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The Impact of Matching Learning-Teaching Styles on Students' Academic Achievement*

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ABSTRACT

Purpose: The primary aim of the current study is to identify whether there is a significant difference between students' academic achievements and the matching of students' learning styles to the teaching styles of their instructors. **Research Methods:** This research was designed as a survey study and employing the quantitative research methodology. The participants consisted of 479 students enrolled in a course titled "Introduction to Computers". The Grasha-Riechmann Learning Styles and Teaching Style Inventories were used to identify the students' dominant learning styles and instructors' dominant teaching styles.

Findings: In direction of the data analyzed with means, frequencies, t-test, and one way ANOVA; there was a statistically significant difference between the students' achievement scores and teaching styles [$F(3\text{-}475)= 11.112$, $p<.01$], conversely there was no statistically significant difference with learning styles [$F(4\text{-}474)= .473$, $p=.755$]. There was no statistically significant difference between matching teaching and learning styles and students' achievement scores [$t(477)=.714$, $p>.05$].

Implications for Research and Practice: The findings of the study showed that the students' achievement scores did not change significantly according to their learning styles; A significant difference was found between the students' achievements and the matching between the instructors' teaching style and the students' learning style. The scope of future studies could be expanded to a greater number of instructors. Considering that the measuring tool is based on the American education system, learning/teaching style inventories adapted to the national culture could be developed.

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Introduction

Changing our living-spaces has become a requirement in today's world where the production of many existing quality products has evolved through the development of more personalized products. Designs that consider personal characteristics, without compromising on quality, have become distinguished in every aspect of life, and individuals have even become capable of creating products of their choice through the use of 3D printers. Whilst previously, there were certain physical requirements such as height to become a pilot, today it is possible to arrange a pilot's seat according to their particular physical characteristics. These kinds of examples can also include customized cups, clothing, and chairs. Similar to such changes occurring in different aspects of daily life, changes have inevitably appeared in educational environments, too. The provision of existing educational programs in terms of their quality, utilization of the same courses, the same textbooks, and the same materials, all taught through the same teaching methods is no longer deemed sufficient in today's educational environment, which aims to accommodate a student population that learns in many different ways. Therefore, transitioning from standardized learning environments to environments that consider the different learning needs of students has become a significant issue in today's educational establishments.

Stephenson (2019) noted that in a speech delivered at Ohio State University, Professor Tony Garcia highlighted the question, "How can I teach you if you do not know how to learn?" This is a remarkably interesting question. According to Wilson (2012), the increase in the number of studies on learning styles represents the educators' search for the optimal methods to enhance student learning processes. Many countries invest in their students and their education. Given the effort, time, and cost of this process, minimizing student failure rates appears as an important subject of study for researchers. As pointed out by Khan and Rashid (2018), variables such as "why students drop out from the education system," "what kind of challenges they continue to face," and "which factors play a role in their success and failure" have become significant areas of research.

Over the past decades, there has been a substantial increase in the number of studies based on the opinion that the interaction between students and instructors is highly significant to the quality and nature of learning, which is affected by the underlying learning process (Ayeni, 2011; Wesonga, 2019). Today, discussions on the coherence between learning style and teaching style continue (Schoen, 2018). Gilakjani (2012) defined teaching and learning styles as alterations that occur in the behaviors and actions of both students and their instructors. In a learning process, if students realize high levels of achievement, it can be said that the appropriate learning methods have been adapted to the learning styles and preferences of the individual student (Stephenson, 2019). Similarly, Reid (1995) stated that the underlying reason for students' academic failure, their disappointments experienced during the learning process, and their lack of motivation may point to inconsistencies between the learning styles of students and the teaching styles of their instructors. Another study that was conducted in Thailand supported the arguments of Reid (1995), stating that when

student problems such as truancy and dropout from school education, and the rise of aggressive behaviors were taken into consideration, such problems were found to be associated with inconsistencies between learning and teaching styles (Damrongpanit and Reungtragul, 2013). The issue of matching learning and teaching styles and its impact on the active participation of students should, therefore, be addressed by future research studies (Awla, 2014; Tuan, 2011). Certain studies have highlighted positive results of such matching, whilst a few have remarked that it may result in negative consequences (Awla, 2014).

Most of the studies related to this issue were conducted in the field of English Language Teaching. Many of these studies had a focus on learning styles and, interestingly, most suggested conducting further studies to better match learning and teaching styles. Considering the literature, it is important in terms of the necessity of the study that an ICT-related course and studies where matching learning-teaching styles are handled together.

There have been various definitions put forward regarding the concept of learning style, which is the focal point of the current study. The definitions of influential theorists have included; how people learn (Gregorc, 1979); the interaction of an individual in the framework of what was learned (Gregorc, 1979; James and Galbrait, 1985; Keefe and Ferrell, 1990); how the mind works (Gregorc, 1979); considering learning as a concept of seven cognitive dimensions (vision, hearing, moving, touching, writing/reading, smelling/tasting, and interpersonal communication) (James and Galbraith, 1985); mental habits and preferences (Ehrman and Oxford, 1990); coping mechanisms of the individual in new and challenging situations (Dunn and Dunn, 1979; Ehrman and Oxford, 1995); the combination of individual cognitive, affective, and physiological characteristics (Collinson, 2000; Keefe and Ferrell, 1990); a process of receiving information and storing it in the mind (Dunn and Dunn, 1979); and the results of an individual's personality, as well as their socio-cultural and educational experiences (Nunan, 1995). In summary, the concept of "learning style" can be briefly defined as reflecting what is learned from cognitive, affective, and physiological perspectives. According to Duchovičová and Kozárová, (2016), the quality and structure of each persons' learning style and the flexibility of her/his learning style, as well as its method of application, is different for everyone.

Theorists who defined learning styles also developed several learning models and assessment instruments based on these learning models. The best-known examples include Jung's Theory of Psychological Type (1971), Grasha-Riechmann's Learning Style Model (Riechmann and Grasha, 1974), Kolb's Learning Styles (1976), Simon and Byrum's Learning Style Model (1977), Dunn and Dunn's Model of Learning Styles (1979), Hunt's Learning Styles (1979), Silver and Hanson's Theory of Learning Style (1980), Lawrence's Learning Style Model (1982), Butler's Learning Style Model (1984), Witkin's Field-dependent and Field-independent Cognitive Styles (1986), Gregorc's Mind Styles Model (1998), McCarthy's Model of 4MAT Learning Cycle (1990), and lastly Merill's Social Style (2000).

Given that the focus of the current research study was both learning and teaching styles, the Grasha-Riechmann Learning Styles Inventory, which includes assessment instruments for both styles, was employed. The Grasha-Riechmann Learning Style Model includes six learning styles: (1) the "competitive type" performs to receive grades higher than their peers, with a desire to stand out based on their academic achievement; (2) the "collaborative type" cooperates with peers and instructors, and are successful in group projects (note: the "competitive type" and "collaborative type" may hamper each other's learning process); (3) the "avoidant type" is unenthusiastic about lectures and the learning content, preferring to spend time on more entertaining tasks; (4) the "participant type" is the opposite of the "avoidant type," and are enthusiastic about lectures and the learning content; (5) the "dependent type" only receives the required information and seeks support from authority sources such as their instructors and peers and have difficulties overcoming uncertainty; and lastly, (6) the "independent type" tends to receive information of their own choice and prefers to work alone, feeling challenged in situations that require cooperation or collaboration.

The individual differences in educational environments should not only address the personal differences of individual students, but also differences between instructors who are important stakeholders in the teaching-learning environment. In this context, the first step is to define the concept of "teaching style." Like many others, Gregorc (1979) defined the concept as the personal behaviors of the instructor. A teaching style, therefore, consists of the behaviors of the instructor displayed during the teaching process. However, the concepts do not refer to the personality traits of an instructor, but to observable behaviors such as an instructor's voice whilst asking questions in the classroom, their way of addressing students, and the way that they convey new ideas to their students. Therefore, teaching style is what is performed and is not performed by an instructor (Grasha, 2002; Hyman and Rosoff, 1984). Gayle (1994) stated that teaching style is based on the instructor's personal needs, professional objectives, and also their personal beliefs.

Both Dunn and Dunn (1979) and also Stitt-Gohdes (2001) indicated that instructors teach in the way that they themselves learn more effectively. In the literature, learning styles have been defined as the mediation behavior of an instructor on both students' and instructors' cognitive characteristics (Butler, 1984); the behaviors of an instructor displayed when teaching a course and interacting with their students (Bennet, 1979); a presumptive structure associated with the cluster of an instructor's behaviors (Conti, 1985); the instructor's interaction with students that demonstrates their interest and the provision of support (Hilligoss, 1992); a predisposition towards the attitudes and purposes based on personal and social history and culture, in the teaching-learning transaction (Whittington and Raven, 1995); an instructor's behaviors based on their beliefs and habits, which leads the instructor to guide their thoughts and actions within the classroom (Heimlich and Norland, 2002); and as a set of behaviors and processes that are triggered within each step of the teaching process (Batista, Portilho, and Rufini, 2015).

The researchers who contributed a theoretical framework to the teaching styles in the literature and proposed a model which includes Brekelmans, Levy, and Rodriguez (1993); Butler (1984); Canfield and Canfield (1976), Dunn and Dunn (1979); Grasha (1994); Guven, Polat, Yildizer, Sonmez, and Yetim (2016); and Witkin (1986). Similar to learning styles, theorists also developed various classification systems for teaching styles as well. These systems were briefly explained by Lacey, Saleh, and Gorman (1998) as follows: five types of teaching styles, as drillmaster, content-centered, instructor-centered, intellect centered, and person-centered (Axelrod, 1970); teaching styles classified according to five levels, from highly content-centered to highly people-centered (Robinson, 1986); two types of teaching, as proactive and reactive (Lenz, 1982); three types of teaching, as guided learning, exposition, and inquiry (May Oi and Stimpson, 1994); two types of teaching, as learner-centered and subject-centered (Beder and Darkenwald, 1982; Crouch and Powell, 1983; Knowles, 1980; Rogers, 1969); three types of teaching, as behavior-centered, discovery-learning, and rational model (Nuthall and Snook, 1973); and various types of learning, such as business-like, objective, impersonal approach, communicative approach, personal approach, self-involvement approach, sensitivity to students approach, proactive approach, and stimulating approach (Solomon and Miller, 1961).

Guven et al. (2016) summarized the teaching style inventories as follows: Brostrom's Training Style Inventory (1975), Canfield and Canfield's Instructional Styles Inventory (1976), Dunn and Dunn's Teaching Styles Inventory (1979), Reid's Teaching Style Preferences Questionnaire (1987), Van Tilburg-Heimlich Sensitivity Measure (1990), Brekelmans, Levy, and Rodriguez's Questionnaire on Teacher Interaction (1993), Grasha's Teaching Styles Inventory (1994), Type Indicator for Adults Inventory (1996), Kulinna and Cothran's Values Perception of Physical Education Teachers Questionnaire (2003), Leung, Lue, and Lee's Teaching Style Inventory (2003), and the CORD Teaching Style Inventory (2005). One more recent inventory can be also added to this list, which is the Portilho/Banas Teaching Style Inventory (Batista et al., 2015).

As previously mentioned, the Grasha-Riechmann Learning Styles Inventory, which includes assessment instruments for both learning and teaching styles, was employed in the current study given that the research addressed both styles. Grasha (2002) defined five teaching styles, which were "Expert," "Formal Authority," "Personal Model," "Facilitator," and "Delegator." The Expert type possesses expertise in the subject area and strives to transmit the required information and expertise to their students. However, interacting with less experienced students might be considered challenging for the expert. The Formal Authority type possesses status and is considered to be highly knowledgeable, and accomplished in providing feedback to their students, meets the required demands, and establishes rules of conduct and standards. These types of instructors are concrete on their standards but may therefore be seen as challenging by their students due to a lack of flexibility. The Personal Model type of instructor is skilled in conveying their approach to their students, providing daily-life examples, and guiding their students by establishing a prototype for thinking and behaviors. These types of instructors may lead students, who could not

otherwise meet the expectations despite the guidance, to feel somewhat inadequate. The Facilitator type instructor behaves as a project advisor, providing their students with alternative ways, nurturing courage, and supporting them to ask questions, to explore different options, to act independently, to take the initiative, and to share responsibility. Providing these types of opportunities requires experience and time. Finally, the Delegator type instructor provides the capacity for students to work autonomously and considers their role to be that of a resource.

Aim of the Study

As mentioned before, some studies suggest that students' academic failures, disappointments in the learning process, and motivation disorders may underlie the mismatch between students' learning styles and instructors' teaching styles. Some studies have also shown negative effects. In this context, there are scales for determining the learning and teaching styles of different theoreticians. It is important to investigate the effect of learning-teaching style matching on students' achievement in computer literacy courses, which were not frequently encountered in previous studies. The primary aim of the current study is to identify whether there is a significant difference between students' academic achievements according to the matching instructors' teaching styles and their students' learning styles in the "Introduction to Computers Course". The research questions are as follows:

1. Is there a significant difference in the academic achievement scores of students according to their learning style?
2. Is there a significant difference in the academic achievement scores of students according to the teaching styles of their instructors?
3. Is there a significant difference between students' academic achievement and the matching of students' learning styles to the teaching styles of their instructor?

Method

Research Design

The current study was designed as a survey study (suitable to define an existing situation without intervening [Karasar, 2002]) and employed the quantitative research methodology. The research process of the study is illustrated as shown in Figure 1.

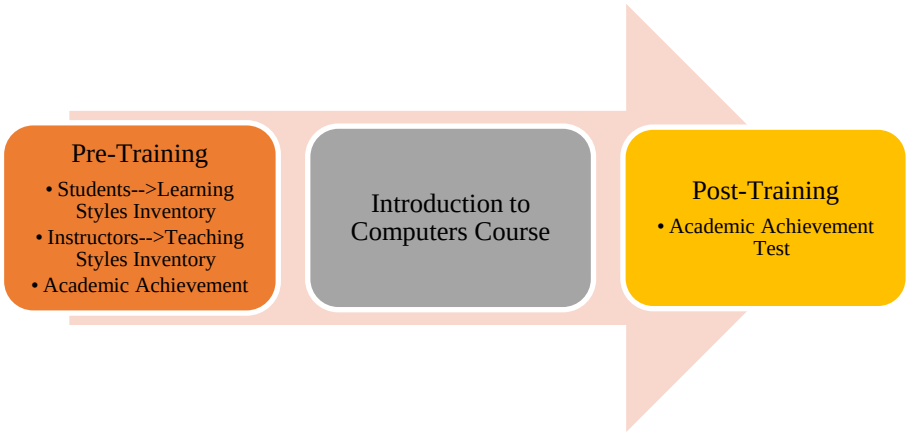

Figure 1. Matching Learning-Teaching Styles

Study Group

The study group consisted of 479 students who were studying at different faculties and enrolled in a course titled "Introduction to Computers" which was provided by the Department of Informatics, as well as the five instructors who delivered this course.

A comparison of the students' academic area and their gender is provided in Table 1.

Table 1

Distribution of Students' Academic Area According to Gender

Academic Area	Female		Male		Total	
	n	%	n	%	n	%
Social fields	108	41	52	24	160	33
Mathematical fields	79	30	101	46	180	38
Vocational school	38	15	30	14	68	14
Health fields	30	12	31	14	61	13
Education	6	2	4	2	10	2
Total	261	54	218	46	479	100

Participants in the current study included 68 students studying at one of five different Vocational Schools; 61 were studying in the field of Health Sciences at the faculties of Medicine, Pharmacy, Dentistry, Veterinary, or Health Education; 160 were studying in the Social Sciences at the faculties of Language, History, Geography, Law, Theology, Communication, or Political Sciences; 10 students were studying at Faculty

of Education; and 180 students from Mathematical fields such as faculties of Science, Engineering, or Agriculture. 54% of the participants were female.

The Teaching Styles Inventory was used in the study and given that the original inventory used the expression "Teacher," the term "teacher" was replaced with "instructor" in this study. Four of the instructors who participated in the current study were aged between 23 and 25 years old, and one was aged 40 years old. All of the instructors were recorded as being male.

Data Collection Tools

This study employed the Grasha-Riechmann Learning Styles Inventory (GRLSI) to identify the dominant learning styles using an unpublished Turkish adaptation by Zereyak (2002), which was then later published (Zereyak, 2005). The scale identifies three levels of learning styles as low, medium, and high. The Turkish adaptation of the scale was applied to 239 students, with the results of the descriptive statistics presented in Table 2. The reliability analysis of the whole scale and 6 subscales, each consisting of ten items in the original scale results is presented in Table 3.

Table 2

GRLSI Analysis of Descriptive Statistics of Subscales (Zereyak, 2002)

Subscale	N	Min	Max	X	S
Independents	239	1.1	4.9	3.814	.504
Avoidants	239	1.6	4.3	2.881	.483
Collaboratives	239	1.6	5.0	3.722	.571
Dependents	239	1.6	4.9	3.808	.497
Competitives	239	1.1	5.0	3.097	.657
Participants	239	1.4	4.8	3.251	.561

Table 3

GRLSI Reliability Analysis Results

Subscale	**Dependents**	**Competitives**	**Participants**	**Independents**	**Collaboratives**	**Avoidants**	**All**
Number of Items	10	10	10	10	10	10	60
Alfa	.66	.78	.66	.73	.76	.53	.83

Table 3 shows that the reliability coefficient of the GRLSI was .83, and considered to be considerably high (see Buyukozturk, 2003). On the other hand, the reliability coefficients of the subscales of GRLSI, of which each subscale contains 10 items, varied

from .53 to .78, and therefore the reliability of these values can be accepted as being of a medium level (Buyukozturk, 2003).

The difference between the results of the assessment obtained from the scale applied every other week to the fourth-year students at the Faculty of Education, Department of Computer and Instructional Technology at Ankara University determined the test-retest correlation of the Turkish adaptation of the GRLSI and was calculated using the Pearson correlation coefficient. The results revealed that the scale was significant at the .01 level across all subscales.

Grasha (2002) grouped the scores that can be received from GRLSI as low, medium, and high, based on the norms and also defined lower and higher limits for each of these groups. Considering standard deviations Zerayak (2002) defined 5 sections for each group in his Turkish version. In this study, to match teaching-learning styles, the Turkish adaptation study of Zerayak (2020) was taken as the basis, but it was grouped into 3, like Grasha.

The dominant learning styles of the 479 participant students of the current research study are presented in Table 4.

Table 4

Dominant Learning Styles of Participant Students

Subscale	n	$\bar{x}$	%	S	Low	Medium	High
Independents	73	4.55	11.08	0.16	[1.0-3.2]	[3.3-4.3]	[4.4-5.0]
Avoidants	21	3.80	3.19	0.30	[1.0-2.3]	[2.4-3.4]	[3.5-5.0]
Collaboratives	64	4.57	9.71	0.18	[1.0-3.1]	[3.2-4.3]	[4.4-5.0]
Dependents	30	4.53	4.55	0.14	[1.0-3.2]	[3.3-4.3]	[4.4-5.0]
Competitives	130	4.22	19.73	0.29	[1.0-2.3]	[2.4-3.8]	[3.9-5.0]
Participants	131	4.19	19.88	0.27	[1.0-2.6]	[2.7-3.8]	[3.9-5.0]
Unknown	210		31.87				

Table 4 points to an interesting result, in that 31.87% (n = 210) of the students did have no dominant learning style. One of the main reasons for this situation might be that first-year university students, who are mostly adolescents, may have insufficient knowledge about themselves; or that 59% of the students who participated in the study were studying social subjects, and therefore did not feel sufficiently equipped to study for a mathematical course such as "Introduction to Computers."

While Grasha addressed both learning styles and teaching styles, she emphasized that students may have more than one dominant learning style or that while one learning style is dominant, other styles may also have secondary dominance. The same is true for the teaching styles of the instructors. He explains this situation with the artist-palette analogy. Just as the artist can take different colors in his palette while painting and blend them, the student/instructor can blend his styles. Consequently,

Grasha, who regards confining a person to a certain style as "stinginess", had created 4 clusters for both learning and teaching styles. Thus, matching has been made easier. According to Grasha, these clusters are defined as;

Cluster 1	DTS*: Expert/Formal Authority
	DLS*: Dependent/Participant/Competitive
Cluster 2	DTS: Personal Model/Expert/Formal Authority
	DLS: Participant/Dependent/Collaborative
Cluster 3	DTS: Facilitator/Personal Model/Expert
	DLS: Collaborative/Participant/Independent
Cluster 4	DTS: Delegator/Facilitator/Expert
	DLS: Independent/Collaborative/Participant

*DTS refers to Dominant Teaching Styles; DLS refers to Dominant Learning Styles

Grasha listed these teaching and learning styles in order of importance for a particular style combination.

For the identification of the instructors' dominant teaching styles, the *Teaching Style Inventory (GTSI)* (which was adapted for the native language of the participants by four educational technology experts) was employed. To show the reliability levels of each teaching styles of GTSI, Cronbach's Alpha Levels can be listed respectively as .85 for Inventory, .75 for Expert, .80 for Formal Authority, .66 for Personal Model, .84 for Facilitator, .70 for Delegator and .85 for the whole scale (Grasha, 1996). The dominant teaching styles of each of the instructors who participated in the current study are shown by grey shading in Table 6. Grey shadings are marked according to the high scores defined by Grasha (given as the last row of Table 5).

Table 5

Dominant Teaching Scores of Instructors

Instructor	Expert	Formal Authority	Personal Model	Facilitator	Delegator
Instructor 1	6.00	5.38	6.38	5.88	5.25
Instructor 2	4.88	4.75	5.88	2.88	4.25
Instructor 3	5.50	4.25	5.88	5.00	3.63
Instructor 4	5.38	5.50	5.63	5.25	4.75
Instructor 5	5.88	6.00	6.00	5.13	4.50
Low Scores	[1.0-3.2]	[1.0-4.0]	[1.0-4.3]	[1.0-3.7]	[1.0-2.6]
Moderate	[3.3-4.8]	[4.1-5.4]	[4.4-5.7]	[3.8-5.3]	[2.7-4.2]
High Scores	[4.9-7.0]	[5.5-7.0]	[5.8-7.0]	[5.4-7.0]	[4.3-7.0]

The distribution of dominant teaching styles of the participant instructors, according to Grasha's (2002) teaching styles, is presented in Table 6.

As explained above, Grasha has gathered the dominant and secondary teaching styles that the instructors can have under 4 clusters, depending on the norms. The clusters that included 5 instructors who participated in this research are shown in Table 6.

Table 6

Distribution of Instructors According to Teaching Styles

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Instructors	3, 4	2	1	5

Table 6 shows that two of the instructors were placed in the teacher-centered group (Cluster 1), and other instructors were each placed in Cluster 2, 3, and 4, accepted as more student-centered. In many countries, the number of teachers who are disposed to reflect their opinions was high. Indeed, the study conducted by Grasha in 2002 revealed that 38% of 560 students were shown to be in Cluster 1 and that this group also had the largest proportion of teachers. Also, in a study conducted by Tuan (2011), the findings showed that three out of four participants preferred traditional teaching methods.

The distribution of participant students according to the learning-teaching clusters defined by Grasha (2002) is presented in Table 7.

Table 7

The Distribution of Students According to Learning-Teaching Style Clusters

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Unclear	Total
n	113	51	43	41	231	479
%	24	11	9	8	48	100

To identify whether or not the students' learning styles and the instructors' teaching styles are consistent, the situation in which both styles have a mutual learning/teaching cluster was coded as "1," and the opposite situation was coded as "0." Table 7 shows an accumulation of 24% students in the first cluster. The findings can be interpreted as; these students having studied in overcrowded classrooms from their primary school years until high school and were exposed mostly to a teacher-centered education. However, the findings also revealed that the styles of 231 students (48%) were not matched. The findings of the study conducted by Sabeh et al. (2011) also presented similar results. Table 8 presents the match level established between the learning styles of the students and the teaching styles of the instructors.

Table 8

Distribution of Matching Between Instructor and Student Styles

Cluster 1		**Cluster 2**	**Cluster 3**	**Cluster 4**	
Instructor 3	Instructor 4	Instructor 2	Instructor 1	Instructor 5	TOTAL
28	30				
58		16	15	19	108

The study's findings showed that the first cluster was teacher-centered as mentioned in the previous sections which provided information both for students and instructors. Similarly, this is clearly shown in Table 8.

The Academic Achievement Test is another data collection tool employed in the current study. For this test, a total of 35 items were developed, and after preparation of the test, it was evaluated by two educational technologists, three instructors who delivered the "Introduction to Computers" course, and two ICT teachers. In total, seven experts took part in this process using a 5-point Likert-type scale in their evaluation. According to the experts' evaluation, five questions were proposed which had a question average below 2.5, and some of the items were subsequently amended. The pre-implementation final version of the achievement test, which comprised of a total of 30 items, was applied to 48 students. Some items which had an *r*-value lower than .20 (Items 11, 15, 17, 27, and 30) were eliminated, and the correlation between the repeated items and the test score was then calculated. The final version of the Academic Achievement Test was calculated as .72 according to the KR-20 formula. These findings showed that the test was deemed reliable. The experts analyzed the table of specifications and unit analysis table for the Academic Achievement Test, whose final version consisted of 25 items, and reached a consensus that the 25 items met the course objectives.

Results

The first aim of the study was to answer the question, "Is there a significant difference in the academic achievement scores of students according to learning style". To facilitate interpretation of this research question, giving information about the means of the students' academic achievement scores according to the learning styles will be enlightening. But as is explained above, a student may have more than one dominant learning style. However, most of the students who participated in this study have no dominant learning style. Therefore, it was preferable to give information about the distribution of the means of the students' academic achievement scores according to the learning-teaching style clusters (see Table 9).

Table 9

The Distribution of the Means of The Students' Academic Achievement Scores According to The Learning-Teaching Style Clusters

Cluster No	Clusters	N	$\bar{X}$	%	S	Min	Max
0	Undefined (210 Unknown + 21Avoidants)	231	73.55	48	12.77	28	96
1	Dependent/Participant/ Competitive	113	74.41	24	11.92	40	96
2	Participant/Dependent/ Collaborative	51	73.69	11	12.80	40	92
3	Collaborative/Participant/Independent	43	72.05	9	13.83	44	92
4	Independent/Collaborative/Participant	41	75.51	8	13.52	28	96
Total		479	73.81	100	12.71	28	96

For the first research question, one-way ANOVA was employed after the assumptions for ANOVA (each factor level should have a normal population distribution; distributions should have the same variance; the data should be independent) had been met. The relevant findings are summarized in Table 10.

Table 10

ANOVA Results According to Students' Academic Achievement Scores Based on Learning Styles

Source of Variance	Sum of Squares	SD	Mean of Squares	F	p
Between groups	307.014	4	76.754	.473	.755
Within groups	76897.929	474	162.232		
TOTAL	77204.944	478			

According to Table 10, the academic achievements of the students did not differ significantly according to their learning styles [$F_{(4\text{-}474)} = .473$, $p = .755$].

The second research question was "Is there a significant difference in the academic achievement scores of students according to the teaching styles of their instructor?"

For this purpose, one-way ANOVA was used to compare the teaching styles separated into five levels and academic achievement. The findings are presented in Table 11.

Table 11

ANOVA Results According to Students' Academic Achievement Scores Based on Instructor Teaching Style

Source of the Variance	Sum of Squares	SD	Mean of Squares	F	p	Significant difference
Between groups	5062.962	3	1687.654	11.112	.000	1-3,2-3,4-3*
Within groups	72141.962	475	151.878			
TOTAL	77204.944	478				
* Cluster 1	Expert/Formal Authority					
Cluster 2	Personal Model/Expert/Formal Authority					
Cluster 3	Facilitator/Personal Model/Expert					
Cluster 4	Delegator/Facilitator/Expert					

Table 11 shows that academic achievement differed significantly according to the teaching styles of the instructors [$F_{(3\text{-}475)} = 11.112$, $p < .01$]. According to the Scheffe Test results, there are significant differences between Cluster 1-Cluster 3; Cluster 2-Cluster 3; and Cluster 4-Cluster 3.

The third research question was, "Is there a significant difference between students' academic achievements and the matching of students' learning styles to the teaching styles of their instructor?" In this context, the difference between the two variables was tested using *t*-test, and the findings of the test are summarized in Table 12.

Table 12

T-Test Results of Difference Between Academic Achievement Scores According to Matching Learning-Teaching Styles

Matching	**n**	**$\bar{x}$**	**S**	**SD**	**t**	**p**
Matched	372	73.58	12.91	477	.714	.476
Unmatched	107	74.58	12.02			

The findings revealed that the academic achievement of the students whose learning styles were matched to the teaching styles of their instructors ($\bar{x}$ = 73.58) was lower than that of the students whose learning styles were not matched to the teaching styles of their instructors ($\bar{x}$ = 74.58). However, according to the findings, no significant difference was found between the teaching styles of the instructors, the learning styles of the students, and the academic achievement of the students [t (477) = .714, p > .05].

Discussion, Conclusion, Recommendations

The findings of the current study showed that the students' academic achievement levels did not change significantly according to their learning styles. This finding is consistent with the results of a study conducted by Dizdar (1993) with bachelor's and master's students. There was also no significant difference found between the students' academic achievement and the match between the instructors' teaching style and the students' learning style. These findings are consistent with other research findings such as in a study conducted by Cekic (1991). On the other hand, the academic achievements of those students whose learning styles did not match the teaching styles of their instructors were found to be higher than those whose learning styles did match with the teaching styles of their instructors. However, the 1-point difference between these groups was not found to be statistically significant.

The findings of the current study were also seen to be consistent with the published literature. The doctoral dissertation of Tucker (1988) identified the learning styles of students who received a business course and the teaching style of their instructors by using the Canfield Learning/Teaching Styles Inventories. In the context of this course, Tucker analyzed the relationship between the teaching-learning style match, and both the class ranking and final grades of the students and determined the students' achievement performance using two-way analysis of variance. The study found no significant difference between the students' achievements following the course, the teaching styles of their instructors, and the match between their learning styles.

In studies conducted following the data collection of the current study, researchers also examined learning, teaching styles, and student achievement. However, as stated by Damrongpanit and Reungtragul (2013), although there was an attempt to explain the relationship between these three variables, other variables such as the specific difficulties that arose whilst teaching a certain subject, student age group, and the context of the school should be taken into consideration. The findings of a study by Tuan (2011) also supported this interpretation. Both Tuan (2011) and Awla (2014) revealed that instructors should attempt to balance their teaching styles to overcome issues regarding learning style differences. Furthermore, Tuan (2011) emphasized certain advantages provided by the matching methods, although stretching teaching styles can also negatively impact student achievement. Nevertheless, Awla (2014) noted that the non-matching of learning and teaching styles may lead to more successful outcomes for inexperienced students who are still at the beginning of the learning process.

The study conducted by Spoon and Schell (1998) in a vocational school located in the state of Georgia used the Principles of Adult Learning Scale to determine learning and teaching styles. Their study concluded that there was no significant difference between the consistent and inconsistent groups. In a study conducted by Tuan (2011), the matching of learning and teaching styles in teaching English as a foreign language to Vietnamese students used the surveys developed by Kolb and Felder. The results of the study showed that stretching the teaching styles according to the learning styles produced unsuccessful outcomes.

For the future, the researcher suggests the following:

- As the current study is limited to five instructors, the scope of future studies could be expanded to a greater number of instructors.
- Considering that Grasha's clusters of learning/teaching styles are based on the American education system, learning/teaching style inventories adapted to the national culture could be developed.
- Research studies could analyze the relationship between attitude towards a course and learning style.
- Research studies could focus on the newest courses being taught to update the literature according to the current learning and teaching styles.

As expressed by Heimlich and Norland (2002), there is no "bad" teaching style. However, this should not impede instructors from improving themselves professionally. Developing an awareness regarding learning/teaching styles may be useful for individuals about to start in their professional life as an instructor or teacher, and also for their students.

Limitations

The main limitation of this study is that most of the students did not have any dominant learning styles.

Research and Publication Ethics Statement

Only volunteer participants participated in the study. Researchers have paid attention to all ethical principles and rules in the collection, analysis, and reporting of data.

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Öğrenme-Öğretme Stili Eşleştirmesinin Öğrenci Başarısı Üzerindeki Etkisi

Atıf:

Karatas, E. & Yalın, İbrahim, H. (2021). The Impact of Matching Learning-Teaching Styles on Students' Academic Achievement. Eurasian Journal of Educational Research 92, 377-402, DOI: 10.14689/ejer.2021.92.19

Özet

Problem Durumu: Öğretim sürecinden etkilenen öğrenmenin kalitesini ve doğasını belirlemede öğrenci ve öğretmen arasındaki etkileşimin çok önemli olduğu görüşünden yola çıkarak yapılan araştırmalarda son 20-30 yılda çok sayıda artış görülmektedir (Ayeni,2011; Wesonga, 2019). Günümüzde öğrenme stili–öğretme stili arasındaki uyum üzerine tartışmalar da hala devam etmektedir (Schoen, 2018). Gilakjani (2012), öğretme ve öğrenme stillerini, öğrenme sürecindeki öğretmen ve öğrencilerin davranış ve eylemlerindeki değişimler olarak tanımlamaktadır. Eğer bir öğrenme sürecinde öğrenenlerin kazanımları yüksekse, o öğrencilerin her birinin öğrenme stili ve tercihine uygun öğretim yöntemlerinin uyarlandığı söylenebilir (Stephenson, 2019). Öğrenme ve öğretme stillerinin eşleştirilmesinin öğrencilerin öğrenme sürecine aktif olarak katılımını etkileyip etkilemediğinin belirlenmesi araştırılması gereken bir konudur (Tuan, 2011; Awla, 2014). Bu eşleştirmenin olumlu sonuçları olduğunu vurgulayan çalışmalar olduğu gibi az sayıda olmakla birlikte olumsuz etkilerinin de olabileceğine dair çalışmalar da söz konusudur (Awla, 2014).

Araştırmanın Amacı: Bu araştırmada "Bilgisayara Giriş dersini veren öğretim elemanlarının öğretme stilleri ile bu dersi alan öğrencilerin öğrenme stillerinin eşleştirilmesi ile öğrencilerin akademik başarıları arasında anlamlı bir ilişki olup olmadığının araştırılması" amaçlanmıştır. Yüksek lisans tezi kapsamında gerçekleştirilen bu çalışmanın alt amaçları ise şu şekilde sıralanabilir: Öğrencilerin akademik başarı puanları,

1 öğrencilerin öğrenme stillerine göre anlamlı bir farlılık göstermekte midir?"

2 öğretim elemanlarının öğretme stillerine göre anlamlı bir farlılık göstermekte midir?

3 Öğrencilerin akademik başarıları ile öğrencilerin öğrenme stilleri ve öğretim elemanlarının öğretme stillerinin eşleştirilmesi arasında anlamlı bir ilişki var mıdır?

Araştırmanın Yöntemi: Bu araştırma nicel araştırma yöntemlerinden korelasyonel araştırma olarak desenlenmiştir. Ankara Üniversitesi Enformatik Bölümünce sunulan Bilgisayara Giriş dersine kayıtlı farklı fakültelerde okuyan 479 öğrenci ve bu dersi veren 5 öğretim elemanı oluşturmaktadır. Bu araştırmaya 5 farklı Meslek Yüksekokulu'ndan 68 öğrenci katılmıştır. Tıp, Eczacılık, Diş Hekimliği, Veterinerlik

ile Sağlık Eğitimi faküllerinden toplamda 621 öğrenci Sağlık Bilimleri alanından; Dil, Tarih ve Coğrafya, Hukuk, İlahiyat, İletişim ile Siyasal Bilgiler Fakültelerinden olmak üzere toplam 160 öğrenci Sosyal Alanlardan, Eğitim Fakültesinden 10 ve Fen, Mühendislik ve Ziraat Fakültesinden 180 öğrenci ise Sayısal Alanlardan araştırmaya katılmıştır. Toplamda katılım sağlayan 479 öğrencinin %54'ü kadın öğrencilerdir. Araştırmaya katılan öğretim elemanlarının dördü 19-25 yaş arasında ve biri 40 yaşındadır ve öğretim elemanlarının beşi de erkektir.

Bu araştırmada öğrencilerin baskın öğrenme stillerini belirlemek amacıyla kullanılmasına karar verilen ölçek Grasha–Riechmann Öğrenme Stilleri Envanteridir (GRÖSE) Bu envanter, Zereyak tarafından 2002 yılında o dönemlerde henüz yayımlanmamış Türkçe uyarlama çalışmasından yararlanılarak düşük, orta ve yüksek olmak üzere 3'lü öğrenme stilleri belirlenmiştir. Ölçeğin bu Türkçe versiyonu 239 öğrenci tarafından işaretlenmiştir. GRÖSE'nin güvenirlik katsayı .83 ile oldukça güvenilirdir. Her birinin 10 maddesi bulunan GRÖSE'nin alt ölçeklerin güvenirlik katsayıları ise .53 ile .78 görülmektedir, ki bu değerler de orta düzeyde güvenilir kabul edilmektedir (Büyüköztürk, 2003). Türkçe'ye uyarlanan GRÖSE'nin test-tekrar test korelasyonuna bakmak üzere Ankara Üniversitesi Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü 4. sınıf öğrencilerine bir hafta arayla uygulanan ölçekten elde elde edilen ölçümler arasındaki ilişki Pearson korelasyon katsayısı ile hesaplanmıştır ve ölçeğin tüm alt ölçeklerinde .01 düzeyinde anlamlı olduğu sonucuna varılmıştır. Grasha (2002), GRÖSE'den alınabilecek puanları düşük, orta ve yüksek olarak gruplamış ve bu gruplar için alt ve üst sınırları belirlemiştir.

Öğretim elemanlarının baskın öğretme stillerinin belirlenmesinde ise Grasha'nın Öğretme Stilleri Envanteri (GÖSE) kullanılmıştır. Eğitim teknolojileri alanında uzman olan dört kişi tarafından ölçek Türkçe'ye çevrilmiştir. GÖSE'nin Türkçe sürümü 5 öğretim elemanı üzerinde uygulanmıştır.

Akademik Başarı Testi için 35 madde geliştirilmiş, hazırlanan test 7 uzman tarafından 5li Likert tipi ölçek kullanılarak değerlendirilmiştir. Uzmanların değerlendirmelerine göre soru ortalaması 2,5 altında olan 5 soru çıkarılmış, bazı maddelerde ise düzeltme yoluna gidilmiştir. 30 madde ile son hali verilen başarı testin ön uygulaması aynı dersi daha önce almış 48 öğrenci üzerinde uygulanmıştır. r değeri 0,20'den küçük olan bazı maddeler atılarak tekrar maddelerin puanı ile test puanı arasındaki ilişkili hesaplanmıştır. Başarı testinin güvenirliği KR-20 formülüne göre .72 olarak hesaplanmıştır. Bu sonuç testin güvenilir olduğunu göstermektedir. Uzmanlar, 25 soru ile son hali verilen Akademik Başarı Testi için dersin belirtke tablosu ve ünite analizi tablosunu incelemişler ve 25 sorunun ders hedeflerini karşıladığı görüşünde birleşmişlerdir.

Araştırmanın Bulguları: Araştırmanın ilk alt amacı öğrencilerin akademik başarı puanlarının, öğrenme stillerine göre anlamlı bir şekilde farklılaşıp farklılaşmadığıdır. Bu alt amacın test edilmesi için tek faktörlü ANOVA işe koşulmuştur. Öğrencilerin akademik başarıları, öğrencilerin öğrenme stillerine bağlı olarak anlamlı bir şekilde değişmemektedir [$F_{(4-474)}$= ,473, p=.755].

Araştırmanın ikinci alt amacı olan "Öğrencilerin akademik başarı puanları, öğretim elemanlarının öğretme stillerine göre anlamlı bir farlılık göstermekte midir?" sorusuna cevap bulmak amacıyla tek faktörlü ANOVA analizinden yararlanılmıştır. Akademik başarı, öğretim elemanlarının öğretme stillerine bağlı olarak anlamlı bir şekilde değişmektedir [$F_{(3-475)}$= 11.112, p<.01].

Bu araştırmada öğrencilerin akademik başarıları ile öğrencilerin öğrenme stilleri ve öğretim elemanlarının öğretme stillerinin eşleştirilmesi arasında anlamlı bir ilişki olup olmadığı sorusu üçüncü alt amaç olarak sunulmuştur. Bu bağlamda her iki değişken arasındaki ilişki t-testi ile analiz edilmiştir. Öğrenme stilleri kendi öğretim elemanlarının öğretme stilleri ile eşleştirilen öğrencilerin akademik başarıları ($\bar{x}$=73.58), öğrenme stilleri kendi öğretim elemanlarının öğretme stilleri ile eşleştirilemeyen öğrencilerin akademik başarılarına ($\bar{x}$=74.58) göre daha düşüktür. Ancak öğretim elemanlarının öğretme stillerinin öğrencilerin öğrenme stilleri ile eşleştirilmesi ile öğrencilerin akademik başarıları arasında anlamlı bir ilişki bulunamamıştır [$t_{(477)}$=.714, p>.05].

Araştırmanın Sonuçları ve Öneriler: Araştırmanın bulgularından biri öğrencilerin akademik başarılarının öğrencilerin öğrenme stillerine bağlı olarak anlamlı bir şekilde değişmediği yönündedir. Öğretim elemanlarının öğretme stilleri ile öğrencilerin öğrenme stillerinin eşleştirilmesi ile öğrencilerin akademik başarıları arasında anlamlı bir ilişki de bulunamamıştır. Öte yandan öğrenme stilleri, öğrencilerin ders aldıkları öğretim elemanlarının öğretme stilleri ile eşleştirilemeyen öğrencilerin akademik başarıları, öğrenme stilleri ders aldıkları öğretim elemanlarının öğretme stilleri ile eşleştirilen öğrencilerin akademik başarılarına göre daha yüksek olmakla birlikte, istatistiksel olarak anlamlı değildir. Araştırmadan elde edilen bulgular alanyazın ile uyumludur.

Gelecekte,

- Araştırmanın daha çok sayıdaki öğretim elemanına ulaşarak araştırmaların genişletilmesi;
- Grasha'nın öğrenme/öğretme stilleri gruplamasının Amerika'daki eğitim sistemine göre hazırlanmış olduğu düşünülerek kültüre özgü öğrenme-öğretme stili envanterlerinin geliştirilmesi;
- Derse karşı tutum ile öğrenme stili arasında ilişki olup olmadığına dair araştırmaların yapılması;
- Değişen çağa uygun yeni ortaya çıkan dersler ve çağa uygun ortaya yeni öğrenme-öğretme stilleri araştırmalarının yapılması

önerilmektedir.

Heimlich ve Norland'ın (2002) da belirttiği üzere herhangi bir öğretme stili "kötü" değildir. Ancak elbette bu, öğretim elemanlarının kendilerini geliştirmeleri önünde bir engel de değildir. Öğretim elemanlığı ya da öğretmenlik görevine yeni başlayacak

kişilerin öğrenme/öğretme stili kavramları ile ilgili farkındalık geliştirmeleri mesleki gelişimleri ve öğrencilerinin yararına olacaktır.

Anahtar Sözcükler: Öğrenme stilleri, Öğretme Stilleri, Bilgisayarlara Giriş Dersi, Yüksek Öğretim