

Learning preferences among dental students using the VARK questionnaire: A comparison between different academic levels and gender

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Abstract

Objectives: To examine the learning style preferences of undergraduate dental students and determine the influence of gender on their selection.

Methods: This descriptive, cross-sectional study was conducted at the College of Dentistry, King Saud University, in Riyadh, Saudi Arabia, from September 2016 to January 2017. The Arabic version of visual, audio, read/write, and kinaesthetic questionnaire was administered to students from the first to the fifth academic year. Data was analysed using SPSS 21. $P < 0.05$ was considered significant.

Results: Of the 491 students, 368 (75.1%) completed the questionnaire. Of them, 269 (73.1%) were males and 99 (26.9%) were females. Significant differences were found when learning styles were compared ($p < 0.05$). No significant differences could be found when the models were assessed as in the unimodal, bimodal, trimodal or quadmodal methods ($p > 0.05$). A significant difference was found between genders when learning styles were compared ($p = 0.05$). Males preferred the unimodal style, while females preferred the bimodal and quadmodal styles almost equally ($p < 0.05$).

Conclusion: Most dental undergraduate students preferred multi-modal learning.

Keywords: VARK, Learning styles, Dental students, Gender, Learning preferences. (JPMA 68: 59; 2018)

Introduction

It is well known that every student has their own learning style or tactic to better understand or grasp any given material to them. Learning style can be defined as an individuals' unique method to studying based on their preferences in mode of acquiring knowledge. This uniqueness leads to the diversity in learning that can be seen in any every classroom. Different models have been proposed to explain the diversity in learning styles and to differentiate the way in which students acquire information.¹⁻⁴ For example, some students learn best by visual tactics, while others prefer to listen or read. The teacher in turn needs to select a modality or several modalities of teaching that will allow the information to be absorbed by as many students as possible. Visual, aural, read/write and kinesthetic (VARK) is an example of one of these models. It was developed in 1987 by Neil Fleming, who was influenced by neuro-linguistic programming.⁴⁻⁸ The theory behind this model was that students receive information through sensory modalities, and hence have sensory modality preferences, independent of differences in personality or information processing.

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Visual individuals prefer to learn information presented in charts, graphs and other symbolic devices instead of words. Aural individuals prefer to learn from spoken lessons and talking. Read/write individuals prefer to learn from printed text, while kinesthetic individuals prefer to learn through direct practice, which may involve other perceptual modes. Students can then focus on the study skills suggested in the inventory to better suit their learning needs.

Even though there are four different preferences in this inventory, it does not necessarily mean that every student will have only one mode of preference of learning. In fact, studies have found that approximately fifty to ninety percent of classes will be made up of students with multimodal preferences.⁹⁻²³ Likewise, nearly fifty percent of faculty members also tend to be multimodal.²⁴ Hence, the VARK inventory can also be a useful tool for faculty because they can determine the way they process information, which in turn influences the way they teach.

It is worthy to note that although these categories are helpful, the VARK model has its limitations. According to Fleming, the VARK is not a complete learning style inventory and only provides a simplistic measure of the basic sensory learning preferences. Other factors that might come into play and are not measured by the VARK method are student engagement,

enthusiasm and motivation.²⁵

Nonetheless, whilst reviewing research on the learning preferences of students, it was found that the VARK method was the most common one used due to its simplicity and generalised categorisation of student preferences.⁹⁻²⁹

Until now, a limited number of studies have been conducted in our region to determine the modes of learning preferences for undergraduate students, especially dental students.^{12,13} A study performed by Al-Saud in 2012 on first-year dental undergraduates using the VARK learning model concluded that more than 59% of the sample were multimodal learners, and that the most common single learning preference was aural, followed by kinesthetic.¹² This is in agreement with a study conducted by Asiry who also used the VARK inventory while studying male dental students, and found that the majority of the sample also preferred the multimodal learning technique, followed by both the aural and kinesthetic strategy equally.¹³ The present study was conducted to compare the preferences of dental undergraduate students in a single institution by utilising the VARK inventory (Arabic version), and to determine if any gender differences exist in their preferred mode of learning. This in turn will better help the educator to establish which teaching method is best suited for dental students, and hence have them focus their efforts on undergraduates during their learning years.

Subjects and Methods

This descriptive, cross-sectional study was conducted at the College of Dentistry, King Saud University (KSU), in Riyadh, Saudi Arabia, from September 2016 to January 2017. The study was reviewed and approved by the institutional Research Centre. The Arabic version of the VARK questionnaire (available for free downloading at the VARK website⁸ with guidelines for analysis and recommendations for improving the students' learning styles) was utilised. Prior to the data collection, the questions were pretested among a group of 40 students (pilot study) in order to ensure the level of validity and degree of reliability (Cronbach's alpha = 0.78).

The questionnaire was sent to participants via email, which included a full description of the study, in addition to the VARK questions. Students were given a choice whether to answer or not. The return of the completed questionnaire demonstrated their consent to participate in the study. The data was kept

confidential and the names of the respondents were not recorded, thus rendering the data anonymous.

Thereafter, the questionnaire was administered to all the first, second, third, fourth, and fifth-year undergraduate students at the College of Dentistry, with both female and male campuses being involved. Satisfactory levels of reliability and validity of the VARK inventory have been reported previously using the factor analysis techniques. The potential problems related to item wording and the scale's scoring algorithms have also been identified.²⁶

The survey was distributed to a total of 491 students through emails which included a description of the study and a link to the questionnaires on www.surveymonkey.com servers.⁵⁻⁸ This questionnaire consists of 16 multiple choice questions, each with four options. The students were requested to choose more than one option if they felt the need for identifying their preferences of learning styles.

The distribution of the VARK preferences was calculated according to the guidelines provided on the VARK website.⁸ Accordingly, learning preferences were categorised as either: unimodal (V, A, R, or K); bimodal (VA, VR, VK, AR, AK, and RK); trimodal (VAR, VAK, VRK and ARK); or quadmodal (VARK).

Data was analysed using SPSS 21. Descriptive statistics were used to describe the categorical study and outcome variables in accordance with the guidelines given in the VARK website.⁵⁻⁸ To determine the percentage of students for each VARK modality and for all possible combinations of modalities, the number of students who preferred each learning style modality was divided by the total number of students. Chi-square test and Fisher's test were used to compare the learning preferences between genders and among academic years. $P < 0.05$ was considered significant.

Results

Of the 491 students, 368 (75.1%) completed the

Table-1: Distribution of respondents.

Participants	Frequency	Males	Females
First year dental student	40	17	23
Second year dental student	87	68	19
Third year dental student	67	42	25
Fourth year dental student	103	89	14
Fifth year dental student	71	53	18
Total	368	269	99

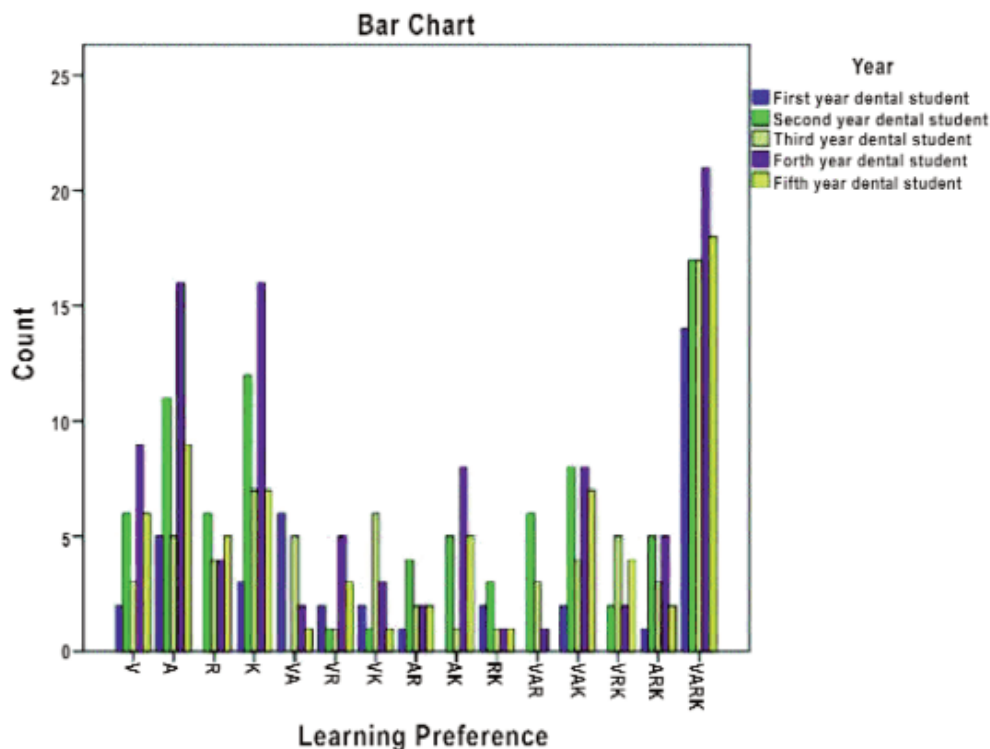


Figure-1: Learning preference by academic year in the sample as a whole.

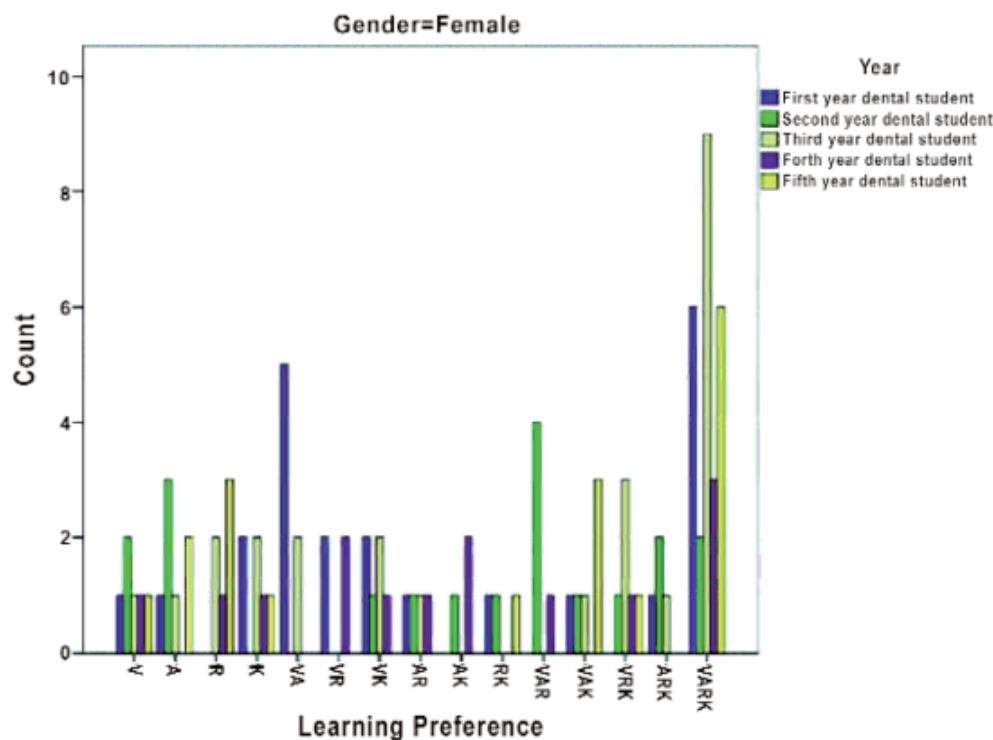


Figure-2: Learning preference in females.

questionnaire. Of them, 269(73.1%) were males and 99(26.9%) were females. Moreover, 103(28%) participants were in the fourth year, 87(23.6%) in the second year, 71(19.3%) in the fifth year, 67(18.2%) in the third year and 40(10.9%) in the first year (Table-1).

When learning preferences were compared between all students, a statistically significant difference was found ($p < 0.05$). It was observed that the majority of the students preferred the VARK learning style. This was followed by aural and kinaesthetic styles which were found in almost equal preference respectively (Figure-1).

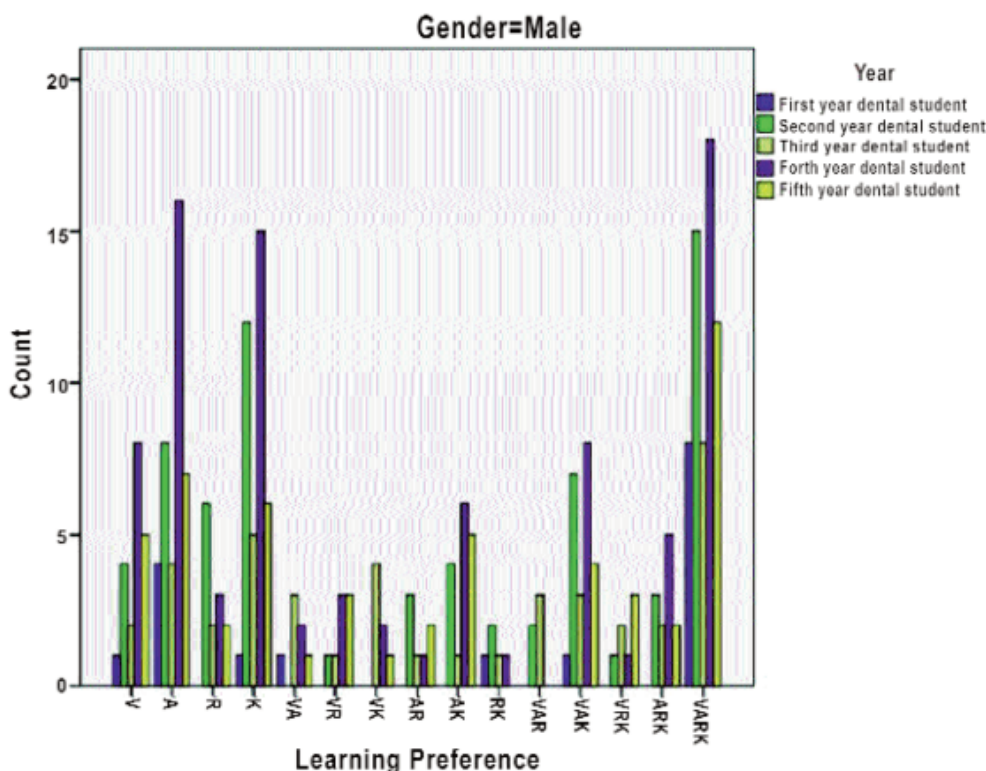
Further, although most of the students preferred the unimodal method followed by the quadmodal, no statistically significant difference was found ($p > 0.05$). When the four models were compared between females and males, a significant difference was also noted. Males preferred the unimodal method while females preferred the bimodal and quadmodal methods almost equally ($p < 0.05$) (Table-2).

When both genders were compared to each other, a statistically significant difference was found ($p = 0.05$). Females preferred the VARK style, followed by the aural and visual-aural equally. The same was true for males with regards to the VARK style, but kinesthetic was found to be

Table-2: Learning Preference by year and gender.

Learning preference	Females & males combined					P value	Females	Males	P value
	1st year	2nd year	3rd year	4th year	5th year				
Unimodal	11	35	20	45	27	Learning preference by year: P = 0.24	1st - 5th year 26 27 20 26 99	1st - 5th year 112 49 48 60 269	Learning preference by gender: *P = 0.04
Bimodal	13	14	15	21	13				
Trimodal	3	21	15	16	13				
Quadmodal	13	17	17	21	18				
Total	40	87	67	103	71				

Chi-square test & Fisher's exact test: *Significance level at P<0.05.

**Figure-3:** Learning preference in males.

equally preferred with the aural style (Figures-2 and 3).

Discussion

The present educational system focuses mainly on the ways in which students are being taught. The questionnaires of VARK are extensively used by researchers to analyse learning style preferences.⁹⁻²⁹ It is essential for the dental teacher to recognise that students have different styles of learning. This recognition will aid them to consider selecting different modalities and preferences, and reflect on the instruction modes effectiveness. In the present study, the preferences of multimodal learning, i.e. VARK, was the most dominant

among the sample of 368 undergraduate dental students. This preference is regarded as typical for adult learners and is a challenge for educators to teach.²⁴ The outcome is in agreement with other studies on postgraduate and undergraduate dental students which have also utilised the learning style of VARK.⁹⁻¹⁵ The method of multimodal learning was found to be the prevalent preference in learning not only among dental students but also in nursing, midwifery and medical students.¹⁵⁻²⁵

Among the dental undergraduate students acting as participants in this research, aural accompanied by kinesthetic were the most commonly preferred single methods of learning. This is in agreement with James et al. Abdallah et al. Slater et al. and Murphy et al., who also noted that the most frequently chosen methods were aural followed by kinesthetic, but in disagreement with a study conducted by Murthy et al. who found that the dominant preference of single learning style was the read-write model.^{11,16,19,23,28} This difference maybe attributed to the differences in the teaching methodologies which are used at the premedical level. It was noted in the study conducted by Murthy et al. that most of the examinations given were focused on written tests, thus explaining the strong read-write preference, while in the former studies

mentioned above, a variation of teaching methods were utilised which were not necessarily focused on the utilisation of one method only.^{11,16,18,23,28}

During the initial years of dental school, the curriculum usually comprises diverse subjects in introductory and basic science, most of which are theory-based with limited practical skills. The major procedure for instruction is the lecture form with the students being required to complete group projects and assignments. This can be overwhelming for most students because of the large number of multiple subjects and information taught in both basic and dental science courses. A better learning style understanding by the teachers can help the students' frustration level to drop and enhance the methods of instruction delivery. Moreover, when the awareness level of the modality of learning is preferred and raised, such as in the current study where it was found that both aural and kinesthetic methods were the most commonly chosen, certain approaches of teaching can be utilised. For example, engaging students by spoken lessons and talking, and in direct manipulation of objects of tactile demonstrations, will improve the learning outcome of students and aid them to cope actively with the demand of the academics of dental school.²⁰ According to Urval et al., a simple intervention, such as learning style administration in the early didactic phase of a student's education, can enhance education.¹⁷ It has been advised that teaching members who are aware of the learning style of students as well as their own can make an informed selection, and are in a position to change the design, course materials, and processes of learning. This widens the effective learning opportunities in their courses.¹⁷

After the early years of dental school, students may go through changes in their preferences in learning pending on a shift from preclinical laboratory, to lecture hall, to patient clinic. The learners who are most effective are those who are able to adapt to the situation of learning requirement. Teachers can also aid them to develop strategies which help them to adapt to situations, especially when the styles of learning do not comply with the task.⁹ Shenoy et al. advised that some of the teaching members need to introduce various models for knowledge deliverance depending on the diversity of learners.⁹

When single learning modality was compared in the present study, dissimilarities were detected between females and males. While both genders favoured the VARK and aural styles, females preferred the visual-aural more so than males, while males preferred the kinesthetic

style. This maybe due to the fact that in our culture, females tend to be more auditory and better able to sit passively in a conventional classroom and listen, more so than males who prefer to be kinesthetic and tend to learn less by listening and sitting passively.

On the other hand, Nuzhat et al.'s study on medical students and Wehrwein et al.'s study on physiology students found that females preferred kinesthetic styles more so than males.^{18,29} In contrast, Urval et al. in 2015 did not find any significant differences between females and males in any of the learning styles.¹⁷ The dissimilarities between studies could be explained by the differences in age, culture, gender and academic level of the students who participated in the research.

With regards to modes of learning methods, differences between genders were also found. It was observed that males preferred the unimodal style while females opted for the bimodal and quadmodal styles almost equally. This could be explained by the fact that females preferred to use multiple sensory modes of learning, in a sense preferred to multitask, whereas males tended to focus on one mode. This is in disagreement with the findings of a study conducted by Wehrwein et al. in 2007 on undergraduates of physiology; they found that most male students selected the multimodal mode as their learning style preference (VARK) whereas female students preferred the single mode of learning.²⁹ In contrast, other researchers found no differences in modes of learning styles between genders in dental, midwifery or medical students.^{12,16,17,23}

To summarise, the results show that the VARK model is the most preferred learning method chosen by dental undergraduate students, followed by the aural and kinesthetic models. A difference in selection of learning styles is noted between genders. It is recommended that teachers and facilitators familiarise themselves with all the four models of learning styles, especially the VARK model, in order to attract and capture the interests of many students.

The current study had a few limitations as well. For instance, the sample size was small and the participants were selected from a single academic institution. Therefore, future researches should comprise larger sample sizes and multiple institutions. Moreover, longitudinal researches are required to compare and track the preferences of learning among dental students. This would aid in understanding and developing the dental students' needs, and support them indirectly in building their personality and pedagogic effectiveness. In addition, it would also help teachers to establish appropriate

strategies to cater to the learners' diverse needs.

Conclusions

Most dental undergraduate students preferred multi-modal learning. In the preference of single learning mode, the most common was aural which was accompanied by kinesthetic. Gender differences were also found to exist. The outcome of this research provides useful insights for enhancing the learning experiences for dental students through the use of the VARK inventory. For a more productive education and instruction, dental teachers need to widen their style and range of presentation to help build a more effective and positive environment of learning for all the students.

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Conflict of Interest: None.

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