

# Learning Styles, Academic Achievement, and Gender in a Medical School Setting

## Tıp Fakültesinde Öğrenme Stilleri, Akademik Başarı ve Cinsiyet

Tıp Fakültesinde Öğrenme Stilleri ve Akademik Başarı / Learning Styles and Academic Achievement in a Medical School Setting

Esin Kulac<sup>1</sup>, Mekin Sezik<sup>2</sup>, Halil Asci<sup>3</sup>, Erol Gurpınar<sup>4</sup>

<sup>1</sup>Department of Medical Education, Kocaeli University Faculty of Medicine, Kocaeli,

<sup>2</sup>Department of Medical Education and Informatics, Suleyman Demirel University Faculty of Medicine, Isparta,

<sup>3</sup>Department of Pharmacology, Suleyman Demirel University Faculty of Medicine, Department of Medical Education and Informatics, Isparta,

<sup>4</sup>Department of Medical Education, Akdeniz University Faculty of Medicine, Antalya, Turkey

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### Özet

**Amaç:** Çalışmada klinik öncesi dönemdeki tıp öğrencilerinin öğrenme stilleri, cinsiyet ve akademik başarıları arasındaki ilişkinin değerlendirilmesi amaçlanmıştır. **Gereç ve Yöntem:** Fakültemizdeki tüm klinik öncesi dönem tıp öğrencileri çalışmaya alınmıştır. Öğrenme stillerini belirlemek için öğrenme stillerini altı kategoride (bağımsız, bağımlı, rekabetçi, işbirlikçi, çekingen ve katılımcı) inceleyen Grasha - Reichmann Öğrenme Stilleri Ölçeği kullanılmıştır. Öğrencilerin akademik başarıları kurul sınav puanları, final sınavı puanı ve geçme notu ile değerlendirilmiştir. **Bulgular:** Tıp öğrencilerinin en sık rekabetçi (% 34.8) ve işbirlikçi (% 33.7) öğrenme stillerine sahip olduğu saptanmıştır. Rekabetçi öğrenme stili ile final puanı ve geçme notu arasında anlamlı ilişki görülmüştür. Ayrıca rekabetçi ve işbirlikçi kız öğrenciler diğerlerine göre anlamlı olarak daha yüksek puan almışlardır. **Tartışma:** Fakültemizde rekabetçi öğrenciler diğerlerine göre daha yüksek başarı puanları elde etmişlerdir. Kız rekabetçi ve işbirlikçi öğrencilerin rekabetçi ve işbirlikçi erkeklerden daha yüksek puan almaları ile sözkonusu ilişkide cinsiyetin de etkili olduğu görülmüştür.

### Anahtar Kelimeler

Eğitimsel Başarı; Cinsiyet; Öğrenme Stili; Tıp Eğitimi

### Abstract

**Aim:** To investigate correlations among learning styles, academic achievement and gender of medical students in preclinical years. **Material and Method:** All medical students in preclinical years at our institution were approached. The Grasha-Reichmann Student Learning Styles Scale was used to define primary learning style of the participants in six categories (independent, dependent, competitive, collaborative, avoidant, and participant). Academic achievement criteria included thematic block exam scores, final exam scores, and passing grades. **Results:** Competitive (34.8%) and collaborative (33.7%) were the most frequent learning styles among participants. Competitive learning style was associated with higher mean final exam scores and passing grades. Female students with competitive and collaborative learning styles scored significantly higher than male students. **Discussion:** Students with competitive learning styles had higher academic achievement than others. Among students with competitive and collaborative styles, there was a gender difference in favor of female students in terms of academic achievement.

### Keywords

Academic Achievement; Gender; Learning Style; Medical Education

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Corresponding Author: Esin Kulac, Department of Medical Education, Kocaeli University, Faculty of Medicine, Izmit, Kocaeli, Turkey.

T.: +90 2623037910 GSM: +905056757908 E-Mail: kulacesin@yahoo.com

## Introduction

Learning style was defined by Grasha [1] as “personal qualities that influence a student’s ability to acquire information, to interact with peers and the teacher, and otherwise participate in learning experiences”. Hilliard and Tallett [2] defined learning style as “a predisposition on the part of some students to adopt a particular learning strategy regardless of the specific demands of the learning task”. According to Slater et al. [3] medical students “encounter a distinctive challenge in the rigor of their required coursework and the increased volume that constitutes the program of study”.

The Grasha Reichmann Student Learning Styles Scale (GR-SLSS) is considered one of the few instruments designed specifically to be used with senior high school and university students. The GR-SLSS aims to assess the social interactions among teacher/student and student/student pairs, as well. Therefore, this scale might be useful in the medical education climate, which usually depends on such interactions. The six major learning style categories defined by the GR-SLSS are summarized in Table 1[4]:

[Table 1]

Table 1. Learning Style Categories Defined by The Grasha Reichmann Student Learning Styles Scale

Category	Definition
Dependent	They would prefer to work alone especially in topics they are highly interested in, irrespective of the learning subjects.
Independent	These students usually do not have any intellectual curiosity and depend on guidance and authority. For a typical dependent learner, the “lecture note” is simply “everything” the teacher mentions during the educational process.
Competitive	The main aim of the competitive learners is to receive recognition among others to perform better than their peers and to be rewarded.
Avoidant	This group of students is not willing to cooperate with teachers and other students and is uninterested in the class content, with an overwhelmed feature.
Participant	In contrast to the avoidant style, participant learners attend to class activities, are interested in learning and try to be a “good” student.
Collaborative	These students tend to share knowledge and are cooperative with the peers and teachers.

“Medical Education in Turkey: Most of the medical schools in Turkey including ours have adopted system-based programs with thematic blocks in the first 3 years. This system includes 3- to 6-week blocks, and each year comprises of 4 to 6 thematic blocks [5]. A block exam is performed at the end of each thematic block. The thematic block score is computed by taking the mean score of these block exams. The final exam takes part at the end of the year.

Although predictive validity of certain factors for success in medical school have been investigated, effects of learning styles on medical students’ academic achievement have not been investigated in depth. Other predictors of success in medical schools such as ethnicity, gender, personal statements, and references might also be indicative [6,7]. Therefore, studies on different populations especially in non-Western communities are needed. For this purpose, we determined learning styles using a standard scale and correlated these with annual exam scores of medical students in preclinical years. We hypothesized

that learning styles would influence success in medical school.

## Material and Method

Medical students in year 1, 2, and 3 (preclinical stage) at our school were initially approached and invited to participate during the last two weeks of the 2011-12 term. Of the 525 students approached, 314 accepted to participate in the study and 282 completed the entire questionnaire, yielding a 53.7% participation rate.

The post-hoc power of the study at an error level (alpha) of 0.05 and calculated effect size was 0.459 for the thematic block exam, 0.789 for the final exam, and 0.630 for the passing grades, respectively [8].

We used Kolay B’s MSD Thesis “The relationship between sixth grade students who have different learning styles of teaching styles and success in science and technology” which has the translated and validated Turkish version of the GR-SLSS for university students. Initially, students’ mean scores for each group of learning styles were calculated [9]. The reliability (Cronbach’s alpha) of the scale was found to be 0.759 (range, 0.746-0.774 for each item) revealing an acceptable internal consistency [10]. Kolmogorov-Smirnov test was used to test normality of data. For categorical data, chi-square contingency table analyses and for continuous data, one-way analysis of variance (ANOVA) was used for comparisons with post-hoc Bonferroni method. Kruskal-Wallis test was employed if parametric assumptions were violated. Two-way ANOVA was used to determine the interaction effect of independent variables such as gender and learning style.

## Results

Descriptive data are summarized in Table 2. There were 168 female and 114 male students in the study group (p=0.001). The

Table 2. Descriptive Data of The Cohort (n=282)

Gender (female/male, %)	59.6 / 40.4 (168 / 114)
Female/male ratio	1.47 / 1
Age (years)	20.1 ± 1.2 (18-24)
≤ 21 y	87.9% (248)
> 21 y	12.1% (34)
Year of education	
Year 1	37.2% (105)
Year 2	31.9% (90)
Year 3	30.9% (87)
Thematic block exam score	68.3 ± 10.8 (21-91)
>50	94.7 (267)
>60	79.1 (223)
>70	45.7 (129)
Final exam score	66.7 ± 10.8 (15-91)
>50	92.9 (260)
>60	76.2 (215)
>70	37.2 (105)
Pass Mark	68.1 ± 9.1 (22-90)
>50	97.9 (276)
>60	81.6 (230)
>70	37.9 (107)

All data are given as mean ± standard deviations (range within parentheses) or percentages (frequencies within parentheses).

participants were homogenously distributed regarding year of medical education ( $p=0.372$ ) (Table 2). Figure 1 shows the distribution of primary learning styles of the participants. Competitive ( $n=98$ , 34.8%) and collaborative ( $n=95$ , 33.7%) were the

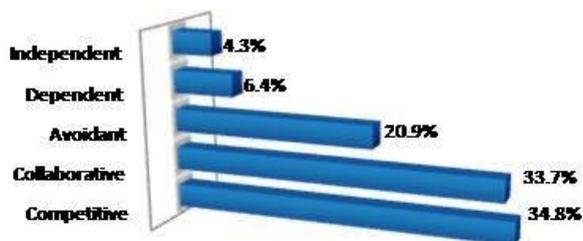


Figure 1.

most frequent learning styles.

[Table 2], [Figure 1]

Distribution of exam scores and passing grades distributions across primary learning style groups stratified for gender are shown in Table 3. In whole study group, competitive learning style was found to be associated with higher mean final exam score ( $p=0.010$ , ANOVA) and passing grade ( $p=0.042$ , ANOVA)

Table 3. Comparisons of Exam Scores and Pass Mark With Various Primary Learning Styles Stratified for Gender

	Thematic block exam	p-value	Final exam	p-value	Pass mark	p-value
<b>Total</b>						
Independent	68.6±8.6		68.0±6.8		68.3±6.8	
Avoidant	66.6±11.9	0.281	63.8±11.9*	0.010	66.0±9.9*	0.042
Collaborative	67.6±11.7		65.3±10.9		66.9±9.6	
Dependent	72.1±9.5		71.3±11.1		71.6±9.7	
Competitive	69.3±9.4		68.8±9.7*		69.6±8.0*	
<b>Female</b>						
Independent	70.2±10.1		67.5±8.2		68.7±7.8	
Avoidant	65.9±13.6	0.088	63.4±13.1**	0.005	65.4±11.4*	0.013
Collaborative	69.2±10.5		66.7±10.0		68.2±8.8	
Dependent	73.1±9.6		72.8±10.4**		72.9±9.4	
Competitive	71.8±7.1		71.0±8.3**		71.6±6.6*	
<b>Male</b>						
Independent	67.0±7.4		68.5±5.9		67.8±6.3	
Avoidant	67.1±10.0	0.895	64.2±10.8	0.540	66.6±8.3	0.686
Collaborative	64.4±13.3		62.5±12.0		64.6±10.8	
Dependent	64.0±1.4		59.5±12.0		61.5±6.4	
Competitive	66.3±11.1		66.0±10.8		67.3±8.9	

\*Avoidant compared to competitive

\*\*Avoidant compared to competitive and dependent

(Table 3).

[Table 3]

Further analyses using two-way ANOVA revealed that female students scored significantly higher than males when they have competitive learning style ( $p=0.010$  for the block exam, and  $p=0.019$  for the pass mark). Moreover, female students with collaborative style compared to corresponding male students had significantly higher block exam scores ( $p=0.038$ ), but final

exam scores or passing grades did not differ between gender in simple main effects analysis.

### Discussion

In our study group, the most frequent primary learning styles were competitive and collaborative. Lack of participant but frequent presence of collaborative styles may be based on certain cultural backgrounds. Although, attending class activities and “competition for being the best” are generally accepted and favored in Western societies, such attitudes may not always be acceptable in some cultures like ours. However, further studies are needed to test whether this social and psychological view is valid or not.

We were able to find few studies on the learning styles of university students in Turkey, using GR-SLSS. Uzun [11] used GR-SLSS for 150 students at a faculty of education and found that mean scores of the independent, collaborative, and competitive learners were higher than those of others. It is interesting to note that independent learners were frequent in this non-medical study group. There are limited data on learning styles of medical students in Turkey [12-15], and all previous studies used scales, such as Kolb inventory or visual, auditory, read-write, kinesthetic (VARK) questionnaires, which aim to evaluate intake and use of knowledge. However, GR-SLSS focuses on

students’ attitudes towards learning and classroom activities that might be more important for medical education. Hence, our study is probably unique, as it is the first study in Turkey to use GR-SLSS in medical students.

Data from studies that used GR-SLSS in other non-Western countries seem to have similarities to our findings. For instance in an investigation including 545 third year university students in Malaysia, subjects were found to be more dominant in collaborative and competitive, but not independent and participant learning styles [16]. In another study carried out using the GR-SLSS among 230 student in Pakistan, avoidant, collaborative, and competitive learning styles were found frequent similar to our results [17].

Gender was reported to influence “student learning style” in addition to various factors including age, culture, academic achievement, and others [18]. However, data from first year medical students in Detroit showed that the numbers and types of modality combinations in the VARK questionnaire were not significantly different between genders [3]. Similarly, an study with first year medical students in Turkey found no differences across male and female students according to VARK questionnaire [15]. Studies from Pakistan and Malaysia support these findings: Female students were found to be significantly better on all dimensions of learning style preferences, revealing significant differences in overall learning style [16, 17].

Dependent females had higher exam scores compared to males in our study group when one-way ANOVA was utilized. In a Turkish study involving final tenth grade high school students’ chemistry achievement, students with more independent learning styles had higher achievement [9]. Grasha and Yangarber-Hicks [19] reported similar findings in college students. Our findings were contradictory to these previous data. There may be sev-

ral reasons for such inconsistency: First, our study group included preclinical medical students, who were relatively unaccustomed to medical knowledge management. Secondly, the curriculum in our medical school might be overloaded with theoretical information. Third, such differences concerning “dependent females” can have a sociocultural background.

Gender has a considerable role regarding social, cultural, and economic issues, creating disadvantages for women in several extents of life. Such disparity is even more pronounced in education [20]. According to Haviland [21], “independence and dependence training” are associated with social and cultural patterns. Given the paternalistic structure of the society in Turkey, gender differences concerning “dependence training” and “independence training” are expected as a reflection of social gender roles on medical education.

Although collaborative style was not generally indicative of overall exam scores in our study, two-way ANOVA yielded a relatively weak association between collaborative style and success, especially in female students. Our results are in line with previous data revealing that college students with high collaborative styles were more likely to receive A's in technology-based and traditional courses [22]. However, not all studies support this association [9]. It is interesting to note that both competitive and collaborative styles were related to success in medical school to some extent in our group. This may be due to higher adaptive capacity of our students especially the females, concerning the measurement and assessment system. It is possible that avoidant and independent learners in our learning environment will not show such adaptive flexibility.

Limitations include a moderate participation rate (54%), and fairly low power (0.465) for the thematic block exams. Our output variables were exam scores and pass mark, which might not totally reflect performance-based long-term assessment.

In conclusion, competitive and collaborative primary learning styles are common in our setting. Competitive students had higher academic achievement scores than others. Female competitive and collaborative students achieved better than competitive and collaborative males. More studies in different cultural settings including gender differences are essential to further investigate the contribution of learning styles to student success in medical education.

### Competing interests

The authors declare that they have no competing interests.

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### References

1. Grasha AF, editor. Teaching with style: A practical guide to enhancing learning by understanding teaching & learning styles. San Barnadino: Alliance Publishers; 2002. p. 167-74
2. Hilliard RI, Tallett SE. The use of an objective structured clinical examination with postgraduate residents in pediatrics. Arch Pediatr Adolesc Med 1998; 152(1):74-8.
3. Slater JA, Lujan HL, DiCarlo SE. Does gender influence learning style preferences of first-year medical students? Adv Physiol Educ 2007; 31(4):336-42.
4. Hruska-Riechmann S, Grasha, AF. The Grasha-Riechmann Student Learning Style Scales. In: Keefe J, editor. Student learning styles and brain behavior. 1st ed. New York: National Association of Secondary School Principals, St. John's University; 1982. p. 81-6.

5. Turkish Medical Association. Undergraduate medical education report of Turkish Medical Association. Ankara: Turkish Medical Association; 2010. p. 55-7
6. Rosenfeld M, Rosenfeld S. Understanding teacher responses to constructivist learning environments: Challenges and resolutions. Science Education 2006; 90(3):385-99.
7. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. BMJ 2002; 324(7343):952-7.
8. Algina J, Olejnik S. Conducting power analyses for ANOVA and ANCOVA in between-subjects designs. Eval Health Prof. 2003; 26(3):288-314.
9. Uzuntiryaki E. Learning styles and high school students' chemistry achievement. Science Education International 2007; 18(1):25-37.
10. Hulley BS, Cummings SR, Browner WS, Grady D, Hearst N, Newman TB. Designing clinical research. Philadelphia: Lipinkott Williams & Wilkins; 2001. p. 238
11. Uzun A. Analyzing the learners before designing the instruction method: a case study in Turkey. The New Educational Review 2010; 21(2):121-131.
12. Budakoglu II, Babadogan C. Learning style scales and studies used with students of health departments of universities between 1998-2008. Tip Egitimi Dunyasi 2011; 30:17-28.
13. Gurpinar E, Alimoglu MK, Mamakli S, Aktekin M. Can learning style predict student satisfaction with different instruction methods and academic achievement in medical education? Adv Physiol Educ. 2010; 34(4):192-6.
14. Kalaca S, Gulpinar M. A Turkish study of medical student learning styles. Educ Health 2011; 24(3):459.
15. Baykan Z, Naçar M. Learning styles of first-year medical students attending Erciyes University in Kayseri, Turkey. Adv Physiol Educ 2007; 31(2):158-60.
16. Amir R, Jelas ZM. Teaching and learning styles in higher education institutions: Do they match? Procedia Social and Behavioral Sciences 2010; 7:680-4.
17. Gujjar AA, Tabassum R. Assessing learning styles of student teachers at federal college of education. Procedia Social and Behavioral Sciences 2011; 30:267-71.
18. Honigsfeld A, Dunn, R. Learning-Style Characteristics of Adult Learners. Delta Kappa Gamma Bulletin 2006; 72(2): 14-31.
19. Grasha AF, Yangarber-Hicks N. Integrating teaching styles and learning styles with instructional technology. College Teaching 2000; 48(1):2-10.
20. Ferreira, Francisco HG, and Jérémie G. Inequality of opportunity for education: the case of Turkey. State planning organization of Turkey and World Bank: working paper 4. Ankara; 2010.
21. Haviland WA, Prins H, McBride B, Walrath D. Cultural anthropology: The human challenge. Wadsworth: Cengage Learning; 2010. p. 131-145.
22. Aragon SR, Johnson SD, Shaik N. The influence of learning style preferences on student success in online vs. face-to-face environments. American Journal of Distance Education, 2002; 16(4):227-243.

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