Original article

Assessment of postgraduate international students’ learning preferences at Tehran University of Medical Sciences, Tehran, Iran

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Abstract

Knowledge of learning preference can help to improve learning and teaching process and understand its implications. The aim of this study was to assess the preference for taking in and putting out information in learning among postgraduate international students at Tehran University of Medical Sciences, Tehran, Iran. Using Institutional based cross-sectional descriptive study and self administered structured version 7.2, visual, auditory, read/write, and kinesthetic and multimodal learners (VARK) questionnaire was used. The questionnaire was divided into two sections including (a) demographic profile and (b) sixteen multiple choice questions. Data was collected from 40 participants who were selected by purposive method. After coding and cleaning, data was entered and analyzed by SPSS version 21 and Microsoft excel using the VARK guidelines. Descriptive statistics was used to see the frequency and percentage of each variable. The p-value<0.05 was significance measurement for the result in this study. A total of 40 postgraduate international medical science students; the majority 8 (20%) were females and 32 (80%) of respondents were male. The most frequent unimodal learning preferences was read/write (32.5%). In addition, aural (27.5%), visual (20%) and kinesthetic (17.5%) were in the next order in learning preference of students. The mean scores of male students who preferred both bimodal learning and trimodal learning was 63.75 whereas in female participants it was 58.69. In conclusion, the mean scores of both bimodal and trimodal learning preferences were equal. However, the mean scores and standard deviation of quadrimodal learning preferences were lower than both bimodal and trimodal. Therefore, further study is necessary to fill this gap.

Key words: International students, Iran, Learning preferences, Postgraduate, Tehran University of Medical Sciences

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Understanding different style preferences in learning process is a useful step for achieving better learning outcomes and improving quality of education. Evidences show that learners vary in their preferences to receive new information. Moreover, their learners’ preferences should match with the approaches or techniques employed to reinforce learning. Variations in learning preferences are mostly related to the learners’ use of either of the visual (V), aural (A), read/write (R) or kinesthetic (K) learning styles (VARK). These preferences help to reinforce learning and a learner may use different combinations of these learning styles which in turn add complexity to the variations in the learning preferences. However, a study revealed that the majority of postgraduate students were unimodal learners. Also, many learners of higher institutions of education are more likely to prefer interactive learning. This is because they engage themselves more on a high level self-directed learning. Thus, verbal (or written) learning predominates over the other learning preferences. Many others, also, have visual learning preferences over other strategies and they tend to use more practical demonstrations or simulation activities to support their learning. For example, when reading text books, the learners usually use colored highlights to reinforce visual learning. Furthermore, learners can employ deep, surface apathetic or strategic approaches for learning. The learning preferences should match with the learning strategies the learners. If the preferences and strategies are not matching, the learners are likely to be at the losing end, and therefore, they will not achieve the intended objectives. This situation calls for educators’ efforts for fitting the teaching, learning and performance assessment methods used to cultivate the learners in order to achieve the intended educational purposes. Furthermore, learners’ interests on the preferred field of study and the strategies they use are positively correlated. A study has shown that, students who were interested to study nursing profession and had adopted strategic learning approach, scored a higher grade point average (GPA) than those who adopted deep or surface learning approaches. Also, those who were interested to study the field of midwifery and adopted strategic learning approach had significantly higher GPA than those who adopted deep learning approach. However, there was no difference shown with those who adopted surface learning approach. Generally, studies show evidence that visual and verbal learning strategies present the most interesting comparison areas of learning preferences. Verbal (or written) learning strategies are predominant learning strategies while the majority of the learners had visual learning preference. This preference was further supported by the learners’ suggestions. The visual learning preferences of learners reflected by their more practical demonstration or simulation activities to support learning, which also reflects visual learning preferences of participants.

There was also a statistically significant positive correlation between level of interest in the field of study and use of strategic approach for both nursing and midwifery students. This represents a significant deficit in the learning materials in catering for participants’ learning styles. Another theme was that of using more practical demonstration or simulation activities to support learning, which also reflects visual learning preferences of participants. Therefore, the main aim of this study was to assess the preference for taking in and putting out information in learning among Postgraduate International Students at Tehran University of Medical Sciences, Tehran, Iran.

Methods and materials

Study area and period

This study was conducted at Tehran University of Medical Sciences (TUMS), Tehran, Iran. TUMS is the oldest and most well-known medical center in Iran, nationally as well as internationally. TUMS, as one of the country’s top research universities, accepts applications from the most qualified students. It also has the largest schools of medicine, dentistry, pharmacy, rehabilitation, allied medical sciences, public health, advanced technologies in medicine, nutritional sciences and dietetics, and nursing and midwifery in Iran as well as a virtual school. Over a hundred specialized research centers such as Science and Technology in Medicine, Rheumatology, Auditory, Digestive Disease, Skin Diseases and Leprosy, Trauma, Hematology and Oncology, Cardiovascular Diseases, Endocrinology and Metabolism, Reproductive Health, Urology, Immunology, and Asthma and Allergy are under the immediate supervision of this university. The study was conducted in 40 purposively selected international postgraduate medical sciences students in November 2013.

Study design

A cross-sectional descriptive study involving a quantitative questionnaire analysis (Well structured VARK questionnaire).

Study population

We sampled postgraduate international students’ at Tehran University of Medical Sciences, Tehran,
Iran prior to the study. The study population consisted of all postgraduate international students who attended at the various schools and they can fulfill the inclusion criteria in the study.

Sample size
The sample size was based on the recommendation by Polit and Beck (2010), advocating that the number of respondents be 10 times the number of items for performing factor analysis of items. Purposively 64 participants were selected.

Sampling techniques and procedure
Purposive sampling technique was used to collected data.

Instrument and measurement
Pretested and well structured self-administered questionnaire was used. The original data were collected from postgraduate international students who are learning at different school or department in Tehran University of Medical Sciences (TUMS). Director of postgraduate students and Dean of Tehran University of Medical Sciences School of Nursing and Midwifery allowed the study to take place by sending the questionnaire through participant e-mail. Subjects in this VARK based questionnaire study consisted of students of all batches who had attended both basic science and clinical practice at difference Tehran University of Medical Sciences departments and clinical settings. All the students present in Tehran University of Medical Sciences (TUMS) common living home (Dormitory) due to this reason, gave an informed written consent to participate in the project. In this study we described the response from postgraduate international students who had received questionnaire through their e-mail and having practice at different health setting/Institutes of Tehran University of Medical Sciences (TUMS). Among the participants who responded their answer regarding to clinical evaluation, there was no missing data from all listed clinical evaluation method in the field of postgraduate international study. However, there was a serious problem on their response according to department. Therefore, there was no problem which effects this study as the students who were admitted at Tehran University of Medical Sciences (TUMS) as Postgraduate International Students were one or two for each department. So, we could generalize students at Tehran University of Medical Sciences. To ensure the reliability and validity of data the Principal Investigator put the maximum effort. In this regard experts on the subject matter were contacted and the questionnaire reviewed to obtain the desired variables. The data collected was kept in a lockable cabinet not accessible to anyone other than the Principal Investigator. In addition the respondents were not allowed to take home the questionnaires so that no references made so that their actual knowledge at the time of the study was analyzed (avoid bias). In addition, each participant was told and strictly followed by the Principal Investigator to respond to the questions by his/her own, without consulting anyone else, and that all the questions provided in the tool was answered.

Data processing, analysis and presentation
Collected data was cleaned, edited, recorded and checked for completeness and consistency and calculated using manual scientific hand calculator. Result is presented by using tables, graph and chart. The statistical analysis was carried out using SPSS for windows version-21 for the comparisons among postgraduate international students as Leite et al.16 suggested that if VARK was to be used more reliably in research projects it needed a statistically-based scoring system. He suggested checking each score for the VARK questionnaire with the means and standard deviations from the extensive VARK database. If the score, for say visual, was more than three standard deviations above the mean for all visual scores from the database it could be allocated a very strong visual category. A score between two and three standard deviations could be allocated a strong Visual category. A score between one and two standard deviations would be allocated a mild visual category. Similarly for a respondent’s aural, read/write and kinesthetic scores, VARK scoring trials have various model preferences of learning. These model preferences include mono-modal (having one of the V, A, R or K preferences), multimodal (having more than one preference of the VARK), bimodal (having two of preference i.e. VA, VR, AR, AK, RK, or VK ) , tri-modal (having three preference-VAR,ARK,VRK or VAK) and quadri-modal (having all the four preferences i.e. VARK).16,17 All the participating students gave the feedback; However, only the feedbacks written legibly were included in this study (n=40). It was seen that the visual category recorded an acceptable value of 3. This is not great, but does indicate that the students like visual mode of learning techniques. Principles of Manometer and related instruments were taught using this technique. There was an absolute need for improving this to a level of 4 at least. The auditory mode of learning recorded the highest possible score of 5. Fundamentals of fluid mechanics was delivered in the traditional lecture format and the students seem to learn the
necessary techniques in a routine manner. The third category, reading mode of learning recorded a low score of 2. This indicates that the students need help from the instructor. As old understanding of Bernoulli’s equation and related mathematical techniques require quite a bit of effort from the students. Finally, a very good mode value of 4 was recorded for kinesthetic style of learning viscosity and related topics were handled like a laboratory, demonstration. The students learn better in a laboratory setting. This should be improved to document a score of 5\textsuperscript{11,15,17}.

Data quality control and assurance

The Principal Investigator supervised daily for the completeness and consistency of data collected by each data collectors. All materials used for data collection were arranged sequentially. The data was stored in safe and secure place.

Ethical consideration

The study was approved by Tehran University of Medical Sciences School of Nursing and Midwifery Director of postgraduate students and Dean of the school. The Principal at the School of Nursing and Midwifery received a permission letter that describe the study with assessment on learning preferences among postgraduate international students at Tehran University of Medical Sciences, Tehran, Iran with full well-done structured questionnaire. The students were informed regarding the main aim of this study and overview or summary of best clinical evaluation methods using different health setting. We discussed about confidentiality and interest through their e-mail.

Result

The VARK–questionnaire was distributed among 64 postgraduate International students in TUMS, and we have received filled forms from only 40 postgraduate International students. This sample size represented a 62.5% response rate from the postgraduate international students who are living in Tehran University of Medical Sciences international campus dormitory and it was markedly above the level which was required to make conclusion about postgraduate international students learning preferences for receiving and processing information.

A total of 40 Postgraduate international medical science students completed the study; 8(20%) were females and 32(80%) of respondents were male. Among males, (25%) of the study participants preferred aural type of unimodal learning preference and other 25% using read/write methods. However, only 10% of the female participants preferred read/write learning style (Table 1). The majority (35%) of total participants preferred read/write learning preference for their learning. In unimodal learning preference, female postgraduate international students preferred read/write than all unimodal learning preference in their learning processes. Read/write(R) was highly popular than all unimodal learning preference (Table1).

<table>
<thead>
<tr>
<th>Table1: Distribution of unimodal learning preferences among genders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unimodal learning preferences</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Visual (V)</td>
</tr>
<tr>
<td>Aural (A)</td>
</tr>
<tr>
<td>Read/Write(R)</td>
</tr>
<tr>
<td>Kinesthetic (K)</td>
</tr>
<tr>
<td>VARK</td>
</tr>
</tbody>
</table>

For each of the sixteen questions, a participant could select anywhere from 0 to 4 response options. ARK mean scores for options selected by postgraduate international students of TUMS showed that read/write and aural preferences ranked highest (5.39 and 5.30 mean scores per respondent respectively), followed by kinesthetic (5.23) and visual (4.03) preferences. Mean scores and standard deviation of TUMS postgraduate international students based on their gender were not statistically significant. Using a one-way ANOVA, the learning preference mean scores showed no statistically significant differences (P=0.494; F=0.476) (Table 2).

The mean and standard deviation of bimodal and trimodal learning preferences were equal (63.75±20.831) however lower in quadrimal learning preferences (21.25±6.944). In addition, the mean scores of the male students (63.75) who preferred both bimodal and trimodal learning were higher than female postgraduate international students (58.69). The mean score of female postgraduate international students were higher in both bimodal and trimodal learning preferences than male. In contrast, the mean score of the quadrimal learning preferences were higher in male participants (19.56±6.005) than female participants (21.25±6.944). No significant correlations were observed between the learning style preferences and their sex (Table 3).

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Table 2: Mean, standard deviation and one-way analysis of variance on learning preference of postgraduate international students of TUMS

<table>
<thead>
<tr>
<th>Learning preference</th>
<th>Male (Mean, SD)</th>
<th>Female (Mean, SD)</th>
<th>Total (Mean, SD)</th>
<th>F, p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>4.28 (2.910)</td>
<td>3.00 (2.204)</td>
<td>4.03 (2.805)</td>
<td>1.347, p=0.253</td>
</tr>
<tr>
<td>Aural</td>
<td>5.25 (2.555)</td>
<td>5.50 (2.619)</td>
<td>5.30 (2.534)</td>
<td>0.061, p=0.807</td>
</tr>
<tr>
<td>Read/write</td>
<td>5.09 (2.821)</td>
<td>6.38 (1.923)</td>
<td>5.39 (2.694)</td>
<td>0.061, p=0.807</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>4.94 (2.169)</td>
<td>6.38 (3.021)</td>
<td>5.23 (2.391)</td>
<td>0.061, p=0.807</td>
</tr>
<tr>
<td>Total</td>
<td>19.56 (6.005)</td>
<td>21.25 (6.944)</td>
<td>19.90 (6.147)</td>
<td>0.476, p=0.494</td>
</tr>
</tbody>
</table>

Table 3: Mean standard deviation and one way analysis of variance on multi modes learning preference of postgraduate international students of TUMS

<table>
<thead>
<tr>
<th>Multimodal learning preference</th>
<th>Female (n=8)</th>
<th>Male (n=32)</th>
<th>Total (n=40)</th>
<th>F, p-value</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td>Mean, SD</td>
<td></td>
<td>Min, Max</td>
</tr>
<tr>
<td>Bimodal</td>
<td>63.7</td>
<td>20.83</td>
<td>58.69</td>
<td>18.015</td>
<td>59.70</td>
</tr>
<tr>
<td>Trimodal</td>
<td>63.7</td>
<td>20.83</td>
<td>58.69</td>
<td>18.015</td>
<td>59.70</td>
</tr>
<tr>
<td>Quadrimal</td>
<td>21.25</td>
<td>6.944</td>
<td>19.56</td>
<td>6.005</td>
<td>19.90</td>
</tr>
</tbody>
</table>
Table 5: Description of comparison between most popular and least popular of the participants learning preferences at current and previous study based on research and standard result

<table>
<thead>
<tr>
<th></th>
<th>Current study</th>
<th>Previous study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V</td>
<td>A</td>
</tr>
<tr>
<td><strong>Most popular</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Standard</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td><strong>Least popular</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Standard</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

Interestingly in this study, the result which indicates that the students’ choosing each option which includes double and triple counting, the read/write group was the highest (43.5%) and the strongly popular learning to standard categories in the individual questions, followed by aural (31.3%) and kinesthetic (25.2%). However, visual learning preference in this study was least popular than all other learning preference (43.5%) (Table 4 and 5).

International postgraduate medical science students used different learning preferences in their learning processes, future quality health services and demonstrated activities which can support on their learning session. For instance; questions allowed students to indicate more than one response regarding their learning preferences (Fig 1). The majority of those who preferred read/write learning as a unimodal learning preference were (47.5%) in comparison aural (27.5%). However, the majority (25%) of participants who preferred bimodal learning preference were AK (aural and kinesthetic). ARK (aural, read/write and kinesthetic learning) as a trimodal learning preferences were (52.5%) in comparison both VAR (visual, aural and read/write) (17.5%) and VAK (visual, aural, kinesthetic) (10.0%).

**Discussion**

Students’ learning preferences are a major consideration in planning for effective and efficient learning process. In this study, there was a wide variation in the learning preferences among international postgraduate medical students at Tehran University of Medical Sciences. Regardless of the sex, the majority (32.5%) of postgraduate international medical students had preferred read/write learning preference. According to gender classification, the majority (25%) of male participants preferred
read/write as unimodal learning preference, while this modality was preferred by only 10% females. The read/write mode of learning preference was most popular than all unimodal learning preference (Table 1). The finding indicated that, the auditory modality was the most preferred unimodal learning style among both male (45.8%) and female (50%) students, followed by the kinesthetic mode (41.7% males and 38.64% females). This might be due to the fact that the students had come to terms with (or at least were trying to) the teaching style which was adopted, predominantly didactic lectures. One way of testing this hypothesis is comparing the learning styles of these students to those in other institutes, where the teaching is not predominantly done through didactic lectures. The highest VARK mean scores in this study by postgraduate international students in Tehran University of Medical Sciences were read/write learning preference (5.39) and aural (5.30). Mean score and standard deviation of participants based on their gender was not statistically significant. There was no statistically significant over-all unimodal learning preferences (Table 2). However, the mean scores and standard deviation of quadrimodal learning preferences were lower than both bimodal and trimodal (21.25± 6.944). The mean scores of the male students who preferred the bimodal learning and the trimodal learning were 63.75. However, the female postgraduate international students who preferred the bimodal learning and trimodal learning preferences were 58.69. This result indicated that the mean score of female postgraduate international students were higher in both bimodal and trimodal learning preferences than male. No significant correlations were observed between the learning style preferences in sex of participants (p>0.05) (Table 3). When learning preference in postgraduate international students in this study is compared with the study done by James and Thomas in Australia, which reported that there were no significant differences between mean VARK scores of the two genders, there was a trend for differing proportions of unimodal and quadmodal learners among males and females. The trend of higher unimodal and lower quadmodal distribution among females as the percentage difference declines from +3.4% to −4.8% for females compared to males. This study result was nearly similar due to no significant difference between unimodal learning preferences and gender. This lack of correlation in this study and previous study may also be due to the real situation that the postgraduate international students from Tehran University of Medical Sciences, Tehran, Iran describes their own learning preferences, as well as they know which one of it is preferred on their learning process in each department and school. Therefore, these students were able to use their learning style according to VARK learning preferences.

Advanced in this study, the result which indicates that the percentage choosing each option which includes double and triple counting, the read/write group was the highest (43.5%) and the strongly popular learning to standard categories in the individual questions, followed by aural (31.3%) and kinesthetic (25.2%). However, visual learning preference in this study was least popular than all other learning preference (43.5%). Another cross-sectional study which was done by Leite et al showed that read/write learning preference was higher among all learning preference according to percentage choosing each option including double counting (37.5%) and categorized that read was a strongly popular learning preference and both visual and aural were least popular for participants, with 43.5% for each (Table 4 and 5). This study finding almost equals with previous study regarding highly popular learning preferences. The differences were visual learning preference in this study was least popular than all other learning preference (43.5%). However, both visual and aural were least popular for participants in the previous study, with 43.5% for each. Regarding few studies which reported that read/write is most popular for postgraduate students among all learning preferences, e.g. the study which was conducted by Noor, suggested that reading was one of the most important components of our language and it is an essential tool for lifelong learning for all learners. Reading is a key to a wealth of experience that links people in a way far beyond distance or time. Reading provides experience to the individual so that he may expand his horizons, identify, extend and intensify his interest and gain deeper understanding of himself and other human being and of the world. Reading is important for students in general in order to cope with new knowledge in a changing world – that of the technological age. The vast majority of those who preferred read/write learning as a unimodal learning preference were (47.5%) in comparison aural (27.5%). ARK (aural, read/write and kinesthetic learning) as a trimodal learning preferences were (52.5%) in comparison both VAR (visual, aural and read/write) (17.5%) and VAK (visual, aural, kinesthetic) (17.5%). However, the majority participants who preferred bimodal learning preference were AK (aural and kinesthetic) with (25%) while the actual total percentage who had preferred read/write were (32.5%) in unimodal learning preferences (Fig 1).
Conclusion

The distribution of VARK postgraduate international students mean scores for both the bimodal learning and the trimodal learning preferences were equal. However, the mean scores and standard deviation of quadrimal learning preferences were lower than both bimodal and trimodal. These shows a preference for postgraduate students who use strong read/write preference to facilitate learning. Although the sample size in this study was small, but significant number of postgraduate international students who prefer to learn by read/write. In addition, students preferred aural learning as other option for their learning; they also preferred kinesthetic and least preferable visual learning preferences. Knowing the postgraduate international students in Tehran University of Medical Sciences preferred learning modes can help to provide instruction tailored to the student's individual preferences, overcome the predisposition to treat all postgraduate international students in a similar way, motivate teachers to move from their preferred mode to using others, and develop appropriate learning approaches and explore opportunities so that postgraduate international students will be able to make the educational experience more productive.

Recommendation

It needs further research finding for educators and students to make them aware of their existing learning preferences on future learning processes, to encourage the development of a balanced learning style and continued research to gather evidence for its significance in education. The main recommendation is repetition of this study with a larger sample size. The study could be replicated in a greater number of postgraduate international students at different schools, universities and institutions of higher education.

Implication on teaching learning process

As we know that, there are different types of learning preference questionnaires for assessing students learning styles and learners for teaching /learning purpose. Among this inventory the VARK questionnaire is one of the simplest and most convenient one to use for postgraduate international students, undergraduate and graduate students. The VARK questionnaire is highly useful in making students motivate how they learn and understand about method to participate on their learning. The data have been distributed to Teheran University of Medical Sciences postgraduate international students to fill the VARK questionnaire so that they are informed of what types of learning preferences are applied on their learning processes and what it gives a meaning to them. Postgraduate international students’ response indicates that students gain meaningful insights about their learning preferences and educational strategies and their targets that can be applied to their course. It will be important to achieve teaching methods that can be used to meet the learning needs of all students. The vast majority of students as per the result of this study preferred read/write learning as a unimodal learning preference. This showed that reading is important for postgraduate international students in general in order to cope with new knowledge in a changing world – that of the technological age. In addition, the mean scores for both the bimodal learning and the trimodal learning preferences were equal.

Practical implication on research

The result that most postgraduate international students use read/write as unimodal learning preference need that multimodal teaching to be further tried and evaluate its effect on student learning. We also need to practice all types of learning style assessments for assessing about how students learn. We need studies investigating the correlation of learning styles and learning outcomes with potential improvements to retention rates among postgraduate international students who had acceptance at Tehran University of Medical Sciences.

Conflict of interest: None

Acknowledgments: None

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