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Evaluation of Learning Preferences of Medical Faculty Students with VARK Questionnaire

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ABSTRACT

Aim: This study aims to evaluate the learning styles of Medical Faculty students using the VARK model.

Material and Method: The population of this cross-sectional quantitative study consists of volunteer students from years II, III, IV, and V who are currently studying. A census sampling approach was employed, and a total of 210 students participated in the study. The data collection instrument was structured into three distinct sections. The first section includes five items pertaining to students' sociodemographic characteristics; the second section contains six questions addressing study habits during the distance education period; and the third section incorporates the VARK Learning Preferences Inventory. Statistical analyses were performed using the SPSS version 22.0 software package. The normality of the numerical data distribution was assessed by examining the skewness and kurtosis coefficients.

Results: This study reveals that medical students' learning styles vary and that demographic characteristics can influence learning preferences. The fact that the majority of students prefer kinesthetic learning methods and unimodal learning styles indicates that individual differences should be considered in the educational process.

Conclusion: Male students demonstrated a greater preference for auditory and kinesthetic learning modalities, whereas female students showed higher scores in the read/write domain, suggesting that learning styles may vary by gender.

Keywords: Learning Preferences, Medical Students, Learning

Tıp Fakültesi Öğrencilerinin Öğrenme Tercihlerinin VARK Anketi ile Değerlendirilmesi

Araştırma Makalesi

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ÖZET

Amaç: Bu çalışmada, Tıp Fakültesi öğrencilerinin öğrenme stillerinin VARK modeli ile değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Araştırmamız kesitsel nicel tiptedir. Araştırma evrenini Dönem II, III, IV ve V'te öğrenim gören 885 öğrenci oluşturmuştur. Örneklem hesabı yapılarak örneklem seçilmiştir. Veri toplama aracı olarak kullanılan anket formu üç bölümden oluşmaktadır. Formun ilk bölümü öğrencilerin sosyodemografik özelliklerinin sorgulandığı beş sorudan oluşmakta, ikinci bölüm uzaktan eğitim dönemindeki çalışma düzeni ile ilgili altı sorudan oluşmakta olup, üçüncü bölüm ise VARK Öğrenme Tercihleri Envanterinden oluşmaktadır. Araştırmanın istatistiksel analizi SPSS 22.0 paket programı ile gerçekleştirilmiştir. Sayısal verilerin normal dağılıma uygunluğu çarpıklık ve basıklık katsayılarının analizi ile değerlendirilmiştir.

Bulgular: Araştırmaya katılmaya gönüllü olan 210 öğrencinin yaş ortalaması 21,1±2,8 idi. %60 (n=126)'ı kız öğrenciydi. Tıp öğrencilerinin öğrenme tercihleri incelendiğinde en sık kinestetik yolla (n=116, %55,2) öğrenmeyi tercih ettikleri görülmektedir. Öğrenimleri ise en sık unimodal (n=132, %62,9)'dir. Erkek öğrencilerin işitsel ve kinestetik öğrenme sıklığı kız öğrencilere göre anlamlı derecede daha fazlaydı. Kız öğrencilerin okuma yazma öğrenme tercih puanı erkek öğrencilerden anlamlı derecede daha yüksekti. Ayrıca klinik öncesi evre öğrencilerinin tüm öğrenme tercihlerinde puanı klinik öğrencilerine göre anlamlı derecede daha yüksekti (p<0,05).

Sonuç: Erkek öğrencilerin işitsel ve kinestetik öğrenme sıklığının daha yüksek olması, kız öğrencilerin ise okuma-yazma tercihinde daha yüksek puan alması, öğrenme stillerinin cinsiyete göre farklılık gösterebileceğini işaret etmektedir. Ayrıca klinik öncesi öğrencilerin tüm öğrenme tercihlerinde daha yüksek puanlar alması, erken dönem öğrenme süreçlerinde çeşitliliğin daha belirgin olduğunu göstermektedir.

Anahtar Kelimeler: Öğrenme tercihleri, Tıp Öğrencileri, Öğrenme

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Introduction

Learning styles refer to the methods of gathering, processing, interpreting, organizing, and thinking about information. diversity in knowledge acquisition is observed in classrooms regarding how students acquire knowledge. Claxton and Murrell categorized learning styles into four categories: personality models, information processing models, social interaction models, and instructional preference models.[1] The VARK (Visual, Auditory, Reading/Writing, and Kinesthetic) model, based on the instructional preference model, allows for the classification of individuals according to their learning preferences.[2] In the VARK model, which defines individual learning styles based on the four sensory modalities used by individuals to assimilate new information, it is stated that visual learners learn best by seeing, auditory learners by hearing, and reading/writing learners prefer printed material. In contrast, kinesthetic learners learn best through physical or practical experience.[2] This model helps determine how individuals perceive, process, store, and recall information most efficiently and effectively. Therefore, identifying students' learning styles enables educators to diversify their teaching methods, providing learning experiences tailored to each student's needs and aiming to maximize students' potential by offering diverse learning opportunities.[3] Today, one of the most important goals in education is to make learning easy, efficient, and appropriate for all students during their studies. To achieve this goal, it is important to know each student's learning style.[4]

With the help of developing and changing technology, it is necessary to follow and implement new approaches and contemporary teaching methods in learning-teaching activities[5]. By determining the personal characteristics of students, the most suitable learning model can also be created.[6] There are various studies showing that determining learning styles and using the correct model in the teaching process are important in improving the quality of education.[7,8] Evaluating individuals' learning styles is important for the teaching and learning process.[9] It is observed that knowing students' learning styles also helps educators in developing methods, techniques, and activities planned to be used in learning and teaching environments.[10] Many studies are showing that learning styles affect student achievement.[11]

Method

Participants

The exclusion criterion for the study was not having studied at this faculty during the distance education period. A total of 885 students were enrolled in the specified academic years. No sampling method was employed in the study, and an attempt was made to reach the entire population. After providing information about the research via a message in the phone application group used for communication, a participation link was sent to the students. Students were invited to participate in the research three times in 10-day intervals. The first page of the online survey contained an informed consent form, and questions were accessible only after participant consent. Incomplete surveys were not included in the study. Repeated entries were prevented through IP address monitoring. A total of 210 students volunteered to participate. A power analysis was conducted using a known population size (N = 885), a sample of 210 participants, and a margin of error of 5%, yielding a confidence level of 90%. Data collection for the study took place between April 1 and April 30, 2021..

Data collection form

The first five questions addressed students' sociodemographic characteristics, followed by six items concerning their study routines during the distance education period. The final section of the questionnaire was dedicated to the VARK Learning Preferences Inventory.

The VARK (Visual, Auditory, Reading/Writing, and Kinesthetic) learning inventory was originally developed by Hawk and Shah in 1987. It consists of 16 items, each presenting a distinct scenario in which respondents are asked to select their preferred response, reflecting their approach to learning in real-life situations. Rather than merely identifying how individuals exchange information, the VARK inventory provides insight into their preferred modalities for processing and internalizing information. The model categorizes learning preferences into four sensory modalities: visual, auditory, reading/writing, and kinesthetic. A Turkish adaptation and validation of the inventory was conducted by Düzgün in 2018, yielding a Cronbach's alpha reliability coefficient of 0.76. These four categories form the basis for understanding individual learning styles and are widely used in educational research and practice.

- Visual learning: Understanding information more easily through drawings, graphs, and visuals.
- Auditory learning: Acquiring information through listening or discussion.
- Reading/Writing learning: Preferring to acquire information by reading or writing.
- Kinesthetic learning: Learning through touching, feeling, and experiencing.

These learning styles are used to understand and support individuals' different approaches to information.[13]

Permissions

Ethical approval for the study was obtained from the Sivas Cumhuriyet University Non-Interventional Clinical Research Ethics Committee (Approval date/number: 10.03.2021. 2021-03/17). Permission to use the scale in our research was obtained via email from Dr. Serkan Düzgün.

Statistical analysis

Statistical analyses were performed using SPSS version 22.0 (IBM Corp., Armonk, NY, USA). The normality of the

data distribution was assessed based on skewness and kurtosis values. Huck,[14] states that for data to show normal distribution, the skewness and kurtosis values should range between -1 and +1. First, descriptive statistical analyses of the data were performed. Frequencies were calculated for categorical data, and measures of central tendency (Mean ± Standard Deviation) were calculated for numerical data. Chi-square test was used for comparing categorical data. Independent samples T-test was used to analyze whether the means of normally distributed numerical data showed significant differences between two independent groups; One-Way ANOVA test was used to analyze whether they showed significant differences among more than two independent groups. At a 95% confidence interval, a p-value below 0.05 was considered significant.

Results

The mean age of 210 students who volunteered to participate in the study was 21.1±2.8 years. 60% (n=126) were female students. The frequency of students living in the city center was 81.9% (n=172), while those living in districts/villages were 18.1% (n=38). 95.2% (n=200) of the participants were Turkish students; 4.8% (n=10) were of foreign nationality. Their distribution according to classes was as follows: 37.6% (n=79) second year, 23.3% (n=49) third year, 26.7% (n=56) fourth year, and 12.4% (n=26) fifth year.

During the distance education period, 93.3% (n=196) of the students stayed at home with their families. 6.7% (n=14) stated that they stayed at home with friends. For studying during the distance education period, 61.4% (n=129) used computers, 4.8% (n=10) used tablets, 11.4% (n=24) used smartphones, and the remaining 22.4% (n=47) stated that they studied from course notes. 7.2% (n=15) of the students stated that they always participated in distance education classes online, while 18.8% (n=39) always watched the recordings. 65.4% (n=136) watched the classes sometimes online and sometimes offline, while 8.7% (n=18) said they never watched the classes. 47.1% (n=99) of the students stated that their frequency of studying decreased during the pandemic period. The resources they used for studying during the pandemic period, in order of frequency, were materials uploaded to the system (77.6%; n=163), previous term's course notes (14.8%; n=31), and textbooks (7.6%; n=16). The students' studying situations during the distance education period are shown in Table 1. The results of the students' evaluation of distance education and face-to-face education in terms of advantages and disadvantages are presented in Table 2.

Table 1. *Students' study habits during the distance education period*

Parameters related to studying habits	n	%
Place of residence during the pandemic		
At home with family	196	93,3
At home with friends	14	6.7
Device used for studying		
Computer	129	61.4
Tablet	10	4.8
Smartphone	24	11.4
From lecture notes	47	22.4
How classes were attended		
Always online	15	7.2
Sometimes online. sometimes recorded	136	65.4
Always from recordings	39	18.8
Did not watch classes	18	8.7
Change in frequency of studying		
Decreased	99	47.1
No change	81	38.6
Increased	30	14.3
Resources used for studying		
Materials uploaded to the system	163	77.6
Lecture notes from previous semesters	31	14.8
Textbooks	16	7.6

Table 2. *Students' opinions on educational methods*

	Distance education		Equal		Face-to-face education	
	%	n	%	n	%	n
Efficient	58.1	122	20.5	43	21.4	45
Instructive	58.6	123	27.1	57	14.3	30
Practical	63.3	133	1.9	4	34.8	73
Accessible	17.6	37	14.8	31	67.6	142
Easy communication	41.4	87	21.9	46	36.7	77
Engaging	66.2	139	23.3	49	10.5	22
Affordable	19.0	40	19.0	40	61.9	130
Knowledge retention	62.9	132	26.7	56	10.5	22
Repeatable	69.0	145	14.3	30	16.7	35

When examining the learning preferences of medical students, it is observed that they most frequently prefer to learn through kinesthetic means (n=116, 55.2%). Their learning style is most commonly unimodal (n=132, 62.9%). Learning preferences and learning preference scores of medical students shown at Table 3.

The comparison of students' learning preferences based on gender and educational stages is shown in Table 4. According to this, male students had significantly higher frequency of auditory and kinesthetic learning compared to female students. Female students' reading and writing learning preference scores were significantly higher than

male students. Additionally, pre-clinical stage students had significantly higher scores in all learning preferences compared to clinical students (p<0.05). When comparing learning preference scores based on the tools students use for studying, students who study by printing out lecture notes (7.3±2.9) had significantly higher kinesthetic scores than those who study from computers, tablets, or smartphones (6.1±2.6) (p=0.032). There were no significant differences between other learning preferences and educational stages (p>0.05). Students with kinesthetic learning preference (n=66, 56.9%) showed a significant decrease in study frequency during the distance education period compared to others (n=33, 35.1%) (p=0.007). When students were asked about the resources they used for studying during this period, 90.5% (n=57) of students who preferred visual learning stated that they studied from visual materials uploaded to the system, while this rate was 72.1% (n=106) for those who preferred other learning models (p=0.007). There were no significant differences between other learning preferences and the materials they used for studying (p>0.05). Figure 1 provides a visual representation of students' learning models.

Table 3. *Learning preferences and learning preference scores of medical students*

Learning Preference	n	%
V (visual)	61	29
A (auditory)	90	42.9
R (reading-writing)	98	46.7
K (kinesthetic)	116	55.2
Unimodal	132	62.9
Bimodal	29	13.8
Trimodal	15	7.1
Quadmodal	34	16.2
Learning Preference Score	**Mean**	**SD**
V (visual)	5.13	3.11
A (auditory)	6.07	2.74
R (reading-writing)	6.08	2.75
K (kinesthetic)	6.58	2.70

Table 4. Comparison of students' learning preferences by gender

Learning Preference	Female n (%)	Male n (%)	p	Preclinical stage n (%)	Clinical stage n (%)	p
V (visual)	39 (31)	24 (28.6)	0.416	39 (30,5)	24 (29,3)	0,490
A (auditory)	48 (38.1)	44 (52.4)	0.029	54 (42.2)	38 (46.3)	0.326
R (reading-writing)	66 (52.4)	34 (40.5)	0.060	57 (44.5)	43 (52.4)	0.164
K (kinesthetic)	63 (50)	53 (63.1)	0.042	69 (53.9)	47 (57.3)	0.366
Multiple learning	41 (32.5)	36 (42.9)	0.085	41 (32.1)	36 (43.9)	0.056
Unimodal	84 (66.7)	48 (57.1)		86 (67.2)	46 (56.1)	
Bimodal	15 (11.9)	14 (16.7)	0.251	15 (11.7)	14 (17.1)	0.071
Trimodal	6 (4.8)	9 (10.7)		5 (3.9)	10 (12.2)	
Quadmodal	21 (16.7)	13 (15.5)		22 (17.2)	12 (14.6)	
Learning Preference Score	**M ± SD**	**M ± SD**		**M ± SD**	**M ± SS**	
V (visual)	5.2±3.2	4.9±2.8	0.449	5.6±3.4	4.3±2.2	0.002
A (auditory)	5.9±2.7	6.2±2.7	0.473	6.6±2.7	5.2±2.5	<0.001
R (reading-writing)	6.4±2.7	5.5±2.7	0.016	6.6±2.8	5.2±2.2	<0.001
K (kinesthetic)	6.4±2.5	6.8±2.8	0.284	7.0±2.7	5.8±2.4	0.002

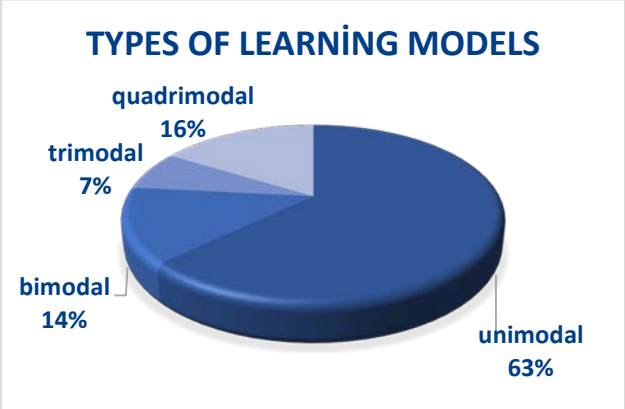

Figure 1. *Students' learning models*

Discussion

This study investigated the learning styles of medical students using the VARK Learning Preferences Inventory and explored how these styles influenced their learning experiences. Furthermore, students' sociodemographic characteristics and their study habits during the period of distance education were also examined.

The findings of this study revealed that medical students most frequently preferred kinesthetic learning (55.2%) and tended to adopt a unimodal learning style (62.9%). Similar results were reported by Chinnapun and Narkkul, who found that kinesthetic learning was the most commonly preferred style among medical students.[15]

Consistent with this, several other studies have emphasized the predominance of kinesthetic preferences and highlighted the importance of practical applications in enhancing academic performance[16]. However, in contrast to the current study's findings regarding the dominance of unimodal preferences, Ojeh et al. reported that most students favored multimodal learning and found no significant gender-based differences in learning preferences.[17] Similarly, Urval et al. found that among unimodal learners, auditory (45.5%) and kinesthetic (33.1%) modalities were most frequently preferred.[18] Another study focusing on the pre-clinical period noted that among both unimodal and multimodal learners, the most preferred style was reading/writing (33.8%), followed by kinesthetic (32.5%)[17].

It has been reported in various studies that the multimodal learning style is most frequently preferred among first-year medical students,[19] with 70% of students preferring this learning style, while the remaining 30% opt for a unimodal style. Auditory (A) and kinesthetic (K) styles were found to be the most preferred unimodal styles.[20] Additionally, a study including undergraduate medical and dental students indicated no significant difference between learning styles, with the majority preferring multimodal learning styles.[21] In our study, it was observed that students most frequently had a unimodal learning style; however, there are also studies concluding that the majority of medical students have multiple learning preferences.[22]

Our study also investigated the influence of gender and stage of education (pre-clinical vs. clinical) on students' learning style preferences. The findings indicated that male students showed a significantly higher preference for auditory and kinesthetic learning styles than their female counterparts. This result is partially supported by previous research, which also identified a higher prevalence of kinesthetic learners among male students, although the difference was not statistically significant[18]. Additionally, our study found that female students scored significantly higher in the reading/writing learning preference. A similar trend was observed in the study by Ojeh et al., which reported that female students tended to prefer reading/writing styles, whereas male students were more inclined toward kinesthetic learning; however, this difference did not reach statistical significance[17].

While some studies suggest gender differences in learning style preferences, others have not been able to demonstrate any difference.[20] One of the prominent findings in our study was that pre-clinical stage students scored significantly higher in all learning preferences compared to clinical students. When examining the literature, it is observed that most studies involve first-year medical school students.[19,20,23-25]

In this study, which also examined study habits and tools during the distance education period, prominent data revealed that most students (93.3%) attended classes from home with their families, primarily preferring computers (61.4%), followed by smartphones (11.4%) and tablets (4.8%). It was found that the majority of students (65.4%) participated in classes sometimes online and sometimes through recordings. When examining study frequency, results showed that it decreased for 47.1%, remained unchanged for 38.6%, and increased for 14.3%. Materials in the system were used most frequently (77.6%); course notes (14.8%) and textbooks (7.6%) were preferred to a lesser extent. Among the obtained results was that most students study at home with their families, using computers and preferring materials provided in the system. Class participation often occurred both online and through recordings, but study frequency generally decreased. Similar to our study, other research found that during the distance education period, a large portion of students participated in education at home with their families via computers and mobile devices,[26] with the majority of students attending classes online and following course materials through digital platforms.[27,28] When comparing learning preference scores based on the tools students used for studying, those who studied by printing course notes had significantly higher kinesthetic scores compared to students who studied using computers, tablets, or smartphones. No significant differences were found between other learning preferences and learning stages. It was observed that the study frequency of students with kinesthetic learning preferences decreased significantly during the distance education period compared to others.

Numerous studies have demonstrated significant variation in students' learning styles, underscoring the need for instructional programs to be tailored to accommodate these individual differences[29].

Knowing students' learning styles is considered a valuable skill in education. Knowledge of learning styles can help educators identify and solve learning problems among students, thus helping them become more effective learners. According to Fleming, a learning style expert and the author of perhaps the most widely used sensory modality preference assessment, there are four main sensory modalities. These four modalities are identified as visual (V), auditory (A), reading-writing (R), and kinesthetic (K). Students with a V preference learn best using pictures, graphs, diagrams, etc., those with an A preference learn best by listening to and discussing the material, those with an R preference learn best with textual materials, and finally, K students internalize information best when physically involved (e.g., touching and experiencing materials).[30] The results we obtained in our study also show that medical students most frequently prefer kinesthetic learning. In other words, with kinesthetic learning, students experience information hands-on and learn best through physical movements and learning by doing-experiencing. This result can be evaluated as consistent with the nature of medical education, which intensively includes practical work. For example, it is possible to express students working on a cadaver in an anatomy class or experiencing patient scenarios during a clinical simulation as typical

examples of kinesthetic learning. Students learn more effectively when they have the opportunity to directly apply theoretical knowledge, not just by reading or listening to it. At the same time, in kinesthetic learning preference, students achieve higher success in activities such as group work and one-on-one field experience. It is emphasized that students who learn kinesthetically prefer to be involved in physical experiences, touch, feel, and have practical hands-on experiences.[31]

This result emphasizes that medical education should not only utilize traditional methods but also make greater use of interactive and hands-on learning tools that support kinesthetic learning. This way, a learning environment that caters to students' natural learning styles can be provided. The VARK questionnaire can be used to identify and explain student sensory modality preferences, which is a critical step in optimizing learning.[32] Students have different learning styles, and it is the instructor's responsibility to address this diversity of learning styles among students and develop appropriate learning approaches.[33]

Conclusion

The findings from this study suggest that the VARK tool is useful in gathering information about different learning styles and can help educators design mixed teaching strategies to meet students' needs, as well as be important in helping students become aware of their learning style preferences to enhance learning. At the same time, the majority of students preferring the kinesthetic learning style emphasizes the importance of hands-on learning methods. Developing methods that suit students' learning styles can increase success in medical education.

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None

Authors' contributions

Concept/Hypothesis NS, EA, MBK, SK; Design, NS, EA, MBK, SK; Data Collection/Data Processing, NS, EA, SK; Data Analysis, EA; Manuscript Preparation, NS, SK.

The authors read and approved the final manuscript.

Conflict of interest statement

The authors deny any conflicts of interest related to this study.

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