Original research

Does English literacy and learning style affect the 2nd MBBS exam performance of medical undergraduates?: a descriptive cross-sectional study

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Abstract

Understanding the possible reasons for some students to fail at different examinations in medical undergraduate career is imperative to improve the teaching-learning strategies.

We aimed to describe the association of learning style and English literacy on 2nd MBBS examination performance.

A descriptive cross-sectional study was conducted among 175 medical students who sat for the 2nd MBBS examination in 2019, using the Kolb learning style questionnaire. Socio-demographic data, English grade in the Advanced Level examination (AL) and Z-scores were collected through another self-administrated questionnaire. As per the stipulated criteria, participants were categorized into 4 learning styles: activist, reflector, theorist, and pragmatist. Association of learning styles, English literacy, and Z-scores with the 2nd MBBS examination performances were analyzed using chi-square test and student's t-test considering $p < 0.05$ as statistically significant.

A total of 145 (83%) students responded. The mean age was 24.91 years (SD=0.96), and the majority were females 54% (n=78). The preferred learning style among participants with unimodal learning style (n=128,88.28%) was 'reflector' (n=96,66.21%). We did not find a significant association between the learning style and examination performance (chi-square test, $p=0.31$). However, a significant association between AL English results and examination performance was noted (chi-square test, $p=0.01$). Moreover, significant associations between AL Z-score either with English (Student t-test, $p=0.22$) or 2nd MBBS results (chi-square test, $p=0.53$) were not noted.

Reflectors, the learners who learn by analyzing observations, was identified as the most preferred learning style among medical undergraduates. English literacy but not the learning style seems to have a significant positive association with their academic performance. Activities to improve the English literacy of students from the entry level should be encouraged.

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Introduction

Medicine is one of the most challenging fields in tertiary education. Currently, Sri Lanka has seventeen state universities and the highest-ranked students who followed the biological science stream (biology, physics, and chemistry) in their secondary education are selected for the eleven medical faculties following a common island-wide competitive examination; advanced level (AL) examination. Medical undergraduate programmes usually run over 5 years in Sri Lanka with several different teaching-learning activities and examinations to create competent medical doctors. Most of the local medical schools have a hybrid curriculum consisting of traditional teaching approaches like lectures, tutorials, and student-centered activities like problem-based (PBL) or case-based learning (CBL) [1,2]. During the medical undergraduate course, examinations are held at different levels to evaluate both theory, skills, and applications. Performances at these examinations are used as the main method of student evaluation.

Despite having different institutional systems, each student has their own way of learning [3], and this learning style may play a key role in examination performances. Understanding the importance of learning style in effective teaching-learning, different questionnaires have been developed to assess the learning styles of students. Visual - aural - read/write – kinaesthetic (VARK) questionnaire [4], Strategy inventory for language learning [5], and Kolb's learning inventory [6] are some examples. Of them, Kolb's learning inventory is a questionnaire developed to assess the adult learning styles. According to the definition given by Kolb, in adult learning, experiences are transformed into knowledge. Each person has a natural preference for his/her own learning style and this can be influenced by their psychosocial experiences and behaviors, as well as their educational background. Moreover, every individual has a preference to learn using one (unimodal), or more (mixed), learning styles [6-10]. Honey and Mumford's learning style questionnaire is an alternative to Kolb learning style questionnaire and identifies four learning styles namely activist, theorist, pragmatists, and reflector [11]. Honey and Mumford's learning style questionnaire has been widely used to assess the most preferred learning style in different disciplines and to identify the effect of different learning styles on various educational outcomes like performance at the exams and educational satisfaction [3,12–14]. However, the studies assessing the association of learning style on examination performances of undergraduates in Sri Lankan universities are scarce.

The majority of the university students in Sri Lanka had followed their primary and secondary education in their mother languages: Sinhalese or Tamil. For most of the students, the teaching-learning methodologies used at the schools may also be different from that of the universities. Moreover, as English is the main language of teaching in medical undergraduate degree programmes in Sri Lanka, the level of English proficiency can also become another factor affecting their performances in exams. The possible effects of conducting undergraduate education in English in Sri Lankan universities have not been studied widely. However, in one study more than the language barrier, the time spent on studies was identified as a factor greatly influencing the overall exam performances of a group of undergraduates [16]. Though the local information is limited, it is an area widely explored in many other countries, especially among the international student communities in countries where English is used as the first language. These studies identified the language barrier as a negatively influencing factor for both study performances and social well-being of international students [17,18]. Moreover, even in home countries, language is known to restrict high achievements when the teaching-learning activities are conducted in English or a language different from their first language [19]. It is also identified as a factor that negatively affects effective communication [20]; one of the essential skills that should be developed in undergraduates.

As both the learning style and the language shift can influence the teaching-learning outcomes of medical undergraduates, it is important to identify the significance of these two factors on examination performance. The second MBBS examination (SME) is the first bar exam faced by the undergraduates entering the Faculty of Medicine and Allied Sciences (FMAS), Rajarata University of Sri Lanka (RUSL), and it is scheduled after the first three semesters of undergraduate teaching. In this study, the association of learning style and English literacy on the SME results among a batch of medical students currently continuing the medical course and have completed the SME was explored.

Methodology

Study design and settings

A descriptive cross-sectional study was conducted at FMAS, RUSL, Sri Lanka in the year 2020 in which the medical undergraduates who sat and passed the SME in their 1st attempt during the year 2019 were considered as the study population. Ethical clearance for the study was taken from Ethics Review Committee, FMAS, RUSL (ERC/2020/17). Informed written consent was obtained from all the study participants.

Data Collection

Two self-administered questionnaires, namely the learning styles questionnaire developed by Peter Honey and Alan Mumford (available online through http://www.mycit.ie/contentfiles/Careers/4.%20Honeya ndMumfordLearningStylesQuestionnaire.pdf and https://www.mint-hr.com/mumford.html, accessed on December 2019), and a structured questionnaire developed by the researchers to obtain socio-demographic data, and examination results were used in this study. This is a previously validated questionnaire and is widely used in assessing adult learning styles [12–15,21]. The questionnaire used 20 statements to assess each of the learning styles. In the final questionnaire which contains 80 items, these statements are ordered randomly and the participants are requested to fill the questionnaire by indicating their agreement (checked) or disagreement (crossed out) for each statement. In this study, we used pre-tested Sinhalese and Tamil translated versions of the learning questionnaire allowing the participants a better understanding of the statements from their mother language. In developing the translated versions, first, the members of the research team translated the questionnaire into Sinhalese and Tamil languages. Two researchers independently translated the questionnaire into either Sinhalese or Tamil languages. The translated questionnaires were then further modified by the research team and pre-tested in a group of volunteer students (10 for each language) studying in another academic year to correct and remove the ambiguities and redundancies. Study participants were given the option to select the language of the questionnaire as per their preference. Apart from the age and gender of the study participants, SME results at their first attempt and, the Z-score and English results at the AL examination as reported by the participants were obtained using the structured questionnaire developed by the researchers.

Data analysis

Data were analyzed according to the instructions given in the questionnaire [11] to identify the learning style of each of the study participants. Accordingly, study participants were categorized into four learning styles, namely activist, reflector, theorist, and pragmatist. Those who were classified into two or more learning styles were grouped as the 'mixed' learning style group, while the students categorized into one style were collectively named as 'unimodal' learners. The associations of learning style, English results, and Z-score in the AL exam and the SME results were analyzed using the chi-square test. Moreover, the Z-scores between the students who received the highest (A) and the lowest (S and F) grades for English were compared using the Student's t-test. In all comparisons $p < 0.05$ was considered as statistically significant. In SME at FMAS, RUSL, instead of raw marks, a grade is given based on the average mark of the three pre-clinical subjects (anatomy, biochemistry, and physiology). Similarly, in the AL exam, English result is also given as a grade, and the mark range represented by each grade in both exams is given in Table 1. Therefore, the final grading of the SME results and the English examination were used in the analysis. In the AL examination, Z-score (range -3 to +3) is calculated from the marks obtained for the three main subjects and is used to select the students for university entrance. Though it is a mandatory subject in the AL examination, English is not used to calculate the Z-score. Considering the median Z-score as the cutoff, the study sample was categorized into two groups as participants with high and low Z-scores to identify the association between Z-score and the SME or AL English results.

Table 1. Mark ranges for different result grades given in 2nd MBBS and advanced level English language examination.

Examination	Category/Grade	Mark range (%)
2nd MBBS	1st class	≥70
	2nd class – upper division	64.50 – 69.49
	2nd class – lower division	59.50 – 64.49
	Pass	49.50 – 59.49
	Referred	<49.49
Advanced level	A	>75
English	B	74 - 65
	C	64 - 55
	S	54 - 50
	F	<50

Results

There were 176 students in the study population representing all nine provinces in Sri Lanka, with the majority from the Western province (n=40, 22.73%) (Figure 1A). Of them, 145 submitted the completed questionnaire. The response rate of the study was 83%. The age range of the participants was 23 – 28 years (mean=24.91, SD=0.96 years), and the male: female ratio was 0.85 (Figure 1B). Thirty (20.68%) of them were referred in the SME, while the majority (n=76, 51.72%) passed with classes (Figure 1C). Moreover, in our study cohort, eight (5.51%) had an 'F' grade for AL English while the majority (n=43, 29.66%) passed with an 'A' grade (Figure 1D).
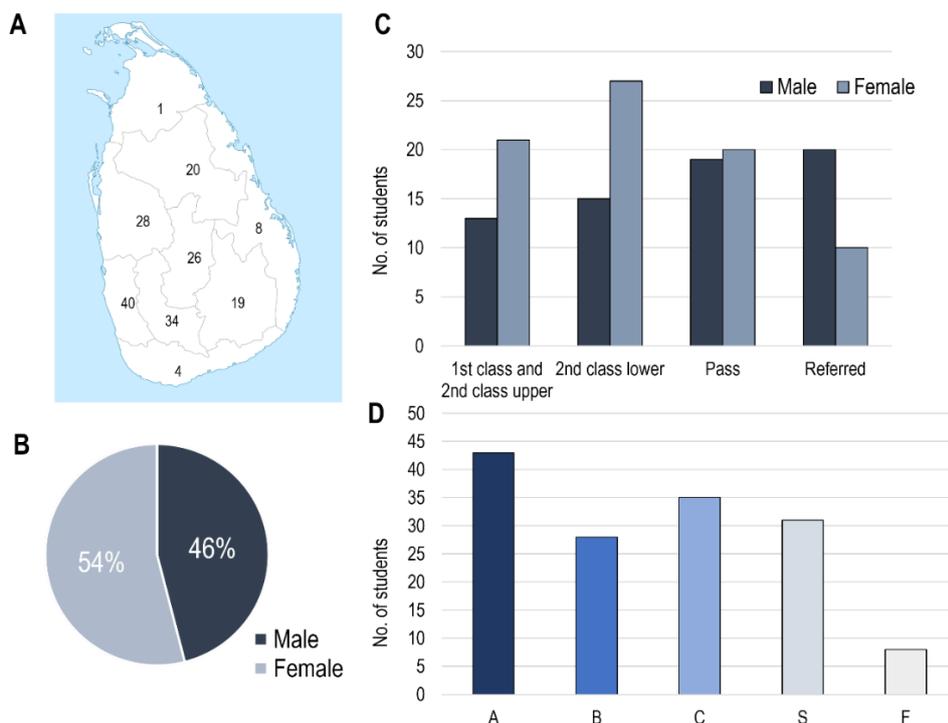

Figure 1. Description of the study cohort A. Distribution of study population in nine provinces in Sri Lanka **B.** Gender distribution of the study sample **C.** 2nd MBBS results of the study sample according to the gender **D.** Advanced level English results of the study sample.

The majority in our study cohort were unimodal learners (Figure 2A) and the reflector (n=96, 66.21%) was the most common learning style among them (Figure 2B). However, a significant association (chi-square test, p=0.31) between the learning style and the SME results was not observed (Table 2).

The association between English literacy and the SME results was also analyzed. Among those who obtained either a 1st class or a 2nd class upper division (n=34), over 50% (n=18, 52.94%) had an 'A' grade for AL English as well. None of the participants in this group failed in AL English. On the other hand, C and S (n=39, 56.52%) were the commonest grades among the participants who received 'pass' or 'referred' grades (n=69) in the SME respectively. Four out of eight participants (50%) who failed AL English, were referred in the SME as well (Table 2). A statistically significant association between AL English results and the SME results (chi-square test, p=0.01) was found reflecting lower grades in the SME among the participants who had low grades for AL English.

Of the total study sample, 141 stated their AL Z-scores which ranged from 1.780 to 2.014 with a median value of 1.910. A significant difference (Student t-test, p=0.22) in the Z-scores between the students who had the highest grade (A) and the lowest grades (S and F) for AL English was not observed (Figure 2C). Moreover, among the students who had high Z-scores (≥1.910, n=71), 18 (25.35%) had 1st class or 2nd upper classes in the SME while 13 (18.31%) failed. The corresponding values for the students with low Z-scores (<1.910, n=70), were 15 (21.42%) and 15 (21.13%), respectively (Figure 2D). A statistically significant association between AL Z-score and the SME results was not observed (chi-square test, p=0.53).
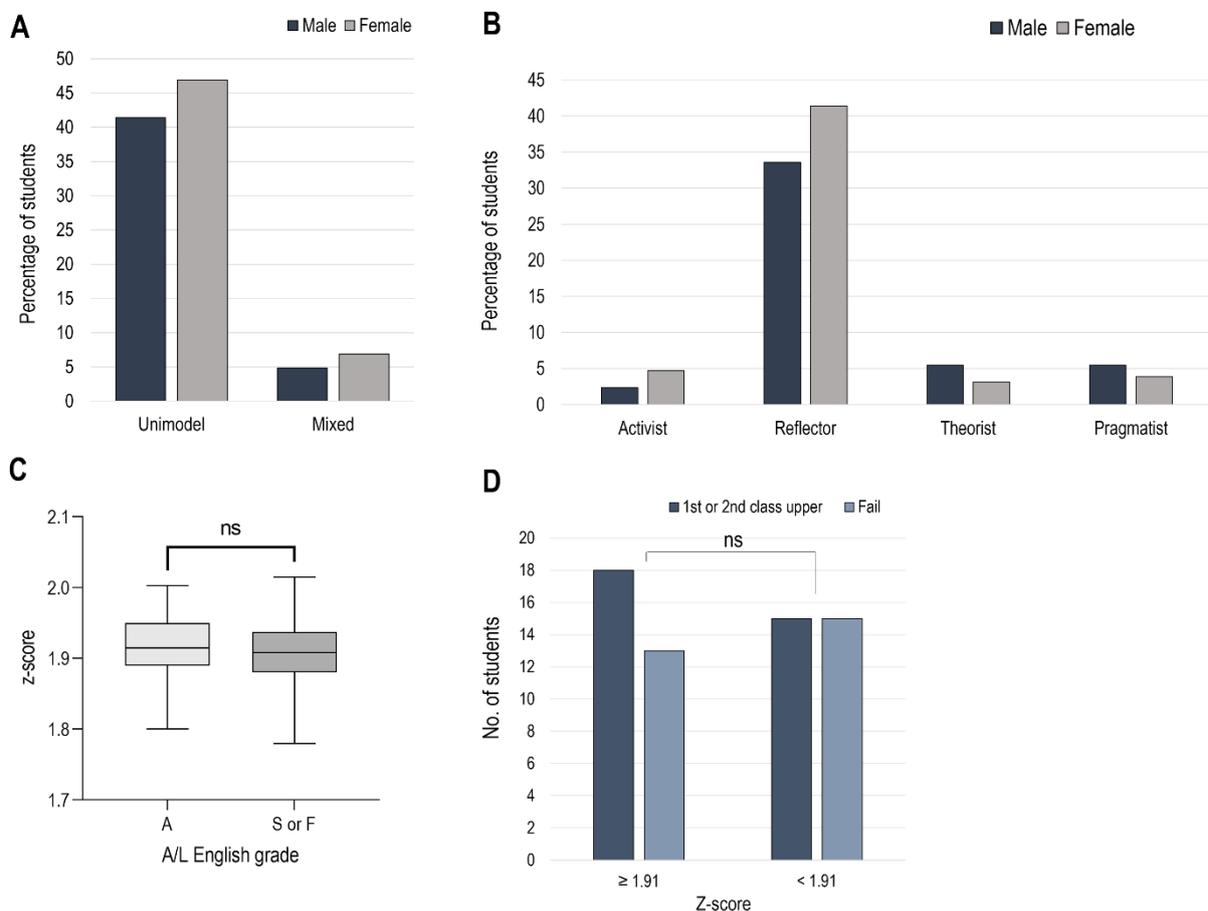

Figure 2. Association between the 2nd MBBS examination results and the learning style and advanced level (AL) performances. A. Bar chart shows the percentage of study participants with unimodal and mixed learning styles **B.** Gender wise distribution of different learning styles in the study sample **C.** Box (mean, 1st and 3rd quartile) and whisker (maximum and minimum Z-scores) plots show the distribution of AL Z-scores of the participants who received high (A) and low (S and F) grades for AL English **D.** Comparison between the 2nd MBBS exam results with the AL Z-scores.

Table 2. Association of the 2ⁿᵈ MBBS examination results with the learning style and advanced level English results

		2ⁿᵈ MBBS examination results n(%)				
		1ˢᵗ class and 2ⁿᵈ class upper	2ⁿᵈ class lower	Pass	Referred	P value*
Learning Style	Activist	2 (1.38)	2 (1.38)	1 (0.69)	4 (2.76)	
	Reflector	23 (15.86)	25 (17.24)	30 (20.69)	18 (12.41)	
	Theorist	4 (2.76)	4 (2.76)	0 (0.00)	3 (2.07)	0.31
	Pragatist	2 (1.38)	4 (2.76)	2 (1.38)	4 (2.76)	
	Mixed	3 (2.07)	7 (4.83)	6 (4.14)	1 (0.69)	
Advanced level English Results	A	18 (12.41)	11 (7.59)	10 (6.90)	4 (2.76)	
	B	7 (4.83)	11 (7.59)	8 (5.51)	2 (1.38)	
	C	5 (3.45)	11 (7.59)	7 (4.83)	12 (8.28)	0.01
	S	4 (2.76)	7 (4.83)	12 (8.28)	8 (5.52)	
	F	0 (0.00)	2 (1.38)	2 (1.38)	4 (2.76)	

* Chi-square test

Discussion

This study primarily explored the effect of learning style and English literacy on examination performances in a cohort of medical undergraduates. 'Reflector' was identified as the commonest learning style in the study cohort, and no significant association between learning style and the SME performances was observed. However, a strong positive association between the SME performances and the AL English results was noted.

An association between the learning style and academic achievement was tested in previous studies as well. Many such studies failed to identify a significant association between the learning style and examination performances [12,13,15]. However, in a study conducted on a group of Chinese Architectural students, a statistically significant correlation was observed between the learning style and exam results in which poor performance was observed among convergers. A significant influence of learning style on some components of the United States Medical Licensing Examination (USMLE) Step 1 was also noted [14]. This reflects a possible association of learning style with exam performances in some study fields [22]. Exploration of preferred learning style(s) is also important in identifying the common elements in the learning process of a given student population and in designing effective and efficient teaching-learning and assessment modalities. Reflector has been identified as the commonest learning style among undergraduate and

postgraduate medical trainees previously as well [14,17]. Reflectors learn best by observing others. After observing, they use to think about their observations. With this nature of the behaviour, these learners prefer trying by themselves only after watching or observing. Moreover, these learners reach conclusions, after collecting and analyzing the necessary information gathered from multiple sources [11]. During the medical undergraduate period, students acquire a substantial amount of scientific knowledge and skills to become competent doctors. In medical training, most of the skills training is initiated through observation. Why 'Reflector' learning style is the commonest, could be partly due to the educational experiences, they have had during the 1ˢᵗ two years as medical undergraduates. It was identified that these learners can learn best when they are given time to think and investigate before implementing. With this nature, they find it difficult to learn when they do not have adequate time to prepare for their action [11]. Therefore, giving adequate time to explore further on the topics which they have thought might facilitate their studies.

We observed a significant association between English literacy and SME performances while detecting no significant association between AL Z-scores and AL English or SME results. As most of the students in Sri Lanka have the AL examination in Sinhalese or Tamil, fluency in English is not an important determinant of AL

performance. However, from the very first day in a medical school in Sri Lanka, the students must carry out their studies in English. Hence, insufficient language skills among these students can be one of the main barriers to acquiring the required knowledge and competencies. The actual effect of the English short course provided at the beginning, on improving fluency in English is seemingly limited.

Considering the global needs, many non-English speaking countries also include English as a subject in their education programme [18,19]. Today, not only medicine but also many other undergraduate courses in Sri Lankan universities are taught only in English and, thus, students have no choice but to follow the course in English. Lack of proficiency in English not only affects their undergraduate performances but also their subsequent employability [15]. Good English literacy is a mandatory requirement for postgraduate trainee doctors during their overseas training; an essential element in postgraduate medical training. Thus, it is important to take effective measures to improve the English language competency among medical undergraduates as it can significantly affect their future career goals as well. Moreover, a considerable number of students upon completing their secondary education are moving overseas to continue their higher education in overseas high-ranked universities. The language barrier is one of the main factors faced by such student communities and is thus used as a factor to consider these international students as a vulnerable population [18,27]. The importance of creating opportunities to improve their language competencies with a special focus on spoken English was identified as a risk reduction approach [27].

If the key outcomes of the Sri Lankan education system include producing graduates who are competent in their respective fields of work as well as in English, the educational system should have solid and well-planned strategies to provide adequate practical English language skills during primary and secondary education. In Sri Lanka, English is one of the compulsory subjects from grade one of schooling. However, the teaching-learning opportunities and resources could vary widely depending on factors such as the locality and inequality of socioeconomic circumstances [18]. Additionally, personal preferences, including attitude toward learning a new language, and reading habits, could affect these outcomes [15]. Enthusiasm toward learning English in our student communities could be improved by informing the timely importance of learning English. Identification of effective learning strategies [5] to match the different ages is primarily important if we are to improve the English language competencies from primary school education. If the language is not comprehensible, understanding key concepts, one of the pivotal requirements in successful learning, cannot be achieved. Thus, it is worthwhile revisiting our educational approaches to provide adequate emphasis on realistic and timely needs.

In conclusion, this study identified reflector as the commonest learning style among medical undergraduates, and English literacy is a significant factor affecting the examination performance of medical undergraduates. Studies with wider representation will be helpful in understanding the impact of English literacy on teaching outcomes in tertiary education. Critical evaluation and revision of the educational policies, teaching and learning approaches, and resources is a timely need to modify our English teaching programme from primary education.

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