved the ability to apply spatial perspective to life situations. In other words, the geographically literate person understands why people are located where they are, how people have shaped space into distinctive places, and how those places have, in turn, affected peoples' lives (Bliss, 2006). A number of studies carried out over the past three decades seem to suggest poor geographic literacy among secondary school students and young adults. In the United States (U.S.), for example, studies and surveys carried out by Helgren (1983), Gallup Organization (1988), Grosvenor (1989), Rand McNally (1990), Eve et al. (1994), Hardwick, Bean, Alexander, & Shelley (1999), U.S. National Geographic Roper (2002), Nolan (2002), Winship (2004), Oigara (2006) and Ottati (2015) reported poor geographic literacy among secondary school students and young adults. According to the surveys, despite the daily bombardment of news from the Middle East, 85% of young Americans could not find Afghanistan, Iraq or Israel on a map. In the local context, however, there were only a few studies conducted to assess geographic literacy among secondary school students, young adults and geography teachers in Malaysia (see, for example, Ahmad & Saidin, 2016; Kumaran, Abdullah, & Tham 2015; Dziauddin, Hashim, & Che Ngah, 2013; Ahmad & Osman, 2006). A survey carried out by Kumaran et al. (2015) from the Malay Mail newspaper on general knowledge of secondary school students in three states in Malaysia - Penang, Perak and Selangor - suggested poor geographic literacy among them. More than half of the respondents did not know there are 13 states and three federal territories in Malaysia and majority of them answered that there are 14 states.

This finding is consistent with Dziauddin et al. (2013) who conducted a study involving over 400 public university students and found that the geographic literacy among these students was generally poor, especially for low-level geographic literacy (place-name and location knowledge) and middle-level geographic literacy (understanding of geographic interrelationships). For example, more than half of the respondents failed to identify correctly the location of five Southeast Asian countries on a blank map. Although nearly 90% of the respondents knew where Malaysia was, 12% of them could not correctly point out Malaysia on a map of Southeast Asia. These findings are worrisome, particularly for the Ministry of Education and Ministry of Higher Education Malaysia, despite excellent results in public examinations making headlines every year. It is important to note that to compete successfully in the global economy, ensuring our citizens develop a broad understanding about the world in which we live is greater than ever. The U.S. Secretary of Education, Rod Paige (2002 cited in Winship, 2004), opined that "each of us is an ambassador when we interact with our global neighbours. Thus, giving our children a solid education, which includes the skills they will need to succeed in a global context, is essential". Professor David Keeling (2003: 5 cited in Winship, 2004) believes that "having a good level of global knowledge is fundamental to the enlightenment of society, and democracy is absolutely dependent on the people's enlightenment." Perhaps more than any other discipline, geography is well equipped to provide the knowledge and skills necessary to understand the world in which we live (Winship, 2004: 1).

This paper, therefore, is an attempt to investigate the links between geographic literacy and formal education of form four students in Malaysian secondary schools. Currently, student understanding of this subject is evaluated through centralised public examination such as the Lower Secondary Assessment (known as P.M.R.) and the Malaysian School Certificate (known as S.P.M.). The achievements at both the P.M.R. and S.P.M. examinations are generally related to the understanding of the contents in the curriculum of a subject examined and not necessarily on geographic literacy (Chang, Dziauddin, Jabar, Daud, Abdul Rahman, & Othman, 2014). This paper seeks to contribute to the literature by providing empirical evidence on lack of geographic literacy among form four students in Malaysian secondary schools and how that can be addressed by the educational authorities in producing all-round students.

MATERIALS AND METHODS

Instrument

The instrument used in this study was developed based on three learning domains, namely cognitive (knowledge), psychomotor (skills) and affective (values), as stated in the national school curriculum (known as K.B.S.M.) and the National Education Developmental Plan 2013-2025. Hence, the instrument to test

geographic literacy among form four students in Malaysia was developed in the context of these three domains of learning outcomes so as to be aligned with the K.B.S.M. in Malaysia. Questions and the choice of answers in the questionnaire were designed with four alternatives. In the domain of knowledge, items built were divided into three parts, namely basic concepts and knowledge about places and locations in geography, current events (declarative), the processes involved in understanding the interaction between humans and the environment (procedural) and applications in real life (self-regulatory).

To measure the level of geographic literacy in all three domains, all items were divided into six levels as proposed by Bloom (1955): knowledge, comprehension, application, analysis, evaluation and synthesis with the following allocations, 58% (knowledge and understanding), 29% (application and analysis) and the remaining 13% (synthesis and evaluation). The respondents must answer all 39 multiple-choice questions. Each multiple-choice item has four possible answers. Pilot tests on the set of questionnaires indicated Kuder Richardson-20 (KR-20) value of $0.7 \leq \alpha < 0.8$.

Data Collection

This study employed quantitative research method to assess geographic literacy among form four students (aged 16) in Malaysian secondary schools. The study was conducted throughout Malaysia between end-October and early November 2013. Stratified random sampling was used in the selection of the respondents. The states were divided into six zones, namely north (Perlis, Kedah, Pulau Pinang and Perak), east (Kelantan, Terengganu and Pahang), central (Selangor, Kuala Lumpur and Putrajaya), south (Negeri Sembilan, Melaka and Johor), Sabah and Sarawak. In each zone, 200 students were selected according to the location of schools (urban or rural) as determined by the Ministry of Education and streams of study (science, technic and vocational and humanities science). Out of a total of 1200 questionnaires distributed, 1,031 completed ones were used for final analysis. Although the sample was relatively small, the sampling procedure employed suggested it was statistically representative of form four students in Malaysian secondary schools. Out of the 1,031 respondents, 473 (46%) were males and 558 (54%) females. The majority of the respondents were Malays (58%) followed by Chinese (17%), Indians (4%), Iban (2%), Kadazan (3%) and others (16%). The test was administered by participating teachers to their students.

Data Analysis

Descriptive analyses were conducted using *Statistical Package for Social Science (SPSS)* version 16.0 for Windows. Data were presented in form of frequency and percentage. The knowledge, skills and values were first calculated and the percentages of overall geographic literacy and in accordance to the three domains of knowledge, skills and values were then obtained. The scores were then converted to grades based on in the S.P.M. examination results set by the Ministry of Education Malaysia (see Table 1). Respondents who received an A+ grade achieving a score between 90 and 100 are considered having the highest level of geographic literacy, whereas those who received grade G with a score between 0 and 39 are considering having the lowest level of geographic literacy. In addition, an independent-samples t-test was carried out to see the differences among the sampled respondents.

Table 1 Overall grade and total score on geographic literacy

Grade	Score
A+	90-100
A	80-89
A-	70-79
B+	65-69
B	60-64
C+	55-59
C	50-54
D	45-49
E	40-44
G	0-39

Source: Kementerian Pendidikan Malaysia (2013)

RESULTS

Overall Geographic Literacy

Table 2 displays overall geographic literacy scores in three domains: knowledge, skills and values. The highest percentage of geographic literacy is recorded in knowledge domain (58%) followed by values domain (55%) and skills domain (52%). It can be concluded, based on this study, geographic literacy among form four students in secondary schools throughout the country is at a moderate level (55%).

Table 2 Overall geographic literacy among form four students in Malaysian secondary schools

Category	Domain	(%)
Geographic Literacy	Knowledge	58.16
	Skills	51.95
	Values	54.99
Overall percentage		55.03

Geography Knowledge

Table 3 displays the scores in three geographic domains, namely knowledge, skills and values. Majority of the respondents performed moderately well in geography knowledge. They however, appeared to be well informed about characteristics of an individual who learn geography (87%), regions where majority of Muslims in the world live (80%), types of heavy industries in Malaysia (80%), effects of deforestation (79%), business and financial centres in Malaysia (78%), ways of spreading information (77%), the longest river in Malaysia (75%), the characteristics of forests in Malaysia (74%), urban heat island phenomena (73%), holy places for Muslim (70%), capital cities of the states of Malaysia (70%), absolute position (69%), the definition of geography (65%), landform (64%), migration (58%), types and location of industrial activities in Malaysia (55%) and time taken to travel from Alor Setar to Ipoh based on distance and speed of vehicles assigned (52%).

Table 3 Respondents' achievement in geography knowledge test questions

No.	Item	True		False		N	sd.
		%	f	%	f		
1	Characteristics of learning geography*	87.0	897	13.0	134	1031	0.336
2	Religion	80.4	828	19.6	202	1030	3.072
3	Heavy industry	80.4	828	19.6	202	1030	3.072
4	Deforestation effects	78.9	812	21.1	217	1029	4.324
5	Business and financial centre	78.4	807	21.6	222	1029	4.324
6	Way of spreading information	76.7	791	23.3	240	1031	0.423
7	Longest river	75.4	777	24.6	254	1031	0.431
8	Forest characteristics	73.5	757	26.5	273	1030	3.076
9	Urban heat island phenomena	72.5	747	27.5	283	1030	3.076
10	Holy places	69.9	719	30.1	310	1029	4.325
11	Capital city	69.5	717	30.5	314	1031	0.460
12	Absolute position	69.2	713	30.8	318	1031	0.462
13	Geography definition	65.8	676	34.2	352	1028	5.284
14	Landform	64.1	661	35.9	370	1031	0.480
15	Migration	58.0	597	42.0	433	1030	3.079
16	Industrial activities	55.2	569	44.8	461	1030	3.079
17	Travel time	51.6	527	48.4	495	1022	9.089
18	Weather	46.4	478	53.6	553	1031	0.499
19	Total Population	43.4	445	56.6	581	1026	6.790

20	Trading country	35.7	366	64.3	660	1026	6.784
21	Relative position	32.6	336	67.4	695	1031	0.469
22	Size of Malaysia	27.5	283	72.5	747	1030	3.062
23	Characteristics of geography	25.1	259	74.9	771	1030	3.060
24	Data source in geography	20.8	214	79.2	817	1031	0.406
25	Direction	16.0	165	84.0	866	1031	0.367

* Items ranked according to the percentage of correct answers.

However, for questions 18, 19, 20, 21, 22, 23, 24 and 25, more than half of the respondents failed to answer correctly. For example, when asked when the monsoon season is on the east coast of Peninsular Malaysia, only 46% of the respondents could provide the correct answer. Similarly, to the question on the total population of Malaysia (item 19), only 43% of the respondents answered correctly which was quite a surprise as this was common knowledge. Meanwhile, when asked about Malaysia's main trading partner, 65% of the respondents did not know the answer was U.S. On questions related to the relative position (item 21), the size of Malaysia (item 22), attributes associated to geography (item 23) and data source in geography (item 24) 67%, 73%, 75% and 79% of the respondents respectively gave the wrong answer. Finally, 84% (item 25) of the respondents were not able to pin point the direction from point 'A' to point 'B' on a blank map.

Geography Skills

Results shown on Table 4 indicate that majority of the respondents have poor geography skills. A majority of them provided wrong answers for items 31, 32, 33, 34, 35, and 36. For example, nearly 53% of the respondents failed to interpret the employment of inhabitants in a given topographic map, 56% were unable to describe the process of globalisation, 58% did not know how to interpret data provided, 60% were not able to calculate the distance based on data supplied, 62% failed to identify the essential functions of topographic maps and almost 64% were unable to identify symbols used to indicate height in the topographic map.

Table 4 Respondents' achievement in geography skills test questions

No.	Item	True		False		N	sd.
		%	f	%	f		
26	Graph interpretation*	79.1	815	20.9	215	1030	3.073
27	Explaining the process of rain	67.7	692	32.3	330	1022	9.103
28	Characterise types of settlement patterns	66.0	678	34.4	350	1028	5.284
29	Calculate percentage	59.6	611	40.4	415	1026	6.801
30	Interprate colours on topographic map	51.6	530	48.4	497	1027	6.086
31	Interprate employment type on topographic map	47.5	488	52.5	540	1028	5.277
32	Explaining globalisation process	44.0	452	56.0	575	1027	6.081
33	Identify area based on economic activities	42.0	431	58.0	596	1027	6.079
34	Calculate travel distance	39.9	408	60.1	615	1023	8.564
35	Identify the function of topographic map	37.6	385	62.4	639	1024	8.015
36	Identify symbols on topographic map	36.5	374	63.5	652	1026	6.784

* Items ranked according to the percentage of correct answers

Geography Values

In the case of geography values, results in Table 5 indicate the majority of respondents performed moderately well. For the geography values domain, respondents were given three scenarios that illustrate the value an individual who learn geography should possess. As for the three items on the values domain, 60% of the respondents answered correctly on the value related to responsibility whilst 55% on the

country's biodiversity, and 50% on the importance of empathy in relation to poverty and hunger in some African countries.

Table 5 Respondents' achievement in geography values test questions

No.	Item	True		False		N	sd.
		%	<i>f</i>	%	<i>f</i>		
37	Responsible	59.8	615	40.2	413	1028	5.282
38	Proud	54.7	562	45.3	465	1027	6.087
39	Empathy	50.4	518	49.6	509	1027	6.085

* Items ranked according to the percentage of correct answers

Respondents' achievement in the geography test questions according to grade and mark

Table 6 displays overall grades and marks obtained by respondents. It is important to note here that the grades and marks obtained by the respondents for the three domains are used as the bases to determine the level of geographic literacy among form four students in selected schools in Malaysia. None of the respondents scored between 90 and 100 (grade A+) and only 3% scored in the 80-89 range (grade A). Interestingly, 17% of the respondents obtained mark below 40 (grade F). However, a large majority of them (43%) scored in the 55 - 69 range (grades C+ and B+).

Table 6 Respondents' achievement in the geography test questions according to grade and mark

Grade	Mark	Geography	
		%	<i>f</i>
A+	90-100	-	-
A	80-89	3.1	32
A-	70-79	14.6	151
B+	65-69	13.5	139
B	60-64	16.0	165
C+	55-59	13.3	137
C	50-54	9.5	98
D	45-49	7.2	74
E	40-44	5.7	59
G	0-39	17.1	176
Total		1031	100.0

Grade and Mark According to the Domain

Table 7 displays the grades and marks according to three domains in geography: knowledge, skills and values. In the knowledge domain, none of the respondents managed to score in the 90-100 range (grade A+); 6% of the respondents scored in the 80-89 range (A) and 14% in the 70-79 range (grade A-). A total of 22% of the respondents scored in the 65-69 range (grade B+), 12% in the 60-64 range (grade B), 9% in the 55-59 range (grade C+), 14% in the 50-54 range (grade C) while 8% in the 40-49 range (grades E and D). Data also shows 15% or 158 respondents failed (scores less than 39) in the knowledge domain.

In the skills domain, the respondents performed even worse in which more than 35% of the respondents scored in the 0-44 range (grades F and E). However, the percentage of those whose had scores in the 80-100 range (grades A and A+) was greater (14%) compared with the scores in the knowledge domain (6%). In the values domain, 27% of the respondents had scores in the 90-100 range (grade A+), 29% in the 65-69 range (grade B+) and 44% in the 0-39 range (grade F).

Table 7 Grade and mark according to the domain

Grade	Mark	Knowledge		Skills		Values	
		%	<i>f</i>	%	<i>f</i>	%	<i>f</i>
A+	90-100	-	-	5.3	54	27.4	282
A	80-89	5.7	59	9.1	94	-	-
A-	70-79	13.5	139	15.0	155	-	-
B+	65-69	22.3	230	-	-	28.7	296
B	60-64	12.3	127	18.5	191	-	-
C+	55-59	9.2	95	-	-	-	-
C	50-54	14.0	144	16.9	174	-	-
D	45-49	4.1	42	-	-	-	-
E	40-44	3.6	37	15.3	158	-	-
G	0-39	15.3	158	19.9	205	43.9	453
Total		100.0	1031	100.0	1031	100.0	1031

Gender and Geographic Literacy (Geography Knowledge)

Table 8 displays the results of the t-test on gender and scores in the knowledge domain. Results show no significant difference between gender and student scores for majority of items except for item 19, the concept of absolute position, in which female respondent's outperformed male respondents.

Table 8 T-test on gender and students' achievement scores for knowledge domain

No.	Item	Gender				t-value	p-value
		Male		Female			
		(Mean)	(N)	(Mean)	(N)		
1.	Geography definition	1.784	473	1.493	558	.883	.378
2.	Characteristics of geography	1.954	473	1.749	558	1.069	.285
3.	Data source in geography	1.789	473	1.796	558	-.280	.779
4.	Characteristics of learning geography	1.142	473	1.120	558	1.026	.305
5.	Relative position	1.691	473	1.660	558	1.086	.278
6.	Capital city	1.281	473	1.324	558	-1.502	.133
7.	Direction	1.858	473	1.824	558	1.483	.138
8.	Size of Malaysia	1.732	473	1.894	558	-.850	.395
9.	Longest river	1.247	473	1.246	558	.007	.946
10.	Landform	1.334	473	1.380	558	-1.531	.126
11.	Weather	1.554	473	1.522	558	1.039	.299
12.	Industrial activities	1.649	473	1.452	558	1.026	.305
13.	Business and financial centre	1.634	473	1.212	558	1.565	.118
14.	Way of spreading information	1.233	473	1.233	558	-.016	.987
15.	Total Population	2.177	473	1.921	558	.604	.546
16.	Religion	1.214	473	1.357	558	-.745	.456
17.	Trading country	2.269	473	1.986	558	.667	.505
18.	Holy places	1.723	473	1.294	558	1.589	.112
19.	Absolute position	1.353	473	1.271	558	2.865	.004*
20.	Deforestation effects	1.647	473	1.192	558	1.686	.092
21.	Migration	1.402	473	1.611	558	-1.088	.277
22.	Urban heat island phenomena	1.250	473	1.471	558	-1.154	.249

23.	Forest characteristics	1.273	473	1.434	558	-.837	.403
24.	Heavy industry	1.222	473	1.350	558	-.664	.507
25.	Travel time	2.514	473	2.185	558	.579	.563

Note: * = significant
p>0.05 = Not significant

Gender and Geographic Literacy (Geography Skills)

Table 9 displays the results of the t-test on gender and scores in the skills domain. Results indicated no significant difference between gender and student scores for all items. Thus, it can be said that gender does not play a significant role in determining one's geography skills at least in the context of this study.

Table 9 T-test on gender and students' achievement scores for skills domain

No.	Item	Gender				t-value	p-value
		Male		Female			
		(Mean)	(N)	(Mean)	(N)		
26.	Interprate colours on topographic map	2.216	473	2.344	558	-.256	.798
27.	Graph interpretation	1.218	473	1.376	558	-.826	.409
28.	Explaining globalisation process	1.736	473	2.109	558	-.983	.326
29.	Identify the function of topographic	1.660	473	2.034	558	-.984	.325
30.	Characterise types of settlement	1.590	473	1.654	558	-.195	.846
31.	Explaining the process of rain	1.744	473	2.541	558	-1.402	.161
32.	Calculate percentage	1.630	473	2.088	558	-1.077	.282
33.	Identify area based on economic	1.744	473	2.140	558	-1.041	.298
34.	Identify symbols on topographic map	1.808	473	2.362	558	-1.308	.191
35.	Interprate employment type on	1.715	473	1.889	558	-.528	.597
36.	Calculate travel distance	2.398	473	2.323	558	.140	.889

Note: * = significant
p>0.05 = Not significant

Gender and Geographic Literacy (Geography Values)

Table 10 displays the results of the t-test on gender and student scores in the values domain. Results indicate e no significant difference between gender and student scores for all items.

Table 10 T-test on gender and students' achievement scores for values domain

No.	Item	Gender				t-value	p-value
		Male		Female			
		(Mean)	(N)	(Mean)	(N)		
37.	Proud	1.651	473	1.984	558	-.874	.382
38.	Responsible	1.628	473	1.735	558	-.324	.746
39.	Empathy	1.913	473	1.841	558	.191	.848

Note: * = significant
p>0.05 = Not significant

School Location and Geographic Literacy (Geography Knowledge)

Further analysis was carried out to identify whether there are significant differences between school location (urban or rural) and student scores in the knowledge domain. The results of the t-test (see Table 11) reveals that there are no significant differences between school location and student scores for items 1, 2, 3, 7, 8,

12, 13, 14, 16, 17, 18, 20, 21, 22, 23, 24 and 25, but there are significant differences for items 4, 5, 6, 9, 10, 11, 15 and 19. Thus, it can be concluded that respondents in urban areas generally scored better than respondents in rural areas; except for item 15 in which respondents in rural areas scored better than their counterparts in urban areas and the mean values for these items are as follows: item 4 (urban = 1,096, rural = 1.166), item 5 (urban = 1.620, rural = 1.730), item 6 (urban = 1.244, rural = 1.369), item 9 (urban = 1.216, rural = 1.277), item 10 (urban = 1.306, rural = 1.413), item 11 (urban = 1.497, rural = 1.577), item 15 (urban = 2,492, rural = 1.563) and item 19 (urban = 1,263 , rural = 1.359) respectively.

School Location and Geographic Literacy (Geography Skills)

Table 12 displays the results of the t-test on school location and student scores in the geography skills domain. Results show no significant difference between school location and scores for items 26, 27, 28, 29, 30, 31, 33, 35 and 36. However, for items 32 and 34, t-test results suggest that there are significant differences between school location and student scores where respondents in rural areas scored better than the respondents in urban areas. The mean values for items 32 and 34 are as follows: Item 32 (urban = 2.295, rural = 1.437) and item 34 (urban = 2.514, rural = 1.681).

Table 11 T-test on school location and students' achievement scores for knowledge domain

No.	Item	School Location				t-value	p-value
		Urban		Rural			
		(Mean)	(N)	(Mean)	(N)		
1.	Geography definition	1.919	529	1.317	499	1.825	.068
2.	Characteristics of geography	1.936	529	1.746	499	.995	.320
3.	Data source in geography	1.817	529	1.768	499	1.943	.052
4.	Characteristics of learning geography	1.096	529	1.166	499	-3.343	.001*
5.	Relative position	1.620	529	1.730	499	-3.760	.000*
6.	Capital city	1.244	529	1.369	499	-4.385	.000*
7.	Direction	1.845	529	1.834	499	.494	.621
8.	Size of Malaysia	1.898	529	1.736	499	.849	.396
9.	Longest river	1.216	529	1.277	499	-2.278	.023*
10.	Landform	1.306	529	1.413	499	-3.581	.000*
11.	Weather	1.497	529	1.577	499	-2.576	.010*
12.	Industrial activities	1.463	529	1.625	499	-.843	.400
13.	Business and financial centre	1.565	529	1.237	499	1.217	.224
14.	Way of spreading information	1.208	529	1.257	499	-1.847	.065
15.	Total Population	2.492	529	1.563	499	2.192	.029*
16.	Religion	1.178	529	1.411	499	-1.215	.225
17.	Trading country	2.248	529	1.976	499	.641	.522
18.	Holy places	1.337	529	1.653	499	-1.172	.241
19.	Absolute position	1.263	529	1.359	499	-3.341	.001*
20.	Deforestation effects	1.550	529	1.243	499	1.138	.255
21.	Migration	1.393	529	1.643	499	-1.300	.194
22.	Urban heat island phenomena	1.189	529	1.561	499	-1.938	.053
23.	Forest characteristics	1.314	529	1.405	499	-.473	.636
24.	Heavy industry	1.163	529	1.427	499	-1.377	.169
25.	Travel time	2.308	529	2.367	499	-.103	.918

Note: * = significant
 p>0.05 = Not significant

Table 12 T-test on school location and students' achievement scores for skills domain

No.	Item	School Location				t-value	p-value
		Urban		Rural			
		(Mean)	(N)	(Mean)	(N)		
26.	Interprate colours on topographic map	2.359	529	2.208	499	.301	.764
27.	Graph interpretation	1.337	529	1.267	499	.364	.716
28.	Explaining globalisation process	2.068	529	1.802	499	.701	.483
29.	Identify the function of topographic	2.193	529	1.515	499	1.784	.075
30.	Characterise types of settlement	1.873	529	1.361	499	1.553	.121
31.	Explaining the process of rain	2.386	529	1.958	499	.752	.452
32.	Calculate percentage	2.295	529	1.437	499	2.022	.043*
33.	Identify area based on economic	2.291	529	1.609	499	1.797	.073
34.	Identify symbols on topographic map	2.514	529	1.681	499	1.967	.049*
35.	Interprate employment type on	2.081	529	1.521	499	1.701	.089
36.	Calculate travel distance	1.887	529	2.862	499	-1.824	.068

Note: * = significant
p>0.05 = Not significant

School Location and Geographic Literacy (Geography Values)

In the geography values domain, the result of the t-test suggests that there are no significant differences between school location and student scores (see Table 13).

Table 13 T-test on school location and students' achievement scores for values domain

No.	Item	School Location				t-value	p-value
		Urban		Rural			
		(Mean)	(N)	(Mean)	(N)		
37.	Proud	2.157	529	1.487	499	1.763	.078
38.	Responsible	1.949	529	1.409	499	1.638	.102
39.	Empathy	2.163	529	1.569	499	1.562	.119

Note: * = significant
p>0.05 = Not significant

DISCUSSION AND CONCLUSION

The goal of this study was to investigate the link between geographic literacy and formal education among form four students in Malaysian secondary schools. Based on statistical analysis of data derived from questionnaires, it is safe to conclude that geographic literacy among form four students in Malaysian secondary schools is at a moderate level (55%). Among the three domains tested, the geography knowledge had the highest score (58%) followed by geography values (55%) and geography skills (52%). These results seem to corroborate previous findings by Laughlin (2006) which indicated secondary school students performed better on questions related to cultural geography (geography knowledge domain) than using scales to measure distance area (geography skills domain). This implies that students are struggling with geography skills such as map reading (i.e. calculate, identify and integrate). Based on these findings, factors related to why students are struggling with geography skills should be further investigated. As for the t-test analysis regarding gender and school location in determining students' geographic literacy, results of the present study indicate that gender does not play a significant role. However, school location is a factor in at least 10 out of 39 questions tested.

As previous researchers (see, for example, Eve et., 1994; Nolan, 2002; Winship, 2004; Oigara, 2006; Dziauddin et al., 2013) have highlighted, there are a number of factors other than gender and school location that could contribute to students' geographic literacy. Previous academic performance at the public examinations, ethnicity, reading habits, parents' academic attainments, having parents who travelled regularly, students' who travelled regularly and favourite television programmes are likely to contribute to students' geographic literacy and therefore, future study could explore these factors further. In conclusion, results of this study have shown that there is an urgent need to review and evaluate current policies, curriculum and practices of teaching and learning as well as assessment of geography education in Malaysian schools considering the role of the formal education system in developing geographic literacy. Thus, developing a new approach to teach geography in secondary schools is essential in order to help students develop their geographic knowledge, skills and values (Ahmad, 2016). Emphasis should be given on map reading skills since findings from this study show lowest scores in this domain. Moreover, it is necessary for Ministry of Education to evaluate the methods for assessing students to understand, identify, analyse, clarify and deduce results. In addition, geography teachers should be giving special emphasis to this subject as geography cannot be taught in the classroom without taking the students to the field which can help them understand better geography concepts and consolidate their knowledge about the world around them. Finally, geography teachers should consider ways to use Information, Communication and Technology (ICT) in transforming old methods of teaching geography to E-learning and using free software applications such as open source geographical information systems (GIS) in order to assist students develop their geographic literacy.

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