An Investigation Into The Learning Styles, English Proficiency And Assessment Performance Of Medical Students

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Appreciation of learning styles can be of use to help both educators and students to enhance the effectiveness of an educational experience. It has been noticed that some students at this College are not very good at expressing themselves in either written or spoken English. Our study aimed to identify the student's learning styles; assess whether there is any correlation between learning style, baseline demographic data and self rated proficiency in English language; and assess their associations with the assessment performance.

A group of third year medical students voluntarily participated in a questionnaire study to provide us with their learning styles, demographic information and self-rated proficiency in English language. This data was compared to the students' performance in the assessment at the end of their junior clinical rotations.

This cohort of students (60% Malay, 35% Chinese and 5% Indian) who were mostly visual learners, considered themselves proficient in English. Students with predominantly Visual learning styles and those with poorer English, score significantly lower during their clinical long case examinations. These two predictors appear to be independent of each other.

These results may suggest that our current teaching modalities may disadvantage students with predominant visual learning styles. It also suggests that the long case clinical examination may favour those with more verbal learning styles.

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Introduction

Much research has been done on the concept of "learning styles".[1] Some experts believe that learning is enhanced when the teaching style is tailored to the dominant learning styles of the students[2,3,4], while others argue that a mismatch of learning and teaching styles forces learners to adapt to the learning environment and enhances their learning experience.[5] An appreciation of learning styles can help students enhance the effectiveness of their educational experience.[6] If faculty members are provided with information on the dominant learning styles of students, they may be in a better position to tailor their methods of instruction to accommodate their learners. In the ongoing effort to improve teaching and learning at our institution, we thought that it may help medical students to have some understanding of their preferred learning style.

It has been noticed that some students are not very good at expressing themselves in either written or spoken English. This is despite the opportunity for immersion in an English speaking environment and being taught in English during their two-and-a half pre-clinical study years in Dublin, Republic of Ireland. The cohort of students reported on here was admitted to the College before the entry requirement of a minimum International English Language Testing System (IELTS) score of 6.5 was introduced. This research was conducted within six months of the students' return to Malaysia from Ireland.

We decided to explore the relationship between the students' demographic details, their preferred learning style and their proficiency in English language. However, as the study of learning in isolation may be meaningless if it does not also take into account the final outcome as judged by performance in assessment, we also compared the students' end of academic year exam results in each learning style group and with their English proficiency.

Our study aimed to:

Identify the learning styles to determine whether one learning style group is represented in a higher proportion.

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Assess whether there is a correlation between baseline demographic details, learning style and self rated proficiency in English language.

Assess the relationship between learning styles, English proficiency and assessment performance.

Methods

A group of third year medical students voluntarily participated in a questionnaire study to provide us with their demographic details, learning style and self-rated proficiency in English language. As the questionnaires were self-completed consent was implied by return of the questionnaire.

Methods employed for assessment of learning styles

There are many different learning styles inventories. We have chosen to use the Felder and Soloman Index of Learning Style (ILS) for reasons that it is freely available in the written and computerized format,[7] is easy to administer and has been validated among undergraduate medical students.[8,9,10] The ILS instrument consists of 44 short items with a choice between 2 responses to each sentence. Learners are categorized in 4 dichotomous areas: preference in terms of type of information perception (sensory or intuitive); mode of information perception (visual or verbal); approaches to organizing and processing information (active or reflective); and the way in which students progress towards understanding (sequential or global). Students who score 1 to 3 on a scale are considered to be balanced on the two dimensions of the scale. Those who score in the range 5 to 7 are considered to have a moderate preference while those who score 9 to 11 are considered to have a strong preference for that dimension of the scale.

Baseline demographics

Students completed a separate questionnaire providing details on ethnic group, sex and secondary schooling attended.

The secondary schooling was categorised as:

- Fully residential (boarding) school – medium of instruction and medium of communication both predominantly Bahasa Malaysia (Malay language)
- National (government) type school – medium of instruction predominantly Malay language for all schools and medium of communication amongst pupils either Malay language, Mandarin Chinese or Tamil
- Private school (privately funded, not government subsidised) – medium of instruction and medium of communication both English
- Others (including National type Religious Secondary School and special model school)

Self rated proficiency in English language

Students were also invited to rate their self-perceived proficiency in English language using the Interagency Language Roundtable (ILR) scales. The ILR scale consists of five levels of language proficiency namely:

1. Elementary Proficiency;
2. Limited Working Proficiency;
3. Professional Working Proficiency;
4. Full Professional Proficiency;
5. Native or Bilingual Proficiency.

For subsequent analysis, English proficiency was regrouped into 2 categories of either "Limited" (ILR score of ≤2) or "Proficient" (ILR score≥3)

Assessment of performance

Learning outcome was measured by performance during one written examination, Medicine Multiple Choice Question scores and one clinical examination (Conjoint Surgical / Medical long case). In the clinical examination, as far as possible, the student is given a patient that is able to converse in the language of the student's choice. Both examinations were conducted after students completed 18 weeks of their first clinical Medicine-Family Medicine-Surgery posting during the last half of their 3rd year of medical school.

Results

52 out of a class of 110 students completed the ILS learning style inventory and 86 completed the questionnaire on demographic details and self-rated proficiency in English language. Some questions were not answered by students, which account for the variable number of responses.

Descriptive analysis of learning styles (Figure 1)

Active-Reflective axis :
Students predominantly balanced

Sequential-Global axis :
Students predominantly balanced

Sensing-Intuitive axis :
Majority of students sensing but an almost equal number were balanced

Visual-Verbal axis :
Majority of students visual and the remainder were balanced, there were no verbal learners

Relationship between learning style, baseline demographic data and self-rated proficiency in English language (Table I)

Female students, when compared to male students, show a significant tendency to be sensing rather than intuitive learners. Ethnic Malay students (compared to ethnic Chinese and ethnic Indian students) show a significant preference for visual learning. Students who had attended fully residential secondary school (compared to national type school and private school) are significantly more likely to be visual learners. However, this figure may be influenced by the fact that all those who attended fully residential secondary school were Malay. The self-rated proficiency in English language had no relation with learning style preference.

Relationship between learning style, self-rated proficiency in English language and assessment outcome (Table II)

There is a significant correlation between both the visual-verbal axis of ILS and the self-rated proficiency in English language and assessment outcome. Students with a preference for visual learning and those with poorer English, score significantly lower during their conjoint clinical long case examinations (Table III). The association between visual learning and poorer outcome during this assessment persists even when self-rated proficiency in English language is taken into consideration.

Discussion

Efforts to better define and utilize learning style theory are an area of persistent research interest[1]. Matching learning and teaching styles may be particularly important for novice learners in professional curricula where course load is significantly large.[9]

The learning styles of medical students in our college, as evaluated using ILS, appear comparable to those in other cohorts of medical students.[8,10] There is a balanced spectrum of students across the dichotomous axes of Active-Reflective and Sequential-Global learning styles. However, our students display a greater preference for Visual learning styles with none displaying a preference for verbal learning.

When correlation with demographic details and self-rated English proficiency was analyzed, baseline demographics have no relationship with the preferred learning styles except for Visual-verbal learning. The Malay students show a greater preference for visual learning compared to Chinese and Indian students. This preference may be influenced by previous schooling as there is a higher proportion of Malay students who attended fully residential secondary school. Another factor may be culture, as correlations between culture and learning styles has been proposed in some studies based on the rationale that culture influences environmental perceptions which in turn determine the way information is processed and organized.[5] A third factor may be proficiency in English language. Limitation in deciphering medical facts taught in spoken and written English may influence the students to rely more on visual senses. However, in our

statistical analysis, we failed to show any statistically significant relationship between the proficiency in English language and preference for visual learning, or any other dimensions axes of the ILS learning styles.

This sample of learners has a significant preference for visual learning. The teaching pedagogy employed in our institution, for example small group tutorials relies more on verbal discussions and less on visual stimulation. The majority of lectures are PowerPoint presentations, which consist mostly of written text. The challenge is for medical teachers to devise ways of augmenting their verbal classroom presentation with visual material, for example, showing concept maps, sketches, photographs, video and other visual displays of course material.

In our cohort of students, those who have a balanced visual-verbal learning style appear to do better in clinical (but not written multiple choice) examinations compared to those with a greater preference for a visual learning style. This may imply that our current teaching modalities are not providing the best opportunities for students with predominantly visual learning styles. It may also be because our assessment methods favour those with more verbal learning styles.

There seems to be an indication that faculty development initiatives might profitably attend to stretching faculty to include teaching strategies that may be of more help to visual learners e.g. more teaching that makes use of concept maps, diagrams, colour-coding etc. It does appear that improving English skills would not make a significant contribution to improving assessment performance among the visual learners.

In our cohort of students, self rated lack of proficiency in English language is also associated with poorer performance in clinical examination. Nearly a quarter of our students rated themselves as having equal or less than limited working proficiency in English language. In Malaysia, English is taught as second language since primary school with greater emphasis placed on written rather than conversational English. The lack of proficiency in English language may influence effectiveness of learning as contact sessions in our College are conducted in English and most textbooks and internet resources (e.g. Cochrane library and Pubmed) are in English. Even a partial language barrier may create impediments to learning that are not easily circumvented. Learning using a second language adds significant cognitive load. This effect may be significantly greater in learning of medicine where it is expected that students simultaneously decipher and process large amounts of factual information and develop skills of clinical reasoning. Studies have shown that listening is a demanding task that limits complete understanding for some non-English speaking background (NESB) students.[11,12] Performance in the clinical long case may be more dependent on linguistic ability compared with MCQs which predominantly assess knowledge recall and theoretical application. Anxiety secondary to self-perceived lower command of English language may also be a factor influencing performance in clinical examination. This may negatively influence the students' performance and the validity of the assessment of competence.

The study contains a few limitations. Only about 50% of students participated in the ILS questionnaire, which may limit the applicability of its interpretation. English proficiency was rated using subjective and not objective scoring. Our small sample of students studied can by no means represent the learning styles of all Malaysian medical students.

This initial study was conducted on only one cohort of students.

Assessment of performance has been done at a very early stage in the students' clinical exposure, so it is not known if the visual learners may adapt better in the clinical years. Lack of confidence in the language of examination is an element not assessed in our students and perhaps should be evaluated in future study. If the trends observed in this study are confirmed by studies in future student cohorts, this should lead to re-evaluation of our teaching pedagogy.

Conclusions

Most of our students (as with most other students) appear to have a preference for visual learning. The Malay students and those that attended fully residential secondary school had a preference for a visual learning style. As most of those who attended fully residential school were Malay, it is not possible to attribute this preference to a cultural or a schooling factor.

There was no relationship between self-rated proficiency in English and learning style preference. However, there was a relationship between poorer self-rated proficiency in English and performance in the clinical assessment. The visual learners also performed less well in the clinical assessment (even when accounting for poorer self-rated English proficiency).

Therefore, there may be a significant advantage for our students if faculty's ability to teach to the strengths of the visual learner were improved. It may also be helpful if students were given the skills to move to a verbal learning style. Further research would need to be done in order to explore any shift that might arise from such changes.

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Figure 1. Scores of study cohort on the four dimensions of the Index of Learning Styles. Scores ranged from -11 to +11 in increments of two points. For the purpose of analysis, scores between -3 and +3 were considered balanced, while scores above or below were classified according to the corresponding learning style
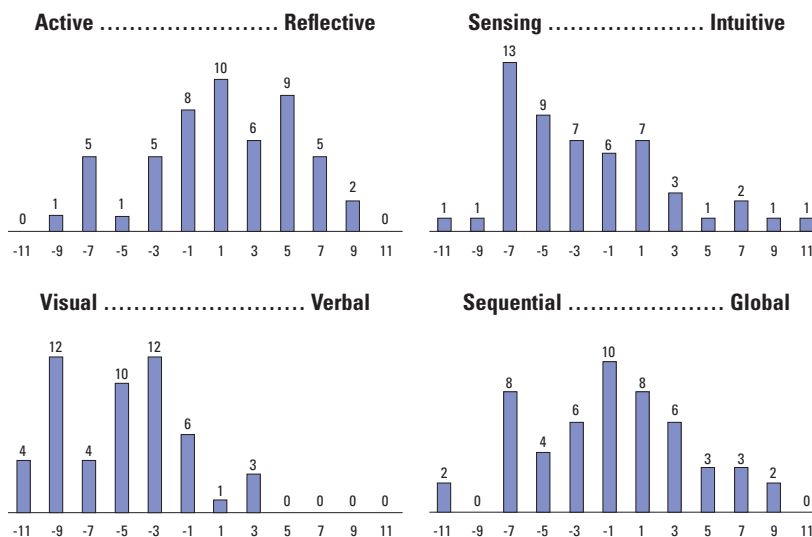

Table I: Correlation between learning styles, demographics and English proficiency

	Active-Reflective Axis				Sensing-Intuitive Axis				Visual-Verbal Axis				Sequential-Global Axis			
	Active	Balanced	Reflective	p value	Sensing	Balanced	Intuitive	p value	Visual	Balanced	Verbal	p value	Sequential	Balanced	Global	p value
Sex																
Female	6	19	9	–	18	15	1	–	21	13	0	–	11	19	4	–
Male	0	9	6	0.369	6	7	2	0.008	8	7	0	0.584	3	8	4	0.350
Race																
Malay	5	16	7	–	13	12	3	–	22	6	0	–	7	17	4	–
Chinese	1	9	7	–	8	9	0	–	6	11	0	–	6	7	4	–
Indian	0	3	1	0.558	3	1	0	0.481	1	3	0	0.006**	1	3	0	0.605
Secondary Schooling																
FRS*	3	7	3	–	7	5	1	–	11	2	0	–	1	10	2	–
NTS*	3	16	8	–	13	13	1	–	13	14	0	–	9	14	4	–
Private	0	3	2	–	3	2	0	–	1	4	0	–	2	1	2	–
Others	0	2	2	0.764	1	2	1	0.699	4	0	0	0.013**	2	2	0	0.253
English Proficiency																
Limited	0	6	4	–	4	5	1	–	7	3	0	–	5	4	1	–
Proficient	6	22	11	0.383	20	17	2	0.745	22	17	0	0.343	9	23	7	0.241

*FRS=Fully residential school; NTS=National type school
** Malay vs Chinese, p=0.004 / Malay vs Indian, p= 0.026/ Chinese vs Indian, p=0.694
++ Fully residential vs National type school, p=0.027/ Fully residential vs private school, p=0.009/ national type school vs private school, p=0.244

Table II: Correlation between demographics, English proficiency, Learning styles and assessment performance

	p value	
	Conjoint Long Case[1]	**Multiple Choice Questions (MCQ)[1]**
Sex	NS	NS
Race	NS	NS
Secondary Schooling	NS	NS
Proficient in English Language (ILR score)[2]	0.042	NS
ILS Active-Reflective	NS	NS
ILS Sensing-Intuitive	NS	NS
ILS Visual-Verbal	0.004	NS
ILS Sequential-Global	NS	NS

1.   Conjoint long case examination and MCQ results analyzed by categories of "honour" or "Pass" or "fail"- according to pre-specified criteria
2.   Proficiency in English language analyzed by categories of "not proficient i.e. ILR score ≤2" or "proficient i.e. ILR score ≥3"

Table III: Correlation between Visual-verbal learner and Assessment grades

	Conjoint Long Case			p value	MCQ			p value
	Honours	Pass	Fail		Honours	Pass	Fail	
Visual Learner, n (%)	2 (6.7)	20 (66.7)	8 (26.7)	**0.004**	6 (20)	13 (43.3)	11 (36.7)	0.109
Balanced Visual-Verbal Learner, n (%)	10 (45.5)	10 (45.5)	2 (9.1)		9 (40.9)	10 (45.5)	3 (13.6)	
Limited English (ILR ≤ 2), n (%)	2 (10)	10 (50)	8 (40)	**0.042**	3 (15)	7 (35)	10 (50)	0.092
Proficient in English (ILR ≥ 3), n (%)	17 (26.2)	38 (58.5)	10 (15.4)		18 (27.7)	31 (47.7)	16 (30.6)	