ORIGINAL RESEARCH

The Relationship Between the VARK Learning Styles and Academic Achievement in Dental Students

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Background: Learning style is a factor influencing academic achievement. There are contradictory results in studies on the relationship between learning styles and academic achievement. The current study aimed at investigating the relationship between learning styles and academic achievement in dental students.

Methods: In the current descriptive-analytical study, 184 dental students were selected by simple random sampling. The VARK questionnaire was used as the data collection tool. The grade point average (GPA) of previous semester was used as an indicator of academic achievement, and accordingly, students were divided into two groups of strong (GPA ≥ 15) and weak (GPA ≤ 14.99).

Results: The most common learning styles in strong students were unimodal (n = 55, 42%) and bimodal (n = 41, 31.3%), while they were unimodal (n = 28, 47.2%) and bimodal (n = 24, 45.3%) in the weak students. There was no significant relationship between learning styles and academic achievement in the two groups of strong and weak students.

Conclusion: No significant relationship was found between learning style and academic achievement. Further studies with larger sample sizes are recommended. Further studies with larger sample sizes are recommended.

Keywords: academic performance, dental, learning, model, students

Introduction

Academic achievement is one of the most important parameters used to predict the future academic status of learners.[1] Learning styles are of the factors influencing academic achievement.[2] The learning style is defined as a combination of cognitive, emotional, and physiological traits that show how the learner perceives and responds to the learning environment.[3] Understanding learning style of learners can be effective in organizing and modifying the learning environment and teaching and learning process.[4] Each student has his/her own learning style.[5] There are several methods to measure learning styles and the VARK questionnaire developed by Fleming and Mills (1992) is the most widely used one. According to this questionnaire, learning styles comprises visual (V), aural (A), reading/writing (R), and kinesthetic (K) models.[6] Visual learners learn through watching videos, images, and figures. Aural learners learn through listening to lectures; reading-writing learners through reading texts and writing notes on them, and kinesthetic learners through touch and manipulation of objects.[6,7]

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According to the VARK model, one may apply multiple learning styles.[4] Various studies investigated the relationship between learning styles and academic achievement in students of different disciplines. In some of these studies, a significant relationship was found between learning style and academic achievement,[8–12] while in some others, no significant relationship reported.[13,14] The current study was designed and conducted in light of the importance of knowledge of teachers about learners' learning styles, and contradictory results of different studies on the relationship between learning styles and academic achievement. The present study aimed at determining the relationship between type and number of learning styles based on the VARK model and academic achievement in dental students of Kermanshah University of Medical Sciences (KUMS).

Materials and Methods
Study Design
The current cross-sectional, descriptive-analytical study was performed on dental students.

Study Questions
We sought to answer the following questions: 1) What is the academic status of dental students?, 2) What is the frequency of learning styles among dental students?, and 3) What is the relationship between academic achievement and learning style in dental students?

Sample and Sampling Method
The study population included dental students of KUMS. The Cochran formula was used to determine the sample size; with a confidence of 95%, the sample size was 184. Inclusion criteria were willingness to participate in the study and studying in third semester and higher. Simple random sampling was used in the current study.

Measurement Instrument
Data collection tools included a demographic information sheet and the VARK questionnaire. The demographic information sheet included four items on age, gender, marital status, and the grade point average (GPA) of the two latter semesters. The VARK questionnaire is a standard tool,[15] which its validity and reliability were assessed and confirmed in a study by Zhu (2018).[16] The Persian version of the VARK questionnaire was psychometrically assessed by Mehdipour et al, (2018) in Iran.[17]

The VARK questionnaire consists of 16 multiple-choice items and can be used to identify four types of learning styles. Each item is related to a particular style. The respondents should choose the options according to their preferences, and if one choice does not reflect the whole view, they can choose more options and leave items not happened yet. Higher scores in each learning style indicate the respondents' greater desire for that style. If an individual gets equal scores in two or more styles, his/her learning style is considered "multimodal". Total score in each item ranges from zero to 16. The GPA of the last two semesters was used to determine academic status. The students were divided into two groups of strong (GPA ≥15) and weak (GPA ≤14.99) based on their GPA.

Data Collection
First, the list of students studying in the third semester and above was taken from the Department of Education at the Faculty of Dentistry, and numbered. Then, using random number table, 184 students entered the study and the ones who agreed to participate, received a questionnaire.

Data Analysis
Data were analyzed by the SPSS v.18.0 software using descriptive and inferential statistics. First, the Kolmogorov–Smirnov test, showing abnormal distribution of GAP and learning style variables, was performed. Chi-Squared test was also utilized to determine the relationship between academic achievement and learning styles. The significance level was considered less than 0.05.

Ethical Considerations
The Ethics Committee of the University approved the study with the code: KUMS.REC.2017.627. Written informed consent was obtained from all students and they were assured of the confidentiality of their information.

Results
According to the obtained results, most subjects were female (58.7%, n = 108) and single (63%, n = 116). Their mean age was 24±30 years. In the group of strong students, majority of the subjects were within the age range of 21–23 years, but in the weak students group, 24–27 years was the most frequent age group (41.5%, n = 22) (Table 1).

Results showed that the majority of students (n = 131, 71%) were in the strong group. In addition, reading-writing

Table 1 Demographic Characteristics of Study Subjects (n=184)

Demographic Variables		Groups	
		Strong Students Number (%)	**Weak Students Number (%)**
Sex	Female	89 (67.94)	19 (35.85)
	Male	42 (32.06)	34 (64.15)
Marital status	Single	93 (50)	23 (12)
	Married	38 (20)	14 (7)
Age (year)	18–20	8 (6.2)	5 (9.46)
	21–23	50 (38.26)	13 (24.52)
	24–27	46 (35.21)	22 (41.5)
	28–30	25 (19.18)	10 (18.86)
	>30	2 (1.15)	3 (5.66)

(n = 87.66.4%) and kinesthetic (n = 22, 16.8%) were the most and least frequent learning styles, respectively, in the strong group. Also, in the weak students group, the reading-writing and kinesthetic learning styles had the highest (n = 30, 56.6%) and lowest (n = 7, 13.2%) frequencies, respectively. Regarding the learning style used, no significant difference was found between strong and weak students (Table 2). In terms of the number of learning styles used by the strong students, the results showed that 42% (n = 55) of the subjects were unimodal and about one-third bimodal (n = 41, 31.3%). In the weak students group, the majority of subjects were unimodal (n = 28, 47.2%) and bimodal (n = 24, 45.3%).

There was no significant difference in the number of learning styles used between the strong and weak student groups (Table 3).

Discussion

The current cross-sectional study aimed at determining the relationship between the type of learning style used and academic achievement in dental students. Findings showed that reading/writing style had the highest frequency in both groups of strong and weak students. In a study (2016) on the learning style of dental students in Saudi Arabia, kinesthetic (35.1%) and aura (35.1%) were the most common learning styles used.[6] Results of a study (2018) in Saudi Arabia on dental students showed that the most commonly used learning styles were aural and kinesthetic.[18] In a study in the USA on anatomy students (2018), the most common learning style was kinesthetic.[19] The results of the study by Habibpour et al (2016), in Iran on medical students showed that the most common learning style used was reading-writing. The results of the aforementioned studies show that students have various learning styles. The predominance of some particular learning styles in students can be related to their field of study, teaching methods, learning experiences, curriculum content, and volume of course content. Therefore, it is suggested that teachers pay more attention to the

Table 2 Relationship Between Types of Learning Styles and Academic Achievement in Study Subjects

Groups	Learning Styles				Test Result
	Visual Number (%)	**Audible Number (%)**	**Readable – Write Number (%)**	**Motion-Movement Number (%)**	
Strong students (GPA* ≥15)	41 (31.3)	56 (42.7)	87 (66.42)	22 (16.8)	χ^2=1.052 NS**
Weak students (GPA ≤14.99)	18 (33.4)	25 (47.2)	30 (56.6)	7 (13.2)	

Notes: *Grade Point Average. **Non-significant.

Table 3 Relationship Between Number of Learning Styles and Academic Achievement Among Study Subjects

Groups	Number of Learning Styles				Test Result
	Unimodal Number (%)	**Bimodal Number (%)**	**Trimodal Number (%)**	**Quadmodal Number (%)**	
Strong students (GPA* ≥15)	55 (42)	41 (31.3)	28 (21.4)	20 (15.3)	χ^2=7.685 NS**
Weak students (GPA ≤14.99)	28 (47.2)	24 (45.3)	6 (11.3)	3 (5.7)	

Notes: *Grade Point Average. **Non-significant.

differences in learning styles among students when preparing the lesson plan.

In the current study, 42% of strong students and 47.2% of their weak peers were unimodal and in fact had a predominant learning style. The result was similar to those of the study by Zamani and Kaboodi (2017) on Iranian students, and Siddiqi et al (2012) and Haq et al (2012) in Pakistan.[3] But in studies by Moshabab (2016) and Al-Saud (2013) in Saudi Arabia, Murphy et al (2004) in the USA, and Tantawi (2009) in Egypt, the predominant learning style of most dental students was multimodal,[6,20–22] which is not in line with the result of the current study. The reasons for inconsistency between the results of the current study and the aforementioned studies may be differences in personal characteristics of the studied subjects and the teaching method of lecturers in the colleges.

The results showed no significant relationship between learning style and academic achievement. Almigbal et al (2015) in Saudi Arabia, Dobson et al (2010) and Dobson et al (2009) in the USA (2014), Urva et al in India (2014), and Mlambo et al (2011) in Jamaica also did not find a significant relationship between learning style and academic achievement,[13,23–26] but Samarakoon et al (2013) in Sri Lanka, and Habibpour et al (2016) and Panahi et al (2012) in Iran reported a significant relationship between learning style and academic achievement in students.[27–29] The relationship between learning style and academic achievement may vary in different situations. Choosing a teaching method based on the students' learning style can increase the students' interest in lessons and encourage their participation in the classroom, which can influence their academic achievement.

The present study also had some limitations. Since the current study had a cross-sectional design, it was not possible to investigate the likelihood of a cause-and-effect relationship between learning style and academic achievement. The self-report method used to collect data in the current study might affect the accuracy of the results. The individuality of learning style used can also influence the generalizability of the results. Since students from third vs last grade may present differences due to acquired experience and maturity, the results might be affected when comparing students from different grades.

Conclusion

The most common learning style in strong and weak students was the reading-writing model. Most of the strong and weak students were unimodal and, in fact, had the same learning style preferences. No significant relationship was found between type and number of learning styles and academic achievement. Further studies with larger sample sizes are recommended in other dental schools.

Disclosure

The authors report no conflicts of interest in this work.

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