Medical Education and Evaluation

The Effect of English Language on Multiple Choice Question Scores of Thai Medical Students

Pochamana Phisalprapa MD*, Wayuda Muangkaew BSc*,
Jintana Assanasen MD*, Tada Kunavisarut MD*, Torpong Thongngarm MD*,
Theera Ruchutrakool MD*, Surapon Kobwanthanakun MD*, Wanchai Dejsomritrutai MD*

* Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Background: *Universities in Thailand are preparing for Thailand's integration into the ASEAN Economic Community (AEC) by increasing the number of tests in English language. English language is not the native language of Thailand. Differences in English language proficiency may affect scores among test-takers, even when subject knowledge among test-takers is comparable and may falsely represent the knowledge level of the test-taker.*
Objective: *To study the impact of English language multiple choice test questions on test scores of medical students.*
Material and Method: *The final examination of fourth-year medical students completing internal medicine rotation contains 120 multiple choice questions (MCQ). The languages used on the test are Thai and English at a ratio of 3:1. Individual scores of tests taken in both languages were collected and the effect of English language on MCQ was analyzed. Individual MCQ scores were then compared with individual student English language proficiency and student grade point average (GPA).*
Results: *Two hundred ninety five fourth-year medical students were enrolled. The mean percentage of MCQ scores in Thai and English were significantly different (65.0 ± 8.4 and 56.5 ± 12.4, respectively, $p<0.001$). The correlation between MCQ scores in Thai and English was fair (Spearman's correlation coefficient = 0.41, $p<0.001$). Of 295 students, only 73 (24.7%) students scored higher when being tested in English than in Thai language. Students were classified into six grade categories (A, B+, B, C+, C, and D+), which cumulatively measured total internal medicine rotation performance score plus final examination score. MCQ scores from Thai language examination were more closely correlated with total course grades than were the scores from English language examination (Spearman's correlation coefficient = 0.73 ($p<0.001$) and 0.53 ($p<0.001$), respectively). The gap difference between MCQ scores in both languages was higher in borderline students than in the excellent student group (11.2 ± 11.2 and 7.1 ± 8.2, respectively, $p<0.001$). Overall, average student English proficiency score was very high, at 3.71 ± 0.35 from a total of 4.00. Mean student GPA was 3.40 ± 0.33 from a possible 4.00. English language MCQ examination scores were more highly associated with GPA than with English language proficiency.*
Conclusion: *The use of English language multiple choice question test may decrease scores of the fourth-year internal medicine post-rotation final examination, especially those of borderline students.*

Keywords: *Effect of English language, Multiple choice question scores, Thai medical students*

In 2016, Thailand will become a member of the ASEAN Economic Community (AEC). English was selected to be the official communicating language between ASEAN countries. English language test scores of Thai students at the primary, secondary, and university levels are low compared to students at the same educational levels from other ASEAN countries[1,2]. This relative lack of English language proficiency and lack of confidence in using English in functional communication may be due its role as a second language and, further, because there are only a limited number of international schools in Thailand.

Many schools and universities in Thailand have developed strategies to prepare for AEC integration, including increasing the number of English language learning activities and increasing the number of tests given in English. Medical students have historically had the highest university entrance exam scores. Similarly, medical students, as a group, also have the highest English test scores of any group entering university. Regardless of their high English test scores relative to other student groups, medical students continue to have English language-related problems when it comes to medical skills testing in medical school, including lengthened test taking time and lower score than material tested in Thai language.

Correspondence to:
Phisalprapa P, Division of Ambulatory Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.
Phone: +66-2-4197190
E-mail: pochamana.phi@mahidol.ac.th

It should be acknowledged that English language-related problems would vary by student and, further, that students with lower level of English proficiency may score lower on medical subject-centered exams even though they possess high subject knowledge[3-5].

The final examination for fourth-year medical students completing their internal medicine rotation contains a 120 multiple choice question (MCQ) test. The ratio of Thai MCQs to English MCQs is 3:1. Both the Thai language questions and English language questions pertain exclusively to general internal medicine-based knowledge.

This retrospective study aimed to study the impact of English language multiple choice questions on test scores of medical students and to evaluate the correlation between the test scores of both Thai and English MCQs.

Material and Method

Final examination MCQ scores of all fourth-year medical students on internal medicine rotation were collected. Individual scores of tests in both languages were compared and correlations between the languages were analyzed. Students were then categorized into the following six grade groups: A, B+, B, C+, C, and D+. The total grade for the rotation comprised clinical rotation performance grades and final test grade. Students receiving an A grade were characterized as excellent students. Students earning a B+ were described as good students. Those students who were given B, C+, or C grades were considered average students. Finally, students earning a D+ grade were described as borderline or low performance/low knowledge students. The effects of English language on MCQ scores for each group were analyzed. Then, MCQ scores of medical students were compared with their English language proficiency, as determined by the grades they achieved (A, B+, B, C+, C, and D+) in English language study in their first year of medical school and overall student grade point average (GPA).

Statistical analysis

Mean ± standard deviation and median (range) were used to summarize continuous variables. Categorical variables were expressed as number and percentage. Spearman's rank correlation was used to calculate the correlation between scores of both languages, grades of internal medicine rotation, English proficiency, and GPA. To compare differences between Thai and English test scores, paired t-test (normality)

was used for continuous variables. ANOVA was used to compare both language scores (Thai and English) between the six groups of students followed by Bonferroni multiple comparison. All statistical analyses were performed with PASW Statistics 18.0 (SPSS, Inc., Chicago, IL, USA). For all analyses, a p-value <0.05 was considered to be statistically significant.

Results

Two hundred ninety five fourth-year medical students were enrolled. Mean overall score of the MCQ test combining both languages (75% Thai and 25% English) was 62.9±8.2%. Minimum and maximum test scores were 39.2 and 81.7%, respectively. Overall test scores were separated into two language tests. The mean percentage of scores in Thai and English languages were significantly different (65.0±8.4 and 56.5±12.4, respectively, p<0.001) whereas the difficulty level of examination in Thai language, evaluating by average scores to item (AI), was significantly more difficulty (AI 0.49±0.01 vs. 0.64±0.04). Minimum and maximum scores in Thai language vs. English language were 40.0 and 84.6% vs. 20.0 and 86.7%, respectively (Table 1). Mean difference between Thai and English test scores was 8.50±11.5%. The minimum difference was -22.2% and the maximum difference was quite high (40%). The correlation between Thai and English language test scores was fair (Spearman's correlation coefficient 0.41, p<0.001). Seventy-three (24.7%) students achieved higher scores in English than in Thai language and, 209 (70.9%) students scoring lower in English

Table 1. Comparison between Thai and English language MCQ scores

	Thai	English	p-value
Number of MCQs	90	30	
Score (%), mean ± SD	65.0±8.4	56.5±12.4	<0.001
Min, max	40.0, 84.6	20.0, 86.7	
Average scores to item (AI)	0.49±0.01	0.64±0.04	0.001

MCQs = multiple choice questions

Table 2. Comparison of test performance between English and Thai language test components (n = 295)

Scores (%)	n (%)
English > Thai	73 (24.7)
English < Thai	209 (70.9)
English = Thai	13 (4.4)

than in Thai (Table 2). Score distribution between two languages was normal. In a condition where the cut-off point for passing the examination is 50%, 4.7% of medical students would fail the Thai language portion of the test and 26.4% would fail the English language portion of the test. In a condition where the cut-off point for passing the examination is 60%, 25.1%, and 55.9% of students would fail the Thai and English language MCQ tests, respectively. As such, if the language of all tests changes from Thai to English according to university policy for AEC compliance, the cut-off point for passing examinations should be adjusted. If the cut-off point is not lowered, a larger number of medical students will not pass the MCQ test.

Students were categorized into six grade groups with the following grade identifiers: A, B+, B, C+, C, and D+. Total grade for the internal medicine rotation was based on performance (45%) and testing (55%). The number of students in each grade group and the mean scores for both Thai and English tests are shown in Table 3. Test scores in Thai language were higher in every student group. The test in Thai language was more strongly correlated with internal medicine grade than with the test in English language (Spearman's correlation coefficient 0.73, $p<0.001$ and

Table 3. Student grades classified into 6 grade groups by total score of internal medicine rotation and a comparison of the scores between two languages (n = 295)

Grade (A-D+)	Grade (1-4)	n	Percent	Scores in Thai (%)	Scores in English (%)
A	4.0	30	10.2	75.4±5.0[1]	68.3±9.3[7]
B+	3.5	85	28.8	70.0±5.7[2]	61.9±10.1[8]
B	3.0	97	32.9	64.1±5.1[3]	55.6±10.7[9]
C+	2.5	58	19.7	59.6±6.0[4]	48.9±11.1[10]
C	2.0	19	6.4	52.4±6.3[5]	48.3±10.1[11]
D+	1.5	6	2.0	48.1±4.7[6]	36.8±11.8[12]

Scores in Thai: [1] Grade A was different from other grades, [2] Grade B+ was different from other grades, [3] Grade B was different from other grades, [4] Grade C+ was different from other grades, [5] Grade C was different from other grades except D+, [6] Grade D+ was different from other grades except C
Scores in English: [7] Grade A was different from other grades except B+, [8] Grade B+ was different from other grades except A, [9] Grade B was different from other grades except C, [10] Grade C+ was different from other grades except C and D+, [11] Grade C was different from other grades except B, C+, and D+, [12] Grade D+ was different from other grades except C and C+
[1-12] The mean difference is significant at the 0.05 level

0.53, $p<0.001$, respectively). The correlation of scores between two languages in the excellent (grade A) student group and borderline (grade D+) student group had higher significance than between the good (grade B+) and average (grades B, C+, and C) student groups (Spearman's correlation coefficient 0.52 and 0.41 vs. -0.13 to 0.11, respectively) (Table 4). Average gap difference between the scores in both languages (scores in Thai language minus scores in English language in the same student) in borderline students (grade D+) was higher than in that of excellent students (grade A) (11.2±11.2 and 7.1±8.2, respectively, $p<0.001$).

After scores were classified into two categories (45% for performance on the ward and 55% for testing (Objective Structured Clinical Examination (OSCE) and MCQ)), the correlation between performance and testing was only 0.31. The correlation between performance and total scores was 0.66, whereas, the correlation between testing and total scores was 0.90. Moreover, the correlations between Thai MCQ scores and performance, testing, and total scores were 0.27, 0.81, and 0.74, respectively (Spearman's correlation). Correlations between English MCQ scores and performance, testing, and total scores were lower than those of Thai language (Spearman's correlation coefficients 0.17, 0.60, and 0.55, respectively; $p<0.001$).

The OSCE was performed in Thai language for clinical testing with real patients. Correlation between OSCE scores and MCQ scores in Thai language, English language, and overall MCQ were 0.52, 0.37, and 0.55, respectively (Spearman's correlation, $p<0.001$). Performance scores were not significantly correlated with testing scores (both OSCE in Thai language and MCQs in both languages) and total scores; however, MCQ testing in Thai language was more significantly correlated with all parameters in all grade groups. Total scores were more strongly correlated with the excellent student group than the borderline student group (Spearman's correlation coefficient 0.81 and 0.37, respectively, $p<0.001$). Student performance was more strongly correlated with total scores in the borderline group than in the excellent student group (Spearman's correlation coefficient 0.89 and 0.28, respectively, $p<0.001$) (Table 4).

MCQ scores were then compared with English language proficiency. Level of English proficiency was based on grades achieved in English language study courses in the first year of medical school and student grade point average (GPA). Overall average English proficiency score was very high at 3.74±0.35 from

Table 4. Spearman's correlation coefficient (r) between MCQ scores in both languages, OSCE, all testing, performance, and total scores

Grade		MCQ-English	OSCE	All testing	Performance	Total scores
A	MCQ-Thai	0.52*	0.11	0.66*	-0.18	0.63*
	MCQ-English		0.16	0.64*	0.01	0.69*
	All Testing				-0.25	0.81*
	Performance					0.28
B+	MCQ-Thai	-0.13	-0.01	0.53*	-0.38*	0.35*
	MCQ-English		-0.07	0.31*	-0.28*	0.06
	All testing				-0.76*	0.49*
	Performance					0.15
B	MCQ-Thai	0.08	-0.28*	0.53*	-0.43*	0.15
	MCQ-English		-0.10	0.45*	-0.22*	0.28*
	All testing				-0.64*	0.47*
	Performance					0.34*
C+	MCQ-Thai	0.11	-0.19	0.58*	-0.40*	0.23
	MCQ-English		-0.22	0.26*	-0.27*	0.08
	All testing				-0.73*	0.42*
	Performance					0.23
C	MCQ-Thai	0.07	-0.32	0.47*	0.06	0.58*
	MCQ-English		0.06	0.48*	-0.53*	0.58*
	All testing				-0.57*	0.68*
	Performance					0.89*
D+	MCQ-Thai	0.41*	0.00	0.46	-0.06	0.41
	MCQ-English		-0.53	0.54	-0.49	-0.20
	All testing				0.14	0.37
	Performance					0.89*

OSCE = objective structured clinical examination
* Statistical significance

a possible 4.00. Mean medical student GPA was 3.40±0.33 from a possible 4.00.

Correlation between English proficiency and scores in Thai and English were low (Spearman correlation coefficient 0.27 and 0.18, respectively). Correlations between GPA and MCQ score in Thai and English language were better (Spearman correlation coefficient 0.68 and 0.49, respectively.

When students were classified into three groups according to English proficiency, 200 students (67.8%) had very good English grade (3.75-4.00), 69 students (23.4%) had good grade (3.25-3.74), and 21 students (7%) had low grade (less than 3.25) as shown in Table 5. Scores in Thai language were higher than English language in every English capability group. High English proficiency students also had higher MCQ score and higher GPA than the other groups (Table 5). GPA had more association with scores in both languages than English proficiency in every group (Table 6).

Medical students were classified into three groups according to GPA, as follows, 131 students (44.4%) had very high GPA (3.51-4.00), 121 students (41.0%) had average to good GPA (3.01-3.50), and 38 students (12.9%) had low GPA (3.00 or less) (Table 7). Scores in Thai language were higher than English language in every English proficiency group. High GPA students had higher MCQ score and higher English grade than the other groups (Table 7). GPA had more association with scores in both languages than English proficiency in every group (Table 8).

Discussion

There have been many reports from around the world regarding the effects of language on test scores in both clinical practice testing and paper-based testing, especially with regard to MCQs[6-8]. Most Thai students experience challenges regarding the use of English language. Medical students generally have good English skills and achieve high scores in English language testing when taking university entrance examinations. However, even as fourth-year medical students, these students still score lower and take longer on English MCQ test, because English is not their native language. Our study showed that students experienced these problems in varying degrees and

Table 5. Student grades classified into 3 grade groups according to English proficiency scores and comparison of scores between two languages and GPA

Grade	n	Percent	Group	Scores in Thai (%)	Scores in English (%)	GPA
4.00	124	42.0	1 (n = 200)	66.2±8.3	58.0±12.4	3.49±0.29
3.75	76	25.8				
3.50	40	13.6	2 (n = 69)	64.1±7.3	53.2±11.9	3.28±0.27
3.25	29	9.8				
3.00	10	3.4	3 (n = 21)	58.7±8.8	54.5±13.3	3.00±0.39
≤2.75	11	3.8				
p-value				<0.001	0.041	<0.001

GPA = grade point average

Table 6. Spearman's correlation coefficient (r) between MCQ scores in both languages, English proficiency, and GPA in each English grade group

English grade group		MCQ-English	English proficiency	GPA
1	MCQ-Thai	0.43*	0.13	0.68*
	MCQ-English		0.09	0.46*
	English proficiency			0.22*
2	MCQ-Thai	0.26*	0.17	0.56*
	MCQ-English		0.27*	0.47*
	English proficiency			0.42*
3	MCQ-Thai	0.38	0.32	0.44
	MCQ-English		0.39	0.54*
	English proficiency			0.24

* Statistical significance

Table 7. Grade and performance breakdown according to group (n = 295)

Group	GPA (0-4.00)	n	Percent	Score in Thai (%)	Score in English (%)	English proficiency
1	3.51-4.00	131	44.4	70.0±6.8	61.7±11.2	3.86±0.21
2	3.01-3.50	121	41.0	63.1±6.4	54.1±11.7	3.64±0.34
3	≤3.00	38	12.9	54.8±6.4	46.8±10.9	3.45±0.47
p-value				<0.001	<0.001	<0.001

Table 8. Spearman's correlation coefficient (r) between MCQ scores in both languages, English proficiency, and GPA in each GPA group

GPA group		MCQ-English	English proficiency	GPA
1	MCQ-Thai	0.29*	0.14	0.51*
	MCQ-English		0.07	0.38*
	English proficiency			0.28*
2	MCQ-Thai	0.14	-0.20	0.28*
	MCQ-English		0.02	0.28*
	English proficiency			0.18
3	MCQ-Thai	0.29	0.24	0.53*
	MCQ-English		0.06	0.37*
	English proficiency			0.36*

* Statistical significance

both English language proficiency and level of medical knowledge affected score outcomes.

MCQ scores in English language were lower than scores in Thai language in all six grade groups whereas the difficulty level of examination in Thai language was higher significantly. The correlation between Thai MCQ scores and grades that combined both testing and student performance was better than

the same correlation using English MCQ scores. If the language in which all tests are written is completely transitioned from Thai to English within the coming years for purposes of satisfying AEC mandates and cut-off points for passing these examinations remain constant, an increased number of medical students may not pass MCQ test. Medical students in the borderline grade group will be at much higher risk of negative (not passing) outcome than students in the excellent grade groups. Accordingly, we recommend that the cut-off point for passing examinations should be adjusted down to commensurately account for use of English, a non-native language for Thai medical students and these issues of language effect should be more concerned.

In addition, English MCQ scores were compared with both English language proficiency and student GPA. We found GPA to be more highly correlated with MCQ scores in both languages than English proficiency. This finding may be explained by the significant number of medical students who achieved a high grade in English courses (A or B+).

Conclusion

Transition of test language from native Thai language to English language may decrease overall internal medicine final examination MCQ scores in most fourth-year medical students. Thai MCQ scores were only mildly correlated with English MCQ scores, but were more highly correlated with student course performance, internal medicine grade, and GPA. English language negatively affected MCQ score outcomes more in borderline student group than in high grade group students.

What is already known on this topic?

English language test scores of Thai students are low compared to other ASEAN countries. Many educational institutions in Thailand prepared for AEC by increasing the number of learning activities and tests given in English. There have been many reports from around the world regarding the effects of language on test scores especially in MCQs. The students experienced English language-related problems in varying degrees. Both English language proficiency and level of medical knowledge affected score outcomes.

What this study adds?

Our study showed that fourth-year medical students had score lower and take longer on English MCQ test. Borderline students will be higher risk than the excellent group. Thus, we suggested that the effect of language should be more concerned. The cut-off point for passing the examination may be adjusted and the English proficiency in Thai students should be improved.

Potential conflicts of interest

None.

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ผลกระทบของภาษาอังกฤษที่มีต่อคะแนนสอบปรนัยของนักศึกษาแพทย์ไทย

พจมาน พิศาลประภา, วยุดา เมืองแก้ว, จินตนา อาศนะเสน, ธาดา คุณาวิศรุต, ต่อพงษ์ ทองงาม, ธีระ ฤชุตระกูล, สุรพล กอบวรรธนะกุล, วันชัย เดชสมฤทธิ์ฤทัย

ภูมิหลัง: หลายมหาวิทยาลัยในประเทศไทยได้มีการเตรียมตัวเพื่อเข้าสู่ประชาคมเศรษฐกิจอาเซียนโดยมีการเพิ่มจำนวนข้อสอบที่เป็นภาษาอังกฤษ แต่เนื่องจากภาษาอังกฤษไม่ได้เป็นภาษาประจำชาติ การมีความสามารถทางภาษาที่แตกต่างกันอาจจะมีผลต่อคะแนนสอบได้นอกเหนือจากความรู้ทฤษฎี

วัตถุประสงค์: เพื่อศึกษาผลของภาษาอังกฤษที่มีต่อคะแนนสอบปรนัยของนักศึกษาแพทย์ไทย

วัสดุและวิธีการ: คะแนนการสอบปลายภาคของนักศึกษาแพทย์ชั้นปีที่ 4 ที่ผ่านภาควิชาอายุรศาสตร์ ประกอบด้วย ข้อสอบปรนัย จำนวน 120 ข้อ โดยเป็นข้อสอบภาษาไทย 90 ข้อ และภาษาอังกฤษ 30 ข้อ ได้ถูกนำมาวิเคราะห์โดยแยกคะแนนตามชนิดของภาษาเพื่อศึกษาผลของภาษาอังกฤษ และยังนำคะแนนปรนัยมาเปรียบเทียบกับความสามารถทางภาษาซึ่งดูจากคะแนนวิชาภาษาอังกฤษและเกรดเฉลี่ยสะสม

ผลการศึกษา: คะแนนของนักศึกษาแพทย์ชั้นปีที่ 4 จำนวน 295 คน ได้ถูกนำมาวิเคราะห์ ค่าเฉลี่ยของคะแนนสอบปรนัยของข้อสอบภาษาไทยและภาษาอังกฤษมีความต่างกันอย่างมีนัยสำคัญ คือ เท่ากับร้อยละ 65.0 ± 8.4 และ 56.5 ± 12.4 ตามลำดับ ($p<0.001$) คะแนนข้อสอบภาษาไทยและภาษาอังกฤษมีความสัมพันธ์กันปานกลาง (ค่าความสัมพันธ์ Spearman's เท่ากับ 0.41, $p<0.001$) มีนักศึกษาเพียง 73 คน (ร้อยละ 24.7) ที่ได้คะแนนสอบภาษาอังกฤษสูงกว่าภาษาไทย ในขณะที่นักศึกษาจำนวน 209 คน (ร้อยละ 70.9) ได้คะแนนสอบภาษาอังกฤษน้อยกว่าภาษาไทย เมื่อแบ่งนักศึกษาเป็น 6 กลุ่ม ตามเกรดวิชาอายุรศาสตร์ซึ่งเป็นผลรวมของคะแนนภาคปฏิบัติและภาคทฤษฎี (A, B+, B, C+, C และ D+) พบว่าคะแนนปรนัยของข้อสอบภาษาไทยมีความสัมพันธ์กับเกรดมากกว่าข้อสอบภาษาอังกฤษ (ค่าความสัมพันธ์ Spearman's เท่ากับ 0.73 ($p<0.001$) และ 0.53 ($p<0.001$) ตามลำดับ ผลต่างระหว่างคะแนนปรนัยของทั้งสองภาษาจะมีค่าสูงในกลุ่มที่เรียนอ่อนเมื่อเทียบกับกลุ่มที่เรียนเก่ง (11.2 ± 11.2 และ 7.1 ± 8.2 คะแนน, $p<0.001$) นอกจากนี้ ค่าเฉลี่ยของคะแนนวิชาภาษาอังกฤษของนักศึกษาแพทย์มีค่าสูงมาก เท่ากับ 3.71 ± 0.35 จากคะแนนเต็ม 4 และค่าเฉลี่ยของเกรดเฉลี่ยสะสมมีค่าเท่ากับ 3.40 ± 0.33 จากคะแนนเต็ม 4 โดยพบว่าคะแนนข้อสอบปรนัยภาษาอังกฤษมีความสัมพันธ์กับเกรดเฉลี่ยสะสมมากกว่าความสามารถทางภาษาอังกฤษ

สรุป: การเปลี่ยนข้อสอบเป็นภาษาอังกฤษอาจมีผลให้คะแนนสอบปรนัยของนักศึกษาแพทย์ชั้นปีที่ 4 ภาควิชาอายุรศาสตร์ลดลง โดยเฉพาะกลุ่มที่เรียนอ่อน