

The Relation of Dental Students' Learning Styles to Their Satisfaction with E-Learning

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Abstract

Background: E-learning is often covered in university curricula.

Objectives: The purpose of this research was to identify the learning style of students and to look at the connection between learning styles and satisfaction with e-learning.

Methods: All first- through third-year dentistry students at Kerman University of Medical Sciences participated in this descriptive cross-sectional survey in 2022. Four key portions of a 50-question electronic survey were addressed: 1) Demographic questions, 2) Kolb learning style inventory, 3) the e-learning survey, and 4) satisfaction with the e-learning questionnaire. The Kolmogorov-Smirnov test was used to check the normality of the data. Descriptive statistics (mean, standard deviation, frequency, percentage) and analytical (Kruskal-Wallis test, chi-square test, Fisher's exact test) were used to analyze the data in SPSS software. A significance level of $P > 0.05$ was considered.

Results: The questionnaire was filled out by 120 students in total (88% response rate). Divergent learning styles substantially increased students' satisfaction with e-learning compared to other learning styles ($P = 0.048$). The demographic variable and learning style did not significantly correlate (age-gender-semester- mean score). Additionally, e-learning had a middle-of-the-road average satisfaction score (78.32).

Conclusion: This research indicated a considerable relationship between dental students' learning style and their satisfaction with e-learning.

Keywords: Learning Style, Satisfaction, Students, E-Learning, Dental Student

Background

Due to the internet's rise to prominence as an educational instrument, the learning environment for medical science today differs from that of previous decades (1). These students often engage in experiential learning and logic-based approaches, and they frequently make use of cutting-edge teaching techniques like e-learning (2, 3). E-learning is as efficient as classroom instruction. E-learning differs from traditional educational models in several important ways, including its promotion of self-directed learning, upkeep of content with the most recent evidence-based material, and encouragement of medical students to take charge of their education through the adaptability of its materials. Through online assessments, instructors may objectively evaluate students' skills in such models, allowing them to get personalized feedback on their

development (4). E-learning is essential to the medical sciences, which include medicine, dentistry, nursing, and other fields. Several scholars have successfully examined the efficacy and acceptability of e-learning in dentistry education (5, 6). An engaging and dynamic learning environment that has been well-received by dentistry students has been made possible by the creation of novel teaching techniques using cutting-edge technology (7). With e-learning, students may attend courses whenever and wherever they choose to utilize smart devices. Additionally, it is important to encourage students to do their research outside of academic journals and internet sites (webinars, clinical videos, etc.) (8). Additionally, dental students said that online modules helped them better comprehend the course's topics and apply them to actual dentistry circumstances. In other words, online courses improve students'

knowledge of fundamental scientific concepts and their capacity to apply that knowledge in challenging clinical scenarios (9). The function of the student in the online learning system is crucial. Placing learners at the center of pedagogy is one of the aspects that influence e-learning (10). Learning styles may also influence how successful e-learning is (11). Learning style refers to a student's chosen method of learning. In adaptable e-learning systems, learning style might be crucial (12). By providing useful insights into students' strengths and limitations throughout the educational process, understanding learning styles may help dental students perform better and have a better educational experience. The literature has documented a number of learning style models, including the Felder and Solomon learning style, the VARK learning style, the Kolb learning style, etc. (2, 13, 14). The most well-known and often used learning style theory is Kolb's, however. Student satisfaction is a key element that influences e-learning (15). A useful indicator of academic success, such as successful graduation, dedication to academic objectives, general life satisfaction, and academic growth, is the degree of happiness with education (16). Students' satisfaction with e-learning is influenced by a variety of factors (17). The field of dentistry is a combination of cognitive subjects and practical cases that require maximum satisfaction and participation of students in the learning process. Therefore, educators must identify the preferred learning styles of undergraduate dental students. On the other hand, less research has been done on this group of students.

Objectives

The purpose of this research was to determine the learning style of Kerman University of Medical Sciences dentistry students and to ascertain if these styles and the students' satisfaction with e-learning are related.

Methods

Study design and ethics: This cross-sectional and descriptive research aimed to ascertain the connection between dentistry students' preferred learning styles and their level of e-learning satisfaction. Undergraduate dentistry students were mostly taught online during the Covid-19 epidemic. In this research, learning styles and demographic factors (age, gender, semester, and mean score) were independent variables, while satisfaction with e-learning was a dependent variable. The ethics committee of Kerman University of Medical Sciences has authorized this work (ethical code: IR.KMU.REC.1400.464).

Participants: This research included 136 participants, who were all first- to third-year dental students

(pre-clinical dentistry students) at Kerman University of Medical Sciences in 2021. Students were given access to a 50-question electronic survey that was divided into four sections: demographic questions, the Kolb learning style inventory, an e-learning survey, and satisfaction with the e-learning survey. 120 students in total willingly completed the computerized survey.

Collecting data: The groups of dentistry students were contacted by WhatsApp and Telegram multiple times (from November 2021 to January 2022) with an electronic questionnaire. Kolb's Learning Style Inventory is a tool that Kolb created to evaluate different learning preferences (18). The LSI is made up of 12 sentences, each of which has four phrases. The first phrase is an objective experience (CE), the second is reflective observation (RO), the third is abstract conceptualization (AC), and the fourth is active experimentation (AE). Each phrase exemplifies one of the four learning processes. Students give phrases that fit their learning styles a score between four and one (entirely, somewhat, slightly, and very low). There are four possible scores for statements that represent four learning modes. These modes (AC-CE) and (AE-RO) are subtracted pairwise to yield two scores on the two coordinate axes. Active experimentation is represented on the horizontal axis on the left, reflective observation on the right, objective experience on the vertical axis at the top, and abstract conceptualization at the bottom. Each of the four quadrants formed by these two coordinate axes represents a different learning style (19). The four types of learners among students can be explained as follows: Convergers Learn through thinking about topics and doing those activities in a practical way, accommodation learn by experiencing and doing. Third, divergers tend to observe and are aspiring to new experiences when learning. Fourth, assimilationists are logical thinkers and observers, they learn more by thinking and looking deeply (14). The reliability of the Kolb Cognitive Styles Questionnaire has been evaluated and confirmed in several studies, including Gholipour, which reported a Cronbach's alpha coefficient between (0.71 and 0.82) (19). In our study, Cronbach's alpha coefficients for objective experience, reflective observation, abstract conceptualization, and active experiment were studied as (0.90- 0.93- 0.91 - 0.94), respectively.

Students' views and levels of satisfaction with e-learning were gathered using a questionnaire created by the researcher (20). Eight questions regarding online courses and 26 questions regarding Satisfaction with e-learning that using a 5-point Likert scale from 5 to 1 (strongly agree - agree-medium - disagree- strongly disagree). The range of the total scores is 26 to 130. Low

contentment was defined as a score under 45.5, medium satisfaction as a score between 45.5 and 90, and high satisfaction as a score between 130 and 91. All final questions had a CVR ≥ 0.6 , and any items with a low CVR were eliminated. The mean for this questionnaire was (0.92), which was higher than the permissible CVI mean of (0.79). The content validity and reliability of this tool have been confirmed. In the prior research, the questionnaire's Cronbach's alpha level was determined to be (0.94) (21); in the present investigation, Cronbach's alpha level was assessed to be (0.97).

Data analysis: Version 26 of the SPSS statistical analysis program was used in the study. The impact of students' learning preferences on their satisfaction with e-learning was determined using Fisher's exact test. Additionally, in order to investigate the association between learning style and demographic factors, we utilized the Kruskal-Wallis, Chi-square, and Fisher's exact test. We deemed a probability value of P 0.05 to be significant.

Results

One hundred twenty students (with an 88% response rate) completed the questionnaire, including 42 (35% of boys) and 78 (65% of girls). These students had an average age of 21.5 ± 2.8 and a mean score of 16.78 ± 1.47 . Diverger learners made up the biggest group of the 120 pupils, accounting for 46.7% of them ($n = 56$). The other students made up 32.5% ($n = 39$), 11.7% ($n = 14$), and 9.2% ($n = 11$) of the converger, accommodator, and assimilator groups, respectively. Additionally, the findings indicated no statistically significant difference was found in learning style based on age, gender, and grade point average (Table 1).

Student survey results: According to the findings, 17.5% of students solely used offline e-learning, 29.2% of students used online e-learning exclusively, and 53.3% used both online and offline e-learning. Additionally, 33.3% of students liked online education, 30.8% offline education, and 35.8% did not like e-learning. The data also show that the most significant drivers of students' interest in e-learning are flexibility of teaching time (69.2%) and flexibility of teaching environment (51.7%). The most serious issues with e-learning are: The lack of interaction with the teacher (55.8%) - Internet connection problems (53.3%) - Inability to meet classmates (38.3%) - Internet costs (34.2%) - Lack of auxiliary activities in Curriculum (26.7%) - Other Problems (20%)

Satisfaction with e-learning: The average score for e-learning satisfaction was 78.3 ± 30.1 . In accordance with the findings, 50.8% of students reported medium satisfaction with their use of e-learning, 34.2% reported high satisfaction, and 15% reported low satisfaction. The correlation between student's preferred learning methods and their level of e-learning satisfaction was assessed using Fisher's exact test. The majority of students with divergent learning styles (46.4%), convergent learning styles (64.1%), and assimilating learning styles (54.5%) expressed medium satisfaction with e-learning, according to data analysis using Fisher's exact test (P-value = 0.04). Divergent style learners were the most satisfied with e-learning (39.3%), followed by convergent style (30.8%), accommodating style (28.2%), and assimilation style (27.3%). And the lowest satisfaction with e-learning was associated with accommodating (42.9%), assimilation (18.2%), divergent (14.3%), and convergent (5.1%) styles, respectively (Table 2).

Discussion

Using Kolb's LSI, our research revealed that the divergent learning style is the most prevalent (46.7%). According to the findings of Zarabian's research, a divergent learning style is the most prevalent among e-learning students (22). Wang et al. reported in their study that the majority of dental students' learning styles were convergent and assimilating (14). Reginald et al. reported that the assimilation learning method was the most prevalent among pre-clinical and clinical dentistry students (23). According to Farhang et al research, the most prevalent learning method among dentistry students was assimilating (24). In addition, our findings revealed no correlation between learning style and age, gender, mean score, or semester. This outcome aligns with the results of a number of studies (2, 19, 25). Our research revealed that students' satisfaction with e-learning was impacted by their learning styles. Divergent learning styles had the greatest degree of satisfaction with e-learning (39.3%), whereas accommodating learning styles had the lowest level of satisfaction (42.9%). These findings are consistent with previous research indicating that students' satisfaction with e-learning is influenced by their learning style (26, 27). In addition, research by Zarabian has shown that different learning styles are associated with e-learning satisfaction (22).

Table 1. Comparison of learning styles by the students' demographic variables

Variable		Learning styles				P
		Mean (SD)				
		Diverging	Converging	Assimilating	Accommodating	
Age		21.36(2.97)	21.79(2.66)	21.27(1.42)	21.71(3.87)	0.71
Grade point average		16.98(1.43)	16.46(1.29)	16.81(1.32)	16.84(2.10)	0.27
N (%)						
Gender	Male	21(50)	14(33.3)	1(2.4)	6(14.3)	0.27
	Female	35(44.9)	25(32.1)	10(12.8)	8 (10.3)	
Semester		18(15)	10(8.3)	2(1.7)	5(4.2)	0.85
1		8(6.7)	5(4.2)	1(0.8)	2(1.7)	
2		11(9.2)	10(8.3)	2(1.7)	4(3.3)	
3		5 (4.2)	2(1.7)	2(1.7)	0(0)	
4		11(9.2)	8(6.7)	1(0.8)	2(1.7)	
5		3(2.5)	4(3.3)	3(2.5)	1(0.8)	
6		18(15)	10(8.3)	2(1.7)	5(4.2)	

Table 2. Comparison of satisfaction with e-learning by learning style

Satisfaction	High	Medium	Low	<i>P</i>
Learning style	N (%)			
Diverging	8(14.3)	26(46.4)	22(39.3)	0.04
Converging	2(5.1)	25(64.1)	12(30.8)	
Assimilating	2(18.2)	6(54.5)	3(27.3)	
Accommodating	6(42.9)	4(28.6)	4(28.6)	

To examine these data, we discuss learning style attributes; Divergers learn through sensing and seeing; they often choose to observe situations rather than act in response to them. They like problem-solving scenarios that need the deployment of original thought. Accommodators also come from a combination of objective and active experimentation. People with this personality like executing plans and tackling difficult tasks. These individuals favor practical analysis over logical analysis (19). In this investigation, pre-clinical dentistry students were analyzed. The majority of pre-clinical courses consist of online lectures, films, e-books, etc. (lack of active experience). Maybe this is why e-learning is enjoyable for learners with diverse learning styles but not for those with accommodating types.

On the other hand, several studies have shown a weak correlation between the learning styles of students and their usage or satisfaction with e-learning (28, 29). In this context, Gholipour et al. reported that there was no difference in satisfaction with e-learning and LMS amongst students with various learning styles, but there was a substantial difference in satisfaction with electronic material (19).

According to this study's findings, 64.1% of students enjoyed e-learning. According to the satisfaction score for e-learning, just 15% of students were dissatisfied, meaning the majority of students were pleased. According to the findings of a number of studies, students had a good attitude toward e-learning and were somewhat satisfied with it (5, 30, 31). The findings of this research showed that the flexibility of the time and

location of instruction was the primary factor in students' interest in online learning. The most significant drawbacks of e-learning were the lack of interaction with the teacher and connectivity issues to the Internet. Other studies have observed similar problems. For instance, some students lacked access to Wi-Fi and didn't have enough storage to download large-scale PowerPoint presentations or instructional DVDs. Students didn't have access to laptops or computers at home, particularly in rural regions (32,33). The insufficient connection between instructors and students, and a lack of essential facilities and resources (34). The most frequent issues with e-learning were a lack of attentive attention to students' educational requirements, a high number of courses, active teaching approaches, and frequent internet disconnections during online sessions (35). Although individual user characteristics had little bearing on user satisfaction, the platform's accessibility had the most influence (17, 36).

Although e-learning is popular among dentistry students, it cannot be recommended for a particular student level. As an example, Turkyilmaz et al. (6) showed that e-learning could be successfully used in the dental school curriculum to improve students' understanding of fundamental concepts and empower students to apply this knowledge in clinical cases. Some studies have shown that different groups of students have different views on e-learning. However, Van Doren et al. (37) showed that although the clinical course does not replace practical training, the pre-clinical practice develops critical thinking. Azab et al. (38) came to precisely the opposite conclusion, noting that clinical dentistry students were substantially more open to e-learning than non-clinical students. Therefore, since it can satisfy the majority of students, blended learning is advised. This finding was supported by some studies (39-42).

The lack of direct access to students, which made it difficult for them to cooperate in filling out

questionnaires, is a weakness of this research. Measuring the degree of satisfaction with all the various courses and lecturers was another barrier. Student satisfaction may also be impacted by the diverse courses, instructional methods, personality quirks, and social backgrounds of the professors.

Conclusion

According to our findings, the majority of participants were divergent style and convergent style. Additionally, there was no connection between students' age, gender, mean scores, or semester and learning style. The findings revealed a substantial connection between students' learning styles and their satisfaction with e-learning. Divergent learning styles reported the greatest levels of satisfaction with e-learning (39.3%), while adaptive learning styles reported the lowest levels of satisfaction (42.9%). Students generally felt that e-learning met their needs. Therefore, based on our research, we conclude that improving Internet connection issues and fostering closer relationships between teachers and students may boost students' satisfaction with online learning. flexibility of time and place was the most important feature of the virtual environment for all groups of dental students with different learning styles.

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