

A Preference for Hands-on Learning: A Cross Sectional Study Assessing Dental Students' Preferred Style for Receiving Curricula

Randa Fathi Abidia¹,
Bridget Stirling²,
Ambreen Azam³,
Ahmed El-Hejazi⁴ and
Shaikha Al-Dukhail⁵

Abstract

Background: Dentistry education requires a great deal of hands-on learning as well as content-based learning. Although each individual has a unique learning style, our group of educators sought to understand the predominant learning style preferences of a cohort of 84 dental students. The aim of this study was to investigate the learning style preferences of first, second and third year Saudi female dental students in the College of Dentistry.

Materials and method: The research team invited all students at a large, all-female university in Riyadh, Saudi Arabia to engage in a cross sectional study. This project assessed learning styles using the Visual, Aural, Read-write, and Kinesthetic (VARK) questionnaire.

Results: A total of 84 female dental students (more than 3/4 of the entire dental college cohort) returned the completed the questionnaire. The majority (91.5%) were between the ages of 19-22 years old. Just over half of students (54.7%) preferred multimodal learning style preference, meaning that they had no specific strong preference for a single learning style. Of those who had a strong preference for a specific, Kinesthetic (learning by doing) was the most commonly chosen (20.2%).

Conclusion: The majority of the female dental students in this cohort preferred a mixed learning method. For those who had a single, strong preference, learning by doing ranked highest. The results of this study can provide useful information for educators of the learning style preferences of students and facilitate student learning by developing appropriate teaching strategies. Relying less on demonstration and more on hands-on and mixed method teaching may be the most pleasurable and productive strategy for this cohort.

Keywords: VARK; Learning styles; Dentistry; Healthcare; Saudi Arabia; Student; Teaching

- 1 College of Dentistry, DAU, Riyadh, KSA
- 2 University of Calgary, Doha, Qatar
- 3 College of Dentistry, PNU, Riyadh, KSA
- 4 College of Dentistry, KSU, Riyadh, KSA
- 5 College of Dentistry, PNU, Riyadh, Riyadh, KSA

Corresponding author: Bridget Stirling

✉ bridget.stirling@ucalgary.edu.qa

Assistant Professor, University of Calgary,
Doha, Qatar.

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Introduction

Oral health in Saudi Arabia

According to a large, national survey in Saudi (1), only 11.5% of Saudi Arabian people visit dental clinics for routine check-ups or to address oral health issues once per year. The same survey found that approximately 16% of Saudi Arabian people never brush their teeth and 85% never floss their teeth. This, along with

other factors likely contributes to the high national prevalence of dental caries. This was borne out in a study that found Saudi Arabian children to have caries in 80% of primary dentition and 70% in their permanent dentition [2]. A study of pre-school children in Riyadh, (Saudi Arabia's capitol), revealed that of 388 children aged three to five years old, 69% of them had dental caries [3]. This is high compared to countries such as India with 61% [4] and Norway with 11% of children having caries by age five [5].

Saudi Arabia has a long history of dental care, and instruction on maintaining oral health. Some people in the country use miswak, which is a twig used since ancient Greek times for cleaning both the mouth and teeth [6]. The miswak twig is usually extracted from bitter tree branches such as palm or olive trees or the roots.

Dental education in Saudi Arabia

Dental faculty throughout the world are striving to create and deliver high-quality, effective curricula. Faculty members endeavor to engage students in learning in the most resourceful and enjoyable ways. In order to do so, faculty must be sensitive to the learning style preferences of their students. Much is changing about what and how we teach. Current curricula include evidence-based practice, increasingly complex technologies, and strategies for communicating with better informed patients. Therefore more so than ever, it is important for dental faculty to know the learning style preference of their students and respond to meet their needs.

After the preparatory year, female students that achieve the requirements needed to enter dentistry will then be accepted to continue studying in the College of Dentistry. College of Dentistry is one of the most popular colleges and ranks high on students preference, second only to Medicine.

The Dental College at a large, all-female university (Princess Nourah University) in Saudi Arabia was the setting for this study. The College offers a unique curriculum, which is a hybrid between traditional instruction and problem based learning. The subjects are taught using mostly a block system, with a few stream subjects on a yearly basis. Students have lab sessions according to their dental subjects and in their clinical years they have 'Comprehensive Patient Care'.

Learning style preference

Learning style preference describes an individual's predilection for understanding his or her experiences and transforming what they understand into knowledge [7]. There are forces steeped both in nurture and nature that make the same teaching method effective for some students and ineffective for others [7]. There are many learning style inventories [7-9]. One of the most common and widely used categorizations of the various types of learning styles is Fleming's VARK (Visual, Aural, Read/Write, Kinesthetic) learning styles inventory [10]. This inventory can be found on VARK's website at <http://vark-learn.com/>. Fleming based his inventory of learning style preference on the senses, proposing that visual learners have a preference for seeing, auditory learners learn best through listening, and tactile/kinesthetic learners prefer to learn via experience. Some students also prefer to learn via reading and writing (information displayed as words). The VARK learning style inventory was tested for reliability coefficients, which were found to be adequate [11].

Dental faculty can use the knowledge of learning style preferences, to vary the way that they deliver information and play to the strengths of their student population. Miller [12] reported that when students were taught in their preferred mode

of learning, their learning was enhanced. Students can also use the model to identify their preferred learning style and maximize their educational experience by focusing on what benefits them most [10].

Several studies using VARK have been reported in the literature. These studies originate in different countries around the world using the VARK questionnaire, including with dental student populations. VARK studies involving dental students were found from India [13-18], Romania [19], Pakistan [20-22], Poland [23] and in the United States of America [24]. These studies from other countries showed a variety of results of learning style preferences among dental students. In practice, most students worldwide prefer to learn in several ways (multi-model).

To our knowledge, there are only two studies done previously in Saudi Arabia to determine the learning styles of undergraduate dental students using the VARK questionnaire [25,26]. Both were done in the College of Dentistry at King Saud University. One study [25] measured learning style preference in male dental students. This study included a breakdown of findings between the cohorts in Years 1 to 5. The researchers concluded that the learning preference did not differ between undergraduate students from first to final years. This study reported that 58.4% and 41.6% of the students had multimodal learning preferences and uni-modal learning styles, respectively. This population's learning styles reflected strong kinesthetic and aural preferences.

Another study from Saudi [26] using the VARK questionnaire investigated first year dental students and compared students of both genders. This study looked at the relationship of students' learning style preference to grade point average (GPA). The researcher found that more than half (59%) of students had multimodal learning preferences. In this study, students with unimodal learning style preferences also had lower GPAs.

The aim of this study was to investigate the learning style preferences of first, second and third year Saudi female dental students in the College of Dentistry. To our knowledge, there have been no other studies investigating the learning style preferences comparing different years of female dental students in Saudi Arabia.

Materials and Method

This cross-sectional study was conducted at the end of the academic year of 2015. The research team distributed the Visual, Aural, Read/Write, and Kinesthetic (VARK) questionnaire version 7.1 [10] in several dental classes. This questionnaire was in the English language, which is the language of instruction at the College. Students were asked to complete the questionnaire and return it to the research team. The students were reminded that all participation was voluntary. Instructions for answering the questionnaire were provided to the students with a cover letter that gave the purpose of the study, confidentiality assurance, consent and the email of the principle investigator.

The VARK tool was distributed to the entire undergraduate student population including first year (n=44), second year (n=35) and third year (n=31) students. All students were invited to participate in the study, and most of those present chose to

participate (84/111, 79%). This was an adequate sample size, as our original calculation for this cohort required that we enroll at least 81 participants in order to reach a 5% margin of error and a 95% confidence level.

After the completed questionnaires were collected, the distribution of VARK preferences were calculated according to VARK website guidelines [10]. The percentage for each VARK modality and possible combinations of modalities according to the number of students who preferred each learning style was divided by the total number of students. Statistical analysis was done using SPSS version 21 (New York, USA).

Ethical Clearance

The study was explained to the dental students, as they were invited to be a part of the study. Students read and signed consent forms to indicate that they agreed to participate in the study. It was explained to each group of students that they had the right to refuse to participate in the study at any time.

Results

Most of the students participated in the study, with 84 of a possible 110 students enrolled in the College of Dentistry, completing the questionnaire (76%). There were 31 students from first year (37%), 26 students from second year (31%) and 27 students from third year (32%). The majority (91.5%) of students were between the ages of 19-22 years old and all were females and of Saudi nationality.

The prevalence of different learning styles is described in Figure 1. Students who had no strong preference for any learning style (multimodal VARK) made up the largest group (21.4%). Slightly fewer students (20.2%) had a strong preference for learning by doing (kinesthetic). This was followed by unimodal Visual, Aural (listening and speaking) and Read/write (all 8.3%). Distribution of unimodal learning styles is shown in Figure 2.

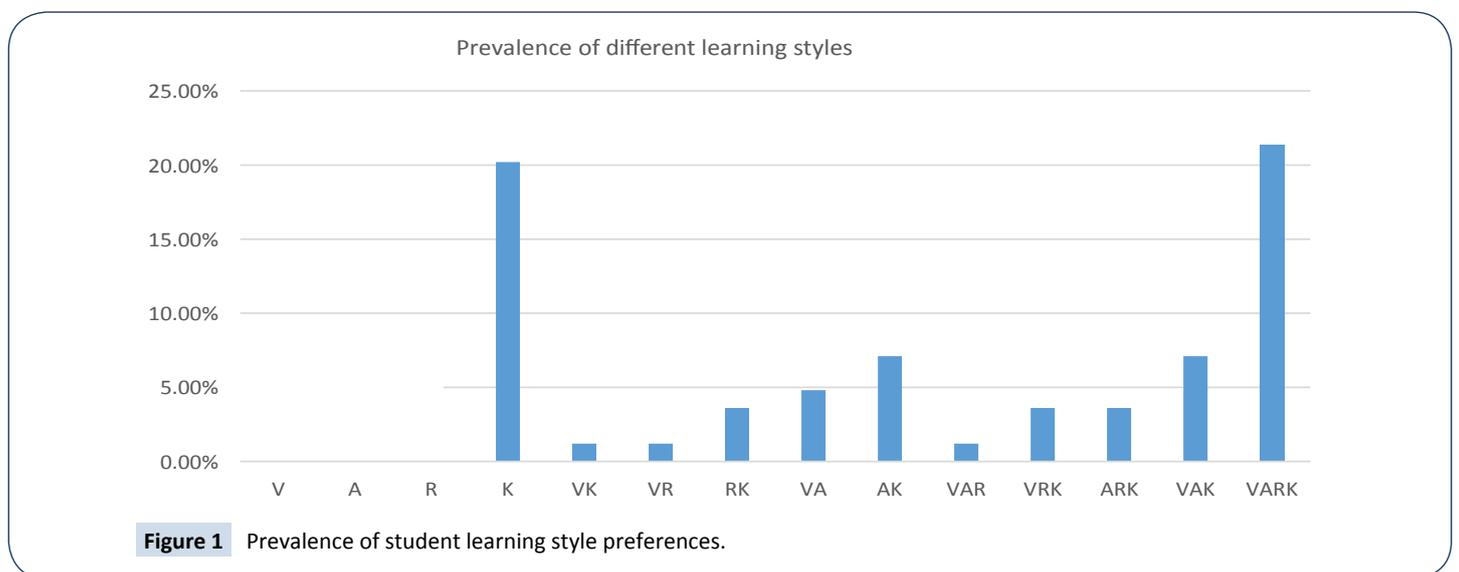
Comparisons were made across the cohorts, by year of study.

Prevalence of unimodal and multimodal learning style preference among first, second and third year dental students is shown in Figure 3.

Prevalence of multimodal learning style preference was higher in year 2 (61.5%) and year 3 (55.6%) compared to unimodal learning style preference (38.5% and 44.4% respectively). Unimodal learning style prevalence was only slightly higher in year 1 (51.6%) compared to multimodal learning style prevalence (48.4%) Table 1 and Figure 3.

The current study suggests that this group of female dental students had varied learning styles with multimodal VARK and unimodal kinesthetic being the most dominant. There was a difference in learning style prevalence among first, second and third year female dental students which is a different finding than was seen in a previous study [25]. In the 2015 VARK study of Saudi male dental students, there was no difference in learning style preference between the first and final years. In the current study of female Saudi Dental students, the first and third years were most often unimodal kinaesthetic whereas for the second year students, they were most often multimodal VARK.

Figure 4 described the breakdown of results found in studies from the literature, to compare with the current study on learning style preferences of Saudi female dental students. Among the studies from Saudi Arabia [25,26], the results do not differ greatly between the studies that looked at males versus females. The unimodal preference for visual learning is higher in all other cultural groups than the Saudi cohorts, except in India. Of interest to many content-heavy curricula (as in dentistry), is the unimodal preference of reading and writing. While Saudi female dental students were more likely to prefer this learning style than males, there were few in any of the cohorts who were unimodal Read/write. Saudi students both male and female had higher unimodal preference for learning by doing than any of the other cohorts of



Distribution of unimodal learning styles

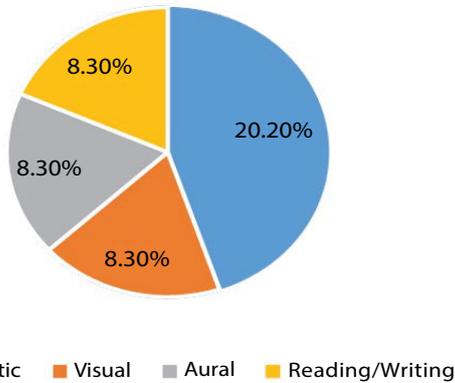


Figure 2 Distribution of unimodal learning style preferences.

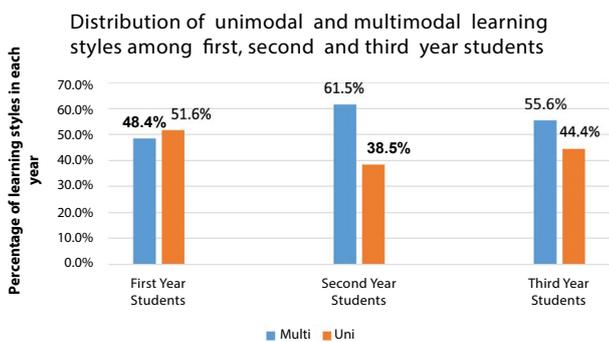


Figure 3 Prevalence of unimodal and multimodal learning styles among 1st, 2nd and 3rd year dental students.

dental students in the comparison.

Discussion

When students enjoy the information presentation or engagement, they are more productive and likely to learn. This study showed that there is a wide variety of learning style preferences among female dental students in this cohort. The head of the Medical Education Department in the Dental College was given these results in order to encourage awareness of the importance of teaching styles and student learning preference. Developing teaching methods that complement a wide range of learning styles appears to be more effective than attempting to tailor the course content to the individual student [27]. The current curriculum at this College of Dentistry includes a hybrid of Problem Based Learning and traditional lecture-based methods. The curriculum engages in most of the ways of encouraging student learning that are suggested by the VARK website. A focus on kinesthetic learning is dominant as the students engage in a high proportion of lab and clinical courses.

Of the total sample, multimodal learning style preference was more prevalent than unimodal. This finding is consistent with other studies(19, 24, 26, 27) that showed similar results. Other

studies(16, 20, 22) reported that the population of dental students that they measured preferred unimodal learning styles.

One of the questions that has been asked by researchers in the literature is at what age learning style preference is developed and if it can change(28). A study of Saudi Arabian children in grades seven and eight found that 48% were multimodal and the others were unimodal (V- 12, A- 4, R- 12 and K- 24)(29). This finding does not vary greatly from the findings in the current study.

When this study sample was divided into year of study, the unimodal learning style prevalence was only slightly higher in prevalence for the first year dental students compared to multimodal learning style prevalence. For the second and third year dental students, the multimodal learning style preference was much higher than unimodal. This may represent a cohort effect or perhaps variations on how students were selected for access to the Dental College. However, a recent study from Australia reported that 45% of students measured before and after starting nursing education maintained the same learning style preference (according to the VARK questionnaire) after one year of follow-up. About a third of the students in that study became more multimodal [28].

In this study, the kinesthetic learning style was the dominant unimodal learning style whereas the other learning styles (V, A, R) had a much lower and equal prevalence. Two previous studies in Saudi dental students [25,26] reported high proportions of both kinesthetic and aural learning style preferences, as did a study from the same Saudi university (PNU), measuring the VARK in a population of Nursing students [30]. Murphy et al., [24] found in a population of US dental students; the read/write and visual preferences were more dominant. Difference in the prevalence of learning preferences between these studies may be explained by the difference in age, gender, culture and academic level of the students that participated in these studies.

Conclusion

This cohort of Saudi Arabian female dental students was highly multi-modal. While culture and gender may play a role in learning style preference, how academic systems select students for professional programs like dentistry may heavily bias the findings. All learning styles being equally preferred (VARK) was the most common preference. This was closely followed by unimodal kinesthetic learning style preference. The results of this study can provide useful information for dental educators of the learning style preferences of their dental students and facilitate student learning by developing appropriate teaching after strategies add Some of these strategies are outlined in **Table 1**. Oral health, which affects general health in Saudi Arabia, has been traditionally very poor compared to other countries. However, new curricula and new programs for training national dentists have a great opportunity to provide community-based and preventative dental services. This cohort of female Saudi national students is

Table 1: Prevalence of different learning styles among 1st, 2nd and 3rd year dental students.

	Types of Teaching Methods that are Effective with Dental Students with Dominant Preferences	First Year Students N=44	Second Year Students N=35	Third Year Students N=31
K	Clinical practice, OSCEs, simulation	22.6%	15.4%	22.2%
R	Lecture notes, reading textbooks and journal articles, writing papers	16.1%	7.7%	0.0%
VARK	Variations on all methods	16.1%	30.8%	18.5%
A	Listening to lectures on MP3s, guest speakers, PBL, small group seminars, reading aloud to other students	9.7%	3.8%	11.1%
V	Watching demonstrations, videos, diagrams, looking at dental models	3.2%	11.5%	11.1%

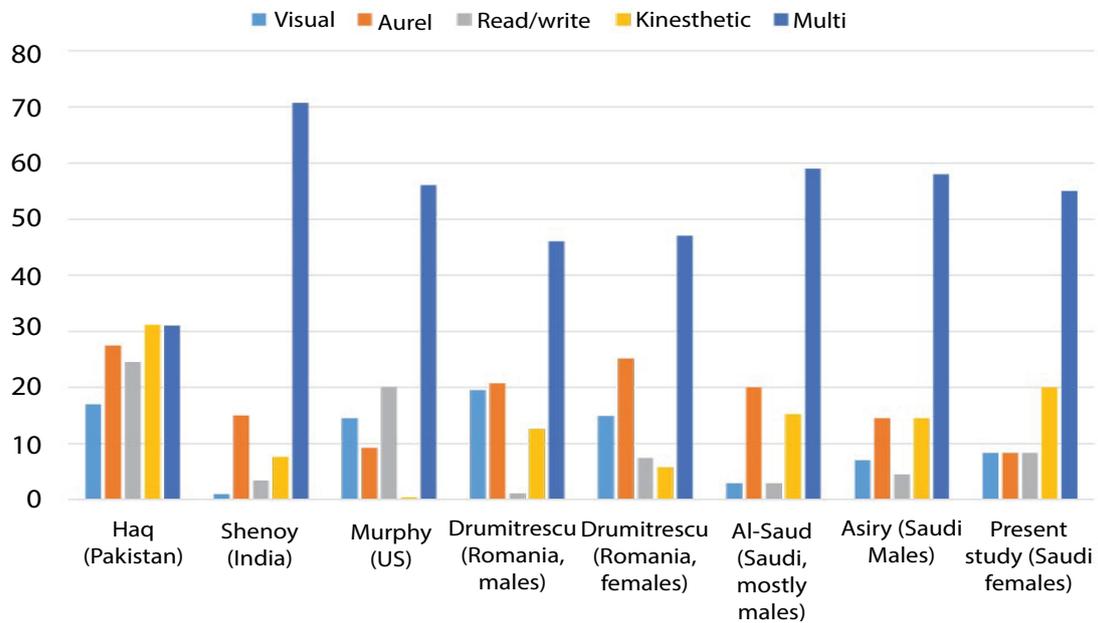


Figure 4 Results from the literature: measuring dental student learning styles preference, using VARK.

at the forefront of the reformation of the dental system in the country. By understanding the way that the students learn, dental faculty can improve the way that they teach.

Students who enjoy learning, will learn more efficiently, and enjoy teaching others. In this way, dental students can learn to teach their patients, which is an important part of encouraging oral health.

Dental faculty can provide guidance on how to improve the quality and the experience of dental education in Saudi Arabia. All of us who are responsible for educating the next generation

of dentists must pay attention to the learning style preferences of the students that they teach. In the case of this cohort, we recommend that faculty use a high proportion of learning activities that involve movement and experiential learning techniques.

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