**Preferred learning styles between students:** A comparative study

**Background:** Learning styles as student preferences for acquiring and nurturing knowledge are different by considering their individual and social factors. Socio-cultural factors and the educational structure of different countries are some of the factors affecting this matter. The present study aimed to compare the learning style of Iranian and international medical students of Tehran University of Medical Sciences. The present descriptive cross-sectional study was conducted among the medical students studying in the basic science courses of Tehran University of Medical Sciences during the educational year of 2018-2019.

**Methods:** In the present study the complete enumeration was used for sampling and data were collected by using VARK standard questionnaire, and then they were analyzed by SPSS 21.

**Results:** Among 225 students participating in the present study-46.4 and 55.3% of the participants were Iranian and international students, respectively. Based on comparing the mean score of four learning styles among Iranian and international medical students, two kinesthetic (P<0.05) and aural (P<0.05) styles were significantly different. The results of the present study represent the preference of b-modal learning style among Iranian and international students (87%) compared to that of tri-modal and quad-modal styles.

**Conclusion:** Based on the results of the present study, the learning style of both groups was bi-modal although a difference was observed between Iranian and international students regarding different education systems. This study can be a tool to utilize all senses in order to frame a specific educational program in order to adjust the teaching methods in terms of educational structure of different countries are some of the factors affecting this matter. The present study aimed to compare the learning style of Iranian and international medical students of Tehran University of Medical Sciences during the educational year of 2018-2019.

**Keywords:** Learning style, Internationalization, Medical students

**ORIGINAL ARTICLE**

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**INTRODUCTION**

Internationalizing educational system is regarded as one of the important strategies of higher education system during recent years. The internationalization of higher education has faced the inclusive growth and welcomed well by the universities and higher education institutions in Iran (1). Soderqvist (2) considered internationalizing higher education as the process of changing the status of one higher education institution from national to international in order to increase educating and learning quality and achieve desired and intended competency at a superior and international level.

The internationalization of higher education in the theory of "the process of integrating international dimension into the activities and programs of higher education" aimed to raise a new responsible, critic, and global citizen generation students (3). Based on the previous studies, internationalizing higher education system is positively related to the improvement of curriculum quality (4).

Educational departments focus on increasing the quality of activities and programs by internationalizing curriculum. Improving teaching standards in departments based on international standards and indexes is considered as one of approaches for increasing the quality of higher education programs (5). In this regard, paying attention to the learning style of learners is regarded significantly important. The learning styles of students with various cultures are different due to the dependency of these styles on culture (6). Effort to understand students is ineffective for achieving educational objectives and improving educational quality, regardless of the cultural background of learners.

Universities should recognize the differences between learning styles in different cultures so that they can support learning and modifying educational programs for empowering students (7).

Learning style is the habit of processing received information and is regarded as one of the factors affecting learning. It is considered as cognitive and emotional trait and physiological behaviour which relative constant indicates how educational environment is understood, acted and responded. Researchers believe that each learner possesses preferred recognizable and stable methods for understanding, organizing, and storing information (8).

Fleming considered learning styles as individual differences and preferences for collecting, organizing, and thinking about information (9). Additionally, he proposed four learning styles based on Neuro-Linguistic Model and described them based on Sensory Modalities. VARK is regarded as the classification of educational preferences and focuses on individual differences in the method of acquiring information. Four approaches of learning style are as following. Learners with visual learning style are trained by using map, chart, graph, colour, and image. The learners having aural style prefer to explain contents to some disputable topics with other students and professors and they prefer to learn by listening. Regarding read/write learning style, learners print articles, reports, and textbooks, in addition they take notes from web pages and read them.

Learners with kinaesthetic style often learn through trial and error, activities done for the better understanding of concepts, referral to lab, problem solving, and sample collection (10), which is abbreviated as VARK. Considering this theory, learners can apply uni-model learning style (visual or aural) or the multi-model style meaning the use of a few styles involving bi-, tri-, and quad-model for their learning. Learners with multi-model learning style prefer to receive information in different forms. Accordingly, they receive and process information with all their senses (11).

The studies conducted in different countries represented that the students of medical sciences university's prefer different learning styles (12). For example, aural and kinaesthetic styles were dominant in first-year Indian medical students (13, 14). Pre-clinic medical students in Oman possessed multi-model learning style, while aural and kinaesthetic style was often observed in learners with bi-model learning style (15). Multi-model style was reported in pre-clinic medical students in Barbados (16). Regarding Pakistani medical students, 44 and 56% preferred bi- and multi-model learning styles, respectively (17). Pre-clinic medical students in Malaysia possessed multi-model style although kinaesthetic learning style was dominant (18).

Various studies mentioned different learning style as the dominant style of Iranian medical students, among which some introduced visual (11) or aural style as the dominant one (19-21). Gebru et al. (22) reported read/write learning style as dominant among international students of Tehran University of Medical Sciences. Considering the conducted studies, the learning style of Iranian and international medical students should be known in order to improve education methods. In this regard, the education methods of Iran can be matched with the learning styles of Iranian and international students. Moreover, a kind of balance can be created among their styles based on recognizing and comparing their learning style and preferences. One of the weaknesses of some research in this field is the lack information about dominant style of Iranian medical students. Thus, the present study aimed to identify and compare the learning style of Iranian and international medical students, which affects the internationalization of university.

**METHODS**

The present descriptive cross-sectional study was conducted among medical students of Tehran University of Medical Sciences during 2018-2019. Complete enumeration was applied for sampling. The data were collected by using the Persian version of VARK questionnaire (23). The present questionnaire involving 16 four-choice questions sought to measure learning style. Regarding the method of scoring in VARK standard questionnaire, the collected scores of guidance of questionnaire were determined based on the type of filled choice in each question to determine the type of dominant style. Further, choices were designed to select each option specifying a particular style, while more options could be selected if one option failed to represent their opinions. Furthermore, acquiring higher score in each learning style indicated greater individual’s tendency to that.
style, while multi-model style was considered if individuals achieved equal score in two or more styles. The technical characteristics of the present study were reported in Persian version (21).

Protecting the personal and confidential information of all participants was exactly predicted and they participated voluntarily in the present study. Data were analysed by using SPSS 21. The frequency distribution of questionnaire results was examined. The means for each item were calculated and items with higher use were identified. The standard of $P < 0.05$ was used to determine the statistical significance of results.

**RESULTS**

The statistical population included 225 students of Tehran University of Medical Sciences in basic science courses with the mean age of 21.5±1.5 years old. Furthermore, 55.2% of students were male and 44.8% were female. In addition, 46.4 and 53.6% were Iranian and international students respectively.

Figure 1 displays the distribution of learning style among Iranian medical students, among whom 24, 18, 14, and 12% preferred aural, kinaesthetic, read/write, and visual learning styles, respectively. Additionally, multi-model style was observed in 32% of participants, among whom 87, 9.67, and 3.33% preferred bi-, tri- and quad-model learning style, respectively. Figure 2 indicates learning styles involving uni-, bi-, and multi-model among Iranian medical students.

Figure 3 displays the distribution of learning styles among international medical students, by indicating that aural, kinaesthetic, read/write and visual styles were preferred by 15, 23, 14, and 9% of participants, respectively. Furthermore,
39% of students possessed multi-model learning style, among whom 87.59, 11.69, and 0.73% learned by bi-, tri-, and quad-model styles, respectively. The uni-, bi-, and multi-model learning styles of international medical students are separately represented in Figure 4. As shown in Table 1, the kinaesthetic ($P<0.05$) and aural ($P<0.05$) learning styles of Iranian and international medical students are significantly different by comparing the mean scores related to two groups. The mean score of the kinaesthetic style related to international students ($M=14.25$) is higher in comparison to that of Iranian students, while mean score of aural style is more in Iranian students ($M=13.75$) compared with international ones. Furthermore, no difference was observed between the two groups regarding other learning styles.

![Figure 3. Distribution of learning styles among international medical students](image)

![Figure 4. Learning style among international medical students](image)

**DISCUSSION**

The present study aimed to assess the learning preferences of Iranian and international medical students based on VARK model. Tehran University of Medical Sciences as the most top medical sciences university in Iran has considered attracting international students and internationalizing university as its perspective during past years. In this regard, recognizing the learning preferences of students for matching educational strategies is regarded as one of the priorities of educational system.

Based on the results of the present study, a significant difference was observed between Iranian and international students regarding kinaesthetic and aural learning styles. The mean score of the aural style related to Iranian students was...
higher compared with that of the international students, while the mean score of kinaesthetic learning style related to international students was more in comparison to that of Iranian students. The results of the present study are consistent with those of Parashar (14) who reported that the students utilized aural devices to learn their basic science courses during the early years of educating, direct their learning preferences toward aural learning style due to the feature of digital generation students (14). Additionally, they selected kinaesthetic preferences and a scientific activity for doing practical skills which are in line with the results of the present study. According to Peymani et al. (24) 58% of Iranian medical students preferred multi-model learning style and their dominant style was aural style. Bokhari and Zafar (25) concluded that medical students used bi-model learning style with preference of aural style. Lio et al. found that the dominant learning style of pre-clinic students in Malaysia was uni-model style with the preference of kinaesthetic style (26). Aural style was reported as dominant learning style for Saudi medical students (25). According to Jamani et al., 80% of students in the Pangam of Pakistan possessed a uni-model style with preference of kinaesthetic style (18). Accordingly, different learning preferences were observed for the students with diverse educational programs in various countries. The existence of different education methods and strategies in the educational systems of various countries is regarded as one of the most important reasons as shown by the results of the present study. Unfortunately, the educational method governing education in Iran is lecture through which students are trained and entered into higher education system. Based on the results of the present and previous studies, Iranian students mostly prefer aural learning style to acquire information because of governing lecture method in medical educational system. However, the international students entered into the medical educational system of Iran possess kinaesthetic style and prefer to acquire information through practical sessions. Thus, this difference should be considered to improve the academic performance of medical students and internationalize medical educational system. Learners with visual and kinaesthetic learning style prefer visual and practical educational methods, respectively. The value of learning increases by harmonizing educational methods and learning styles (27). Accordingly, in order to consider the different learning styles of students with various socio-cultural history for developing the internationalization of educations, current differences should be highlighted as well as modern, active, and diverse medical educational methods should be used.

Based on the results of the present study, uni- and multi-model learning styles were preferred by 61 and 39% of international medical students, respectively, while 68% of Iranian students possessed uni-model and 32% had multi-model learning style. In addition, bi-model style was preferred by 87% of participants and it was regarded more important compared with tri- and quad-model styles. Uni-model learning style was reported as the style preferred by medical students in some studies (28-30). However, multi-model style was preferred by 61-69% of American students (31) and 69% of Korean medical students as reported by Daud et al. (50). Regarding the educational systems of countries, active learning strategies are used more in comparison to lectures. In fact, active learning strategies result in nurturing the learners having different learning styles (28), while conventional methods such as lecturing are used by students with aural style because of learning contents and information mentioned orally without interaction with teacher. The focus of educational system in Iran on lecturing and limitation of some methods such as discussion and practical activity are regarded as one of the main reasons for preferring uni-model learning style among the students under study. Based on the previous studies, multiple learning environments, especially using aural and visual contents, increase learning (32). Considering the development of modern technologies in educational system, modern educational methods should be utilized along with digital media and simulation tools to nurture and empower learners with multi-model learning style. Furthermore, it is suggested that the learning styles of students be assessed by using other relevant tools in further studies.

Some limitations were observed in the present study similar to other studies. Accuracy in generalizing results is regarded as one of the important limitations of the present study. The present study was conducted among a limited number of students in basic science courses. Consequently, selecting

<table>
<thead>
<tr>
<th>VARK</th>
<th>Students</th>
<th>Mean (SD)</th>
<th>t-value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinaesthetic</td>
<td>Iranian students</td>
<td>10.25 (5.23)</td>
<td>-1.59</td>
<td>0.012*</td>
</tr>
<tr>
<td></td>
<td>International students</td>
<td>14.25(8.57)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aural</td>
<td>Iranian students</td>
<td>13.75(8.29)</td>
<td>1.59</td>
<td>0.012*</td>
</tr>
<tr>
<td></td>
<td>International students</td>
<td>9.68(5.87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read/Write</td>
<td>Iranian students</td>
<td>8.18(5.03)</td>
<td>-0.59</td>
<td>0.559</td>
</tr>
<tr>
<td></td>
<td>International students</td>
<td>9.75(9.24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual</td>
<td>Iranian students</td>
<td>6.93(4.7)</td>
<td>0.60</td>
<td>0.548</td>
</tr>
<tr>
<td></td>
<td>International students</td>
<td>5.93(4.55)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

indicates that the value is statistically significant at the 0.05 level.
and comparing the information related to the different groups of medical students are recommended for further studies. Considering the learning preferences and styles of students, it is suggested that the professors of medical sciences be empowered necessarily to be familiar with and apply active educational strategies. Finally, their effectiveness was evaluated to increase learning and motivation among medical students.

Based on the present study, the students of Tehran University of Medical Sciences possessed uni-model learning style. Aural and kinaesthetic styles were preferred by Iranian and international students, respectively. Various educational methods should be used to apply all the senses of students for learning contents in order to get a multi-model learning.

**Ethical considerations**

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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