Learning style preferences among pre-clinical medical students

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Abstract

Generally, different students employ different learning styles during their studies and medical students are exposed to diverse methods of teaching. Therefore, understanding students’ learning style preference is therefore an important consideration for a high quality and effective teaching and learning process. The aim of the study was to study the variation of learning styles among pre-clinical medical students of SEGi University, Malaysia. A cross-sectional study was performed by using VARK (Visual, Audio, Reading and Kinesthetic) questionnaire version 7.2 to assess the learning style preference of 98 (n=98) pre-clinical medical students in SEGi University. The questionnaire consists of 16 items which identify four different learning styles: visual, aural, reading/writing and kinesthetic. Descriptive statistics were used to identify the learning styles of students. 61 students preferred multimodal as their learning style, out of which 43 (70%) of them were female students and 18 (30%) were male students. 37 students preferred unimodal as their learning style, out of which 22 (59%) of them were female students and 15 (41%) were male students. In addition, female students had more diverse preferences than male students by having 10 out of the other 11 possible combinations in multimodal learning style of preference, whereas the male students only had 5 out of the 11 combinations. In this study, there was no significant gender difference in the percentages of males and female students who preferred unimodal and multimodal styles of information presentation (P= 0.263; α=0.05). To conclude, the majority of students, both male and female, had chosen quadmodal as their learning style preference. The results of this study can provide useful information for improving the quality of the teaching and learning experiences of students.

Key words: learning preferences, learning style, pre-clinical medical students

The field of medicine is one of the most competitive disciplines and medical students are exposed to diverse methods of teaching. Students often find discrepancy between learning and delivery of instruction¹. They usually seek information that is methodically and efficiently presented to them².
The pre-clinical years of medical school can be very crucial to individuals who are pursuing a medical career, as it signifies a transition period from a pre-university lifestyle to first-year medical education. It has been known that student motivation and performance improves when instruction is adapted to student learning preferences and styles.

A learning style or preference has been defined as the complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn. Learning style has also been defined as the characteristic cognitive, affective, social, and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. The acquisition of knowledge is through four sensory modalities, visual (by observing pictures, symbols or diagrams), auditory (by listening, discussing instructional material), visual iconic (by reading and writing) and kinaesthetic (using tactile sensory abilities).

Characterizing a learning style is to define a learner's preferred mode of learning. There are four modalities of the sensory modalities, namely visual, aural, reading and kinaesthetic. Each individual has his own preference in terms of the sensory modality by which they prefer to take in new information depending on their own neural system. VARK is a perceptual, instructional preference model that categorizes learning by sensory preferences. Although students can use any single or combination of these sensory modes to learn, one mode is often dominant and more preferred than the other.

Students with a “V” preference learn best by seeing or observing, for example, by using drawings, pictures, diagrams and demonstrations. Learners that prefer “A” are best suited to learn by listening to or recording lectures, discussing material, and talking through material with themselves or others. “R”-type learners learn through interactions with textual materials. “K”-style learners perform best by using physical experiences, such as touching, performing an activity, moving, lessons that emphasize doing, and manipulation of objects. Student learners are capable of using all of these sensory modes of learning. However, each individual has a unique preference or set of preferences, in which one mode is often dominant. According to the score distribution among the different sensory modalities, students can be unimodal or multimodal (bimodal, trimodal and quadmodal). Gender is among a number of factors that has been found to influence student learning style. Others include age, academic achievement, brain processing, culture, and creative thinking.

In light of the different learning modalities understanding, students' learning style preference is therefore an important consideration for a high quality and effective teaching and learning process. To achieve this goal, study was designed to explore and better understand the learning style characteristics, among pre-clinical medical students of SEGi University, Malaysia in order to support students to learn effectively.

Materials and methods

Study Design

A cross sectional study was carried out to assess the learning preferences among the total 98 pre-clinical medical students in Year 1 and Year 2 of the SEGi University. The survey was carried out in different sessions without interrupting the on-going lectures. Explanation was provided to assist the participants in completing the questionnaire during the session. The students were asked to provide informed consent prior to the administration of the questionnaire. The questionnaire was based on the VARK learning preferences version 7.2. Permission in the form of letter was obtained from the VARK author through the VARK website beforehand. All the questions were conducted in English. The questionnaire consisted of 16 questions with multiple options. The participants were asked to tick according to their choice(s) of answer.

The data was analysed by SPSS version 21. Chi-Square tests were performed to determine if there was any association between gender and the unimodal and multimodal learning preferences. The level of significance (α) was set at 0.05 for every Chi-square test performed.

Results

Table 1: Contingency table used to determine the relationship between gender (male and female) and their unimodal and multimodal learning preferences.

<table>
<thead>
<tr>
<th>Gender</th>
<th>General learning preferences of male and female students</th>
<th>Total</th>
<th>Pearson Chi-square value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unimodal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15 (45.5%)</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td>Female</td>
<td>22 (33.8%)</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Multimodal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>37 (37.8%)</td>
<td>61</td>
<td>98</td>
</tr>
<tr>
<td>Female</td>
<td>37 (37.8%)</td>
<td>61</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>81</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Contingency table used to determine the relationship between gender (male and female) and their unimodal and multimodal learning preferences.
Fig 1. Pie chart showing the percentages of male and female students who preferred unimodal and multimodal learning styles.

Fig 2. Pie chart showing the percentages of male and female students who preferred unimodal, bimodal, trimodal and quadmodal learning styles.

Fig 3. Pie chart showing the percentages of male and female students who preferred unimodal and multimodal specifically.

Legend:
V: Visual
A: Aural
R: Read/Write
K: Kinaesthetic
VA: Visual & Aural
VR: Visual & Read/Write
VAR: Visual, Aural & Read/Write
VK: Visual & Kinaesthetic
VAK: Visual, Aural & Kinaesthetic
AR: Aural & Read/Write
AK: Aural & Kinaesthetic
ARK: Aural, Read/Write & Kinaesthetic
RK: Read/Write & Kinaesthetic
VARK: Visual, Aural, Read/Write & Kinaesthetic
Figure 1 shows 45.5% of male and 33.8% of female students preferred using a single sensory modality for information intake and are described as unimodal. 54.5% of male and 66.2% of female students preferred information to reach them via multiple sensory modalities (multimodal). There was no significant difference in the percentages of male and female students who preferred unimodal and multimodal styles of information presentation (P=0.263; α=0.05) as shown in Table 1.

**Table 2:** Contingency table used to determine the relationship between gender (male and female) and their unimodal and multimodal learning preferences (unimodal, bimodal, trimodal and quadmodal).

<table>
<thead>
<tr>
<th>General unimodal and multimodal learning preferences of male and female students</th>
<th>Total</th>
<th>Pearson Chi-square value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unimodal</td>
<td>Bimodal</td>
<td>Trimodal</td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>(45.5%)</td>
<td>(3.0%)</td>
<td>(9.1%)</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>(33.8%)</td>
<td>(7.7%)</td>
<td>(13.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>6</td>
</tr>
<tr>
<td>(37.8%)</td>
<td>(6.1%)</td>
<td>(12.2%)</td>
</tr>
</tbody>
</table>

**Table 3:** Contingency table used to determine the relationship between gender (male and female) and specific unimodal and multimodal learning preferences (V, A, R, K, VA, VR, VK, AR, AK, RK, VAR, VAK, VRK, ARK and VARK).

<table>
<thead>
<tr>
<th>Specific unimodal and multimodal learning preferences of male and female students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unimodal</td>
<td>Bimodal</td>
</tr>
<tr>
<td>V</td>
<td>A</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
</tr>
<tr>
<td>(6.1%)</td>
<td>(12.9%)</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
</tr>
<tr>
<td>(6.2%)</td>
<td>(9.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Figure 2 and Table 2 shows 45.5% (15) male and 33.8% (22) 3.0% male and 7.7% female 9.1% male and 13.8% female 42.4% male and 44.6% female for unimodal, bimodal, trimodal, and quadmodal preferred learning style respectively. There was no significant gender difference in the percentages of male and female students who preferred unimodal, bimodal, trimodal, and quadmodal learning preference during their clinical medical studies. However, no significant gender difference was found in the learning preferences among pre-clinical medical students. Initially, when this study was carried out, the alternative hypothesis stated that there would be a significant difference in terms of learning styles preferences between male and female students. This idea was supported by reporting female adolescents were using a variety of preferences in terms of social context during their learning, including working alone, in groups and

**Discussion**
etc., while the males did not exhibit these. There were however, studies which also supported the finding of no significant difference between genders in learning preferences, such as studies done on medical students in Saudi Arabia and the United States of America.

Although the majority of students from both genders preferred multimodal learning, some variations can be seen when further classification were made based on the possible combinations of sensory modalities.

Those unimodal learners who were classified by the VARK algorithm showed a stronger preference for collecting information by a single sensory modality and the learners did not exclude any of the other sensory modalities. For example, a strong Visual (V) preference unimodal learner will still choose some of the options other than “V” in the questionnaire. For the female students, the most common possible combinations after the quadmodal was the unimodal of Reading (R), 15.4%, while the male students tend to have Kinaesthetic (K) as their second most common possible combinations after the quadmodal. However, the majority in the unimodal section tend to choose “R” as the dominant learning style, other than “K”. This finding did not match the study done locally in Manipal Medical College, where 35% of their clinical students preferred “K” as their learning style preference. Further studies can be made to study whether there is a change of learning style preference from pre-clinical to clinical phase for the medical students, as the study made in Manipal Medical College had suggested that almost one-third of the clinical phase students preferred this learning style but in the section of unimodal learning style, majority of the pre-clinical students in SEGi University have chosen “R” as their dominant learning style preferences.

Since the results from our study shown that the majority are multimodal learners, there is a necessity to inform the medical educators, as one model of teaching will create a monotonous learning environment and everyone will not enjoy the process of learning. Furthermore, student-centric classes should be encouraged to replace traditional teacher-centric classes for the benefit of the majority. All sensory modalities teaching can also allow all types of students to participate the learning session actively and meaningfully.

Identifying one’s learning style is important as it allows the student to process and memorize the information easily and successfully. As a pre-clinical medical student, knowing his or her own learning style is definitely an advantage to him or herself. For example, a unimodal Audio (A) learner, other than concentrating during the lectures, can read aloud to him or herself or listen to background music during revision. Since there are no absolute learning style preferences, perhaps learners can actually choose the one that they feel comfortable with during their studies. They can also learn through other learning styles, as most of the researchers had found out that multiple learning styles can significantly enhance the academic performance of students. Others also supported the previous statement by stating that most of the successful learner learns in several ways. Perhaps the learning process which involved more than one sensory modality showed that it is more efficient and quality assured than unimodal learning.

Future studies can be done by using different questionnaires which are related to learning style, so that comparison can be made between this study and the others. As mentioned previously, we are curious as well about the statement that “successful learner learns in different ways to succeed”, so studies regarding academic performance and learning style can also be done to validate the statement stated above. Since Manipal Medical College and SEGi University are the only 2 medical schools in Malaysia which had studied learning style preferences among medical students, perhaps we should invite more medical schools to perform this study in order to find out the learning styles preferences of other Malaysian medical students. The sample size of our study can be expanded as well to include the medical students in the clinical years in order to study their learning styles. Other than this, by having a larger sample size, errors that might have occurred during data collection and analysis can be reduced. It was also advisable to compare the learning style preferences of the students studying the same course across academic years to see if an indicator for the general direction to take can be identified.

Conclusion

There were no significant gender differences found in the learning style preferences of SEGi University pre-clinical medical students. The majority of students, both male and female, had chosen quadmodal as their learning style preference. This study demonstrated the potential of using the VARK questionnaire for identifying learning style preferences to help the design of teaching format. It also suggested the usefulness of identifying the students’ learning style preferences at the beginning of the medical course to help the lecturers to make...
adjustments in the teaching methods in order to facilitate the learning of the students. The lecturers would be able to comfortably design their course materials and teaching styles based on the finding of this study.

Conflict of interest: None

Acknowledgments: None

References