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Are the Learning Styles of Elementary School Students Related to Their Academic Success? A Study of Mixed Research Methods

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ABSTRACT

The aim of this study is to point out the relationship between learning styles and the academic. The purpose of this study is to show the relationship between learning styles and academic achievement of 4th grade elementary students. The study was designed according to the convergent parallel design, one of the mixed research designs in which quantitative and qualitative research methods are used together. While the quantitative and qualitative data are collected together in accordance with the convergent parallel design, the data analysis is presented separately in the results section. The study group of the research consists of 163 grade 4 primary school students, 74 girls (n=74) and 89 (n=89) boys, taught in a government primary school in Istanbul Turkey. To find out whether learning styles predict academic achievement, linear regression analysis was conducted. On the other hand, descriptive analysis and content analysis were used in the qualitative data analysis. In this study, it was found that learning styles predict academic achievement. It was also found that students tend to discover their own learning methods, and depending on which method they prefer, the academic area in which they succeed differs.

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Keywords:
Learning style, academic success, elementary school, mix research

1. Introduction

The term style is defined as the set of personality traits, activities, and behaviors that an individual embodies and maintains over a period of time. As can be seen from this definition, learning style is an individual difference. In many studies of academic achievement, learning styles are considered as a variable in addition to the many individual differences such as intelligence, age, gender, socioeconomic situation, and motivation. It is expected that finding out how individuals think and how they learn and recognizing the factors that influence them will facilitate the process of effective learning and clear thinking (Gueven & Kueruem, 2008).Therefore, in many researches done about learning styles, academic success plays an important role. Thus, Cevher and Yıldırım Cevher & Yıldırım (2020) have analysed 341 studies about learning styles carried out between 2000 and 2016 in Turkey and they have pointed out that the most applied variable is academic success. According to the results of the analysis, the variables of learning styles and academic success have been applied in 137 researches and it has been concluded that, only in 83 of them, the learning environment prepared considering the learning styles increases academic success. When the literature is reviewed, in studies carried out also in different countries, it can be understood that there is a relationship between learning styles and academic success and learning environments arranged regarding the learning styles increase academic success. (Chen, 2006; Collinson, 2000; Williams, 2010). Collinson (2000) When the learning styles and academic success of 110 primary school students in California were compared, a significant difference was determined. Chen (2006) worked with 390 junior high school students in Taiwan and found out that there was a considerable correlation between their reading grades and learning styles and those learning styles predicted reading grades. Similarly, Williams (2010) also pointed out a significant relationship between learning styles

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and the level of comprehension which is a key point of academic success. On the other hand, Johnson and Illionis (2006) worked with 25 students from 5th grade in Social Studies course and pointed out that the students' academic success increased in that lesson when it was prepared regarding the learning styles of the students.

The researches done about learning styles contains a wide range of ages from primary school to higher education. Bozkurt and Orak (2016) have analysed 100 studies (2000-2013) carried out in Turkey about learning styles only in the field of academic success variable and 44% of those studies took place in higher education while 6% of them was carried out in primary schools. Similarly, Cevher and Yıldırım (2020) found out that 341 studies have been carried out on the maximum bachelor degree level and primary school level minimum. When the effects of basic education on other levels of education are regarded, it is important to consider the learning styles from an early age. Styles can be changed and learned. Thus, when individuals discover and organise their learning styles at an early age can help acquire an important skill in terms of academic success. An important reason why primary school students have been chosen for this study is that, generally, a limited number of researches about academic success and learning styles on the primary school level have been carried out.

In the field of styles no unity has yet been formed. Reviewing the literature, it is found that there are various models of learning styles and many different scales have been developed to measure them. One of these models is based on the very well-known "theory of experiential learning" by Kolb (ELT).Kolb's learning style covers two dimensions: perception and processing. While perception defines concrete thinking, processing defines active and reflective data processes. These dimensions are combined to create a model identifying four types of learning styles. To measure these dimensions defined, Kolb, in 1985, revised Learning Styles Inventory (LSI), which he first developed in 1976, by increasing the reliability and the construct validity of it (Riding & Rayner, 1998, p. 56). On the scale, there are 9 (later 12) self-identification items. Each item asks participants to put 4 words in an order starting from the one that best defines their learning style. Each word, on the other hand, refers to one of 4 learning styles: Concrete experience (simple word, feeling), Reflective Observation (watching), Abstract Conceptualisation (thinking) and Active Experimentation (doing) (Kolb, 1981, p. 290). As a result, the dimension that the individual prefers most determines the individual's learning style (Kelly, 1997, p. 3). The published versions of LSI [Kolb, 1976a; Kolb, Baker, & Gish, 1979; Kolb, Rubin, & Mclntyre, 1979] points out that the scale must be supported with other data and that it is only a starting point for understanding the learning approach (Kolb, 1981, p. 290). This model drew attention especially in the 1970s and contributed to the development of several new learning models. By revising Kolb's Learning Cycle, Honey and Mumford determined four learning styles that refer to each level that Kolb suggested. In Chart, these learning styles and their characteristics can be observed (Honey & Mumford, 2000 qtd. Coffield, et al., 2004, p. 72).

To measure learning styles, whose characteristics are explained in Table 1, the Learning Style Questionnaire (LSQ) developed by Honey and Mumford was used. This questionnaire consists of 80 items. The items of the questionnaire were composed to measure the styles to which individuals are most inclined. Individuals indicate whether they agree or disagree with each item. Specific scores are assigned for the selected items, most of which exhibit behavioral characteristics, and the style appropriate for the individual is determined (Honey & Mumford, 1986, p. 21). The most important feature of the LSQ is that it not only identifies the learning process but also aims to improve it (Mumford, 1987 cited in Coffield, et al., 2004, p. 73).With their studies in Lancaster and Edinburgh university, Entwistle and his friends, who work on education psychology, also developed a conceptual model based on quantitative and qualitative methodology. In this model, the aim is to develop the required attitudes and behaviours for students to develop effective learning approaches and determine them (Coffield, et al., 2004, p. 91).

Style	Strengths	Weaknesses
Activists	● Flexible and open-minded Ready to take action ● Like to be exposed to new situations ● Optimistic about anything new and therefore unlikely to resist change	● Tendency to take the immediately obvious action without thinking through possible consequences ● Often take unnecessary risks ● Tendency to do too much themselves and to hog the limelight ● Rush into action without sufficient preparation ● Get bored with implementation / consolidation / follow through
Reflectors	● Careful ● Thorough and methodical Thoughtful ● Good at listening to others and assimilating information ● Rarely jump to conclusions	● Tendency to hold back from direct participation ● Slow to make up their minds and reach a decision ● Tendency to be too cautious and not take enough risks ● Not assertive; not particularly ● forthcoming and have no 'small talk'
Theorists	● Logical, 'vertical' thinkers Rationale and objective ● Good at asking probing questions Disciplined approach ● Grasp of the 'big picture.'	● Restricted in lateral thinking ● Low tolerance for uncertainty, disorder and ambiguity ● Intolerant of anything subjective or intuitive ● Full of 'shoulds, the oughts and musts'
Pragmatits	● Eager to test things out in practice ● Practical, down to earth, realistic ● Businesslike – get straight to the point ● Technique-oriented	● Tendency to reject anything without an obvious application ● Not very interested in theory or basic principles ● Tendency to seize on the first expedient solution to a problem ● Impatient with indecision ● More task-oriented than people- oriented

Approaches to Studying Inventory (ASI) developed by Entwistle has a few versions. In the beginning, ASI was developed to cover broad subjects identifying learning approaches, learning styles, motivation and study methods (Entwistle & Tait, 1990, p. 171). Dunn and Dunn (1993, p. 2) defines learning styles as a way which shows differences in each individual and as an ongoing process of receiving information and implanting it in the mind. Thus, learning styles reflect the personality traits which adapt each individual better to the teaching methods (Dunn, Denig & Lovelace, 2001, p. 12). The learning styles in the Dunn and Dunn model are related to environmental, emotional, sociological, psychological, and physiological (Dunn, 2003, p. 2). In other words, individuals perceive according to these stimuli and interact with the learning environment (Dunn, 1999, p. 51). These stimuli are related to the elements in learning style. To illustrate, regarding the environmental stimuli, an individual has the tendency of choosing to study either in a loud or noisy place, in bright or dim light, in cold or hot place, in classroom or library or in kitchen or living room (Coffield, et al., p. 22). Dunn ve Dunn (1993) Learning styles are based on those basic principles:

- Most people have the ability to learn.
- Within the learning process, sources and environmental factors can be arranged according to the learning style.
- Every individual has a certain strength. However, not each of them is strong on the same level.
- Every student has different learning preferences within the learning process. These preferences can be measured and evaluated.
- Educators can use their learning styles within the learning process.
- Students can realise their learning styles when they encounter new and difficult information within the learning process.
- Learning environments arranged according to learning styles increase the success of students.

As it is seen, various models and inventories have been developed to explain the learning styles and to measure their fields (Riding & Rayner, 1998). This can be seen clearly in researches. Kolb's model (ELT) and LSI are preferred more than the others (Bozkurt & Orak, 2016; Cevher & Yıldırım, 2020). The fact that the researches have been conducted frequently in higher education is quite normal because LSI is a convenient scale for this age group. On the other hand, when the studies about learning styles and academic success of students at an early age are examined, it can be seen that Dunn & Dunn model is mostly preferred which is more proper for little children (Bozkurt, 2005; Bozkurt & Aydoğdu, 2009; Collinson, 2000; İnal, 2013). In this

research, Marmara Learning Style Scale, which is developed regarding Dunn & Dunn model, has been preferred considering the age group. It aims to explain the relationship between the learning styles and academic success of 4th grade primary school students. The research is limited with the 4th grade primary school students who are educated in a state school.

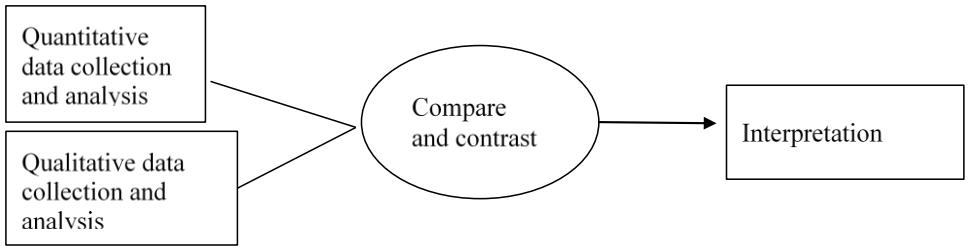
The aim of this study is to determine the relationship between elementary students' learning styles and their academic achievement. In view of this objective, the study sought to answer the following questions: (1) What is the role of learning styles in predicting academic achievement? (2) What is the relationship between students' learning preferences and their academic performance? (3) What are students' opinions about the reasons for their performance? (4) What is the relationship between students' preferred learning strategies and their academic performance?

2. Methodology

2.1. Research Model

In this study, a mixed research method was applied. Mixed methods can be defined as "a lot of different ways to see" (Creswell & Plano-Clark, 2020). The mixed method is a research approach that is used in the field of health, social and behavioral science by the researcher who integrates two data sets where both quantitative (close-ended) and qualitative (open-ended) data are included to understand the research problem and then takes advantage of these sets to find out the results. In other words, the researcher collects data by using both quantitative and qualitative approaches in one study or research program, analyses them, integrates the findings and makes deductions (Tashakkori & Creswell, 2007). The hypothesis of the approach is that it will be more advantageous for the researcher to combine the statistical tendencies (quantitative data) with stories and personal experience (qualitative data), rather than using one of these methods alone, in order to understand the research problem better. Therefore, in this research both quantitative and qualitative approaches are applied.

In this research, four main mixed-method designs are used: the sequential explanatory design, the sequential exploratory design, the embedded design, and the convergent parallel design. However, in this research, only the convergent parallel design is carried out. It consists of the researcher simultaneously applying the quantitative and qualitative phases of the research process.



Figures 1. *Convergent Parallel Design Model (Creswell & Plano-Clark, 2015, 77)*

In the analysis, the phases are separated, but it is checked whether the results confirm each other or not. Thus, equal priority is given to the methods (Creswell & Plano-Clark, 2020). In this research, to collect quantitative data regarding the identification of students' learning styles, "Marmara Learning Style Scale" was used simultaneously with an open-ended questionnaire consisting of 3 questions to collect the quantitative data.

2.2. Research Sample

The participants of the research consist of 163 fourth grade students, 74 girls (n=74) and 89 (n=89) boys, who receive education in a state primary school in Istanbul. The age average of the participants is identified to be 9.97 ($\bar{X}$ = 9,97). In determining this group, the convenience sampling method is applied. In this method, because of the limitations due to some factors (time, work force etc), the sampling is chosen from the reachable and available participants (Fraenkel, Wallen, & Hyun, 2011). In the convenience sampling method, the researcher starts from the participants who can be reached easily and tries to reach the sampling number in the goal (Büyüköztürk et al., 2008). From the same study groups, both quantitative and qualitative data were obtained, but the analysis of the quantitative data was carried out with the data received from 60 students of this sampling group. The reason for it is the sampling was at the point of redundancy. Sample size is determined with the first level of informative assessments about the research and the situations the researcher

encounters during data collection. If the goal is to obtain the maximum amount of data, at the point where no new data is received from the new sample group, in other words, when the point of redundancy is reached, no more sample is included. In other words, the repetition of data is the first criterion. The basic rule for ideal sampling is the repetition cycle that results from the redundancy point. After a certain point, all new samples will contain the data found in the previous parts of the survey. In the case of this repetition, the data collection must be stopped and the sample size must be determined at the point where the repetition is first observed (Morgan & Morgan, 2008; Onwuegbuzie & Collins, 2007; Shenton, 2004 qtd. Baltacı, 2018).

2.3. Data Collection Tools and Procedure

Three data collection tools were applied in the research: Marmara Learning Style Scale, open-ended questionnaire, and personal information form.

Marmara Learning Style Scale: In this research, "Marmara Learning Style Scale", which was developed by Şimşek (2007), was used in order to collect quantitative data. Marmara Learning Style Scale was inspired by the theoretical basis of the learning styles scale developed by Dunn and Dunn. Not all dimensions of Dunn and Dunn's learning styles are included in the scale. The aim of the scale is to measure the learning styles of 3rd, 4th and 5th grade students, which corresponds to the age group between 9 and 11 years old.The scale consists of 4 basic dimensions and 17 sub-dimensions which makes 94 items. The basic dimensions are Environmental (noise, light, heat, sitting position), Emotional (motivation, persistence, responsibility, structuredness), Sociological (social interaction, learning with an adult, learning in different ways), Physiological (auditory perception, visual perception, tactile perception, food, time, activity). The items of the scale are not questions and there is not only one answer to them. Each person to whom the scale is applied chooses the "yes" option if they feel that option best describes them. For the items that do not fit her, the person chooses the "no" option. Half of the number of items in each subdimension shows a preference, while the other half consists of the statements that are opposite to those of the other half. In the calculations of the internal consistency coefficient of the scale, Spearman Spearman-Brown, Guttmann, Cronbach Alpha used the reliability coefficient. Looking at the results of the calculations, it can be seen that Spearman Spearman-Brown, Guttmann and Cronbach Alpha obtained high coefficient values of .53, .67 and .66 respectively. When the coefficient of the whole group is considered in the validity research, the value of Learning Style Scaleis .67. This coefficient value is also called acceptable.

Open-ended Questionnaire: This questionnaire consists of these open-ended questions: (1) How do you learn best? What do you do when you learn something new? (2) What is the lesson that you are most successful? Why? (3) What needs to be done to be successful in lessons?

Personal Information Form: This form includes the sex and academic achievement grades of the students. The academic achievement grades are entered by the class teacher calculating the average grade of each lesson.

2.4. Data Analysis

In the analysis of quantitative data, simple linear regression analysis via SPSS was applied in order to examine if all the sub dimensions of learning styles predict academic achievement. The aim of regression analysis is to determine whether the independent variables affect dependent variables and identify its level of effect. In simple regression analysis, the linear relationship between response variable and one explanatory variable is explained (Weisberg, 2005). In simple linear regression, while Y response variable, XI explanatory variable, $\beta 0$ and $\beta 1$ are identifying the parameters of this variable, i ε is referring to the random error terms (Kutner et al., 2005 qtd. Arı & Onder, 2012):

$$Y = \beta 0 + \beta 1\ X1i + i\ \varepsilon\ i = 1,2,...,n$$

On the other hand, in qualitative data analysis, descriptive and content analysis were applied. In the content analysis, data resembling each other are brought together within the context of specific terms and themes and they are organised and interpreted in a comprehensible way (Yıldırım & Şimşek, 2018). Within the content analysis process, apart from the researcher, another expertise in educational sciences carried out all the codings. By comparing these codings, it was tried providing consistency. Moreover, these codings carried out and the themes created were presented to two lecturers from the Department of Curriculum and Instruction

and the Department of Elementary Teacher Education to examine the consistency of the codings. Regarding the suggestions, the codings were revised. In descriptive analysis, on the other hand, the opinions of the individuals who are interviewed or observed are directly quoted (Yıldırım & Şimşek, 2018). Detailed descriptive method was applied and direct quotations were presented so as to increase the transferability of the research.

3. Findings

As a result of the independent sample t-test, it was found out that academic achievements do not differ significantly according to the sex of the participants. For Turkish grammar (t(161)= 1,204, p>.05), for Maths knowledge (t(161)= ,488, p>.05), for Sciences (t(161)= 1,422, p>.05), and for Social Studies (t (161)= ,668, p>.05), the related t values are not statistically significant. The academic achievement of boys and girls are alike. To examine whether the learning styles of students differ in terms of their sex, independent samples t-test analysis regarding the sub-dimensions of the learning style scale was conducted. According to the results of the analysis, a statistically significant difference for the sub-dimension of "seating position" was found (t(161)= -2,149, p<.05). Male students have more points in the related sub-dimension than the female students. Findings regarding other quantitative and qualitative analysis are stated in the subtitles below.

3.1. Findings related to the role of the learning styles in predicting the academic achievements of the students

The results related to the role of learning styles in academic achievement are presented separately for each lesson.

3.1.1. Regression Analysis Results for Social Studies: Simple linear regression was applied to test whether each sub-dimension of the learning styles scale is a predictor for Social Studies. The results related to the analysis is demonstrated in Table 1.

Table 1. *Values Related to The Regression Analysis of Learning Styles and Achievement in Social Studies*

Social Studies	B	S.H.	β	t	p	R	R^2	F	p
Time Preference	93,711	2,135		43,883	,000	,157	,025	4,080	,045*
	-,969	,480	-,157	-2,020	,045				
Persistence	91,263	1,095		83,378	,000	,156	,024	4,020	,047*
	-1,113	,555	-,156	-2,005	,047				
Auditory learning	96,227	2,760		34,864	,000	,191	,036	6,083	,015*
	-1,034	,419	-,191	-2,466	,015				

*p<0.05, **p<0.01 (N=163; df(1,161)

According to the result, it is observed that time preference F(1,161)=4,080, p<.05; persistence F(1,161)=4,020, p<.05 and auditory learning F(1,161)=6,083, p<.05 styles significantly predict the achievement in Social Studies statistically.

3.1.2. Regression Analysis Results for Sciences: Simple linear regression was applied to test whether each - sub-dimension of the learning styles scale is a predictor for Sciences. The results related to the analysis is demonstrated in Table 2.

Table 2. *Values Related to the Regression Analysis of Learning Styles and Achievement in Science*

Science	B	S.H.	β	t	p	R	R^2	F	p
Time preference	94,582	2,601		36,363	,000	,194	,038	6,300	,013*
	-1,466	,584	-,194	-2,510	,013				
Responsibility	79,403	4,207		18,873	,000	,172	,029	4,888	,028*
	2,616	1,183	,172	2,211	,028				
Persistence	90,701	1,337		67,839	,000	,178	,032	5,295	,023*
	-1,560	,678	-,178	-2,301	,023				

*p<0.05, **p<0.01 (N=163;df(1,161)

According to the result of the analysis, the styles time preference F(1,161)=6.300, p .05; responsibility F(1,161)=4.888, p .05 and reliability F(1,161)=5.295, p .05 statistically significantly predict performance in science.

3.1.3. Regression Analysis Results for Mathematics: Simple linear regression was applied to test whether each -sub-dimension of the learning styles scale is a predictor for Mathematics. The results related to the analysis is demonstrated in Table 3.

Table 3. *Values Related to the Regression Analysis of Learning Styles and Achievement in Mathematics*

Maths	B	S.H.	β	t	p	R	R^2	F	p
Time preference	92,141	3,477		26,498	,000	,208	,043	7,308	,008**
	-2,112	,781	-,208	-2,703	,008				
Auditory Learning	93,887	4,542		20,672	,000	,187[a]	,035	5,814	,017*
	-1,664	,690	-,187	-2,411	,017				

*p<0.05, **p<0.01 (N=163;df(1,161)

According to the analysis result, the styles of time preference F(1,161)= 7,308, p<.01; Auditory Learning F(1,161)=5,814, p<.05 styles are statistically significant predictors for Math achievement.

3.1.4. Regression Analysis Results for Turkish: Simple linear regression was applied to examine whether eachsub-dimension of learning styles scale is a predictor for Turkish Lesson. The results related to the analysis are demonstrated in Table 4.

Table 4. *Values Related to the Regression Analysis of Learning styles and Achievement in Turkish*

Turkish	B	S.H.	β	t	p	R	R^2	F	p
Stable	90,215	2,676		33,711	,000	,166	,027	4,536	,035*
Time Preference	-1,280	,601	-,166	-2,130	,035				

*p<0.05, **p<0.01 (N=163;df(1,161)

According to the result of the analysis, time preference F(1,161)= 4,536, p<.05 style is a statistically significant predictor of Turkish achievement. Time preference sub-dimension is observed to be the predictor of academic achievement for all lessons.

3.2. Findings Related to the Qualitative Data

Findings related to the qualitative data are stated below.

3.2.1 Results related to the relationship between learning style and academic performance: The table below shows the answers to the following questions: "How do you learn best? What do you do when you learn new things?" and the lessons particularly well achieved by the students who answered these questions are included.

Table 5. *Differentiation of Academic Achievement in Regard to Learning Preference*

Theme	Category	Code	*f*	Academic Achievement
Learning Preference	Cognitive preference	by listening	18	Science, Social Studies
		by observing	4	Mathematics
	Learning Strategy	by reading	11	Turkish
		by revising	6	Mathematics
		by explaining	5	Science
		by researching	4	Science
		by writing	3	Turkish, Social Studies
	Setting Preference	quiet place	15	Science, Social Studies
		other (with music, by travelling)	6	Turkish, Social Studies
		by playing games	2	Mathematics, Social Studies
	Studying Preference	by asking others (family, teacher, friend)	7	Social Studies, Science
		by studying alone	5	Science

As it can be observed in Table 5, choosing a quiet place and studying with auditory learning is observed as the most repeated two learning style preferences. The lessons in which students are more successful than in others differentiate under the title of the category. When the academic achievement grades of the students who state their preferences are taken into consideration, it was observed that they are more successful in Science and Social Studies. While the achievement in Turkish stands out with learning by reading, revision

and observation highlight the achievement in Mathematics. The fact that the students who generally prefer studying in a quiet place also learn by listening is among the findings. Some sample responses of the students are stated below.

- *"I learn best by listening. I listen carefully while learning new things."*
- *"I learn best in peace and quiet places. I listen carefully as I am learning new things."*
- *"I learn best in a place which is quiet and has bright light. I listen carefully to the person who teaches."*

As observed from the samples, "listening" is stated by the students as the best way to learn. According to the results obtained, the students' academic achievement varies regarding the learning methods they prefer. One of the results of the quantitative data is that the auditory learning method significantly predicts the achievement in social studies in terms of statistics. The qualitative results that are obtained support this result.

3.2.2. Findings Related to the Opinions of the Students About the Reasons of Achievement: In the table below, the students' answer to the question "What is the lesson that you are most successful? Why?" can be observed.

Table 6. *Reasons of Academic Achievements*

The course achieved	Frequency	Sample Statement
Maths	25	S12. Maths because I value it. S13. I understand the topic better. S14. I have a distinct interest in this lesson. S15. I love it. S16. It is fun and it helps us with brainstorming. S17. Because I study this lesson most at home and the teacher loves this lesson most. S18. Maths because I get 100 from all of its exams and I feel happy when I start studying maths.
Sciences	19	S6. Because I love it. It is full of science and fun. S7. We do experiments and obtain information about the planet on which we live in. S8. We do experiments and we keep what we learn in mind. S9. Science catches my attention. S10. I love science lessons. S11.Science because it is very easy.
Social Studies	12	S1: Social studies because I learn a lot from it. S2. Social studies is great. S3. Because I know the subjects well. S4. Social studies is the lesson that I love most.
Turkish	3	S1. I can read and understand very well. S2. I love studying it.
Other (Human Rights Citizenship and Democracy, Religion, Traffic Safety, Visual Arts, Physical Education, English)	15	S19. Religion because I am successful in this lesson S20. Traffic Safety because I can learn easily S24. Visual Arts because everybody loves my paintings, I get 100 and it is fun. S.25. Physical Education because I am good at sports. S.26. Physical Education because I am good at playing football.. S26. Because I am interested in English. I want to go abroad and talk to foreigners. In short, I am interested in English lessons.

As it is seen in Table 6, mathematics is the most frequently repeated lesson among the "most successful" courses. Science and Social Studies follow it. Students explained that the reasons for their achievements are their interest and love towards the lesson. Moreover, they stated that it is easy to learn in these lessons. Some sample answers can be seen below.

- *"Turkish because it is the lesson that I have fun most."*
- *"English because I am interested in English lessons. I want to go abroad and speak English. In short, I am interested in English."*

- *"Mathematics because I get 100 from all of its exams and I feel happy when I start studying mathematics."*
- *"Painting class because I love drawing. I practice painting and drawing in my free time so that I don't get bored."*
- *"Mathematics because I like arithmetics and solving problems."*
- *"It's religion because I learn it gladly."*

Considering the answers given by the students, apart from learning styles or preferences, it can be observed that the attitude towards the lesson affects academic achievement. The results can be interpreted as students deciding on learning preferences and establishing a studying strategy only after developing a positive attitude towards the lesson.

3.2.3. Findings Related to the Relationship Between Learning Strategies and Academic Achievement: The table below demonstrates the students' answers to the question "What needs to be done to be successful?"

Table 7. *The Strategies That the Students Use in Order to be Successful*

Theme	Categories	f	Most Achieved Lessons
Learning Strategy Preference	Doing homework/revision	44	Turkish/Social studies/Maths/Sciences
	Following the lesson/listening	22	Social studies/Sciences
	Other (Reading/Writing/Finding a solution)	5	Maths/Sciences

Table 7 demonstrates students' opinions about the strategies that must be used to be successful. The strategy which is repeated most is "doing homework/revision". This item is stated by the students who are successful in both quantitative and verbal lessons. Therefore, regardless of academic field, "doing homework/revision" can be seen as a significant strategy affecting achievement. "Following the lesson/listening" is also a strategy preferred by both quantitative and verbal lessons for academic achievement. In Table 5, the listening strategy is the most repeated item among the answers given to the questions "How do you learn best? What do you do while learning new things?". This leads to the consideration that there is a relationship between "listening" in particular and academic achievement in Social Studies and science. The common features of these lessons are that they are both interdisciplinary. Social Studies appears as an integration of the fields (history, geography, philosophy, etc.) associated with the social sciences. Science, on the other hand, is the integration of physics, chemistry, and biology. Since the structure of the class relates to more than one area, students might find it complicated. Therefore, students might feel the need to listen to a guide who explains the topics in a factual manner.The sample answers related to the strategies that the students apply to be successful can be observed below.

- *"I think we need to revise the subjects of the lessons and we need to take tests about them."*
- *"It requires lots of practice. Everybody must use the technique they find easy to apply frequently."*
- *"I try to pay attention to the new information during the lesson and use it to find a new way and solutions."*

As observed in samples, the students tend to find the best way to learn and study in that way. "Listening" appears to be the way that the students apply most to be successful.

4. Conclusions and Discussion

Learning Styles are individual based manners. In fact, rather than being the sole way to academic achievement, it is a way which is preferred for academic achievement (Esmer, 2013). The styles defined as the individual differences that affect performance (Zhang, 2000) are considered to have a positive effect on the academic achievement as long as the differences are taken into consideration in the learning environments. Hence, a significant number of researches that support this opinion have been conducted. Those researches have demonstrated that when students learn with their learning styles proper for their learning process, their academic achievements increase (Altun & Serin, 2019; Berberoğlu & Demircioğlu, 2000; Burke & Dunn, 1998; Chen, 2019; Demirbaş, 2001; Li, Yin, Zhang, & David, 2019; Peker, 2005). In Turkey, studies generally prove that styles are one of the individual differences that affect academic performance, and the studies that investigate the relationship between them indicate that the academic field is related to style preferences (Arslan & Babadoğan, 2005; Bilgin ve Durmuş, 2003; Erbey, 2013; Ersoy, 2003; Gueven, 2004; Kanadlı, 2016; Kaya 2007; Kılıç, 2002; Koçak, 2007; Kurnaz & Erguen, 2019; Usta et al., 2011).With different learning styles

scales, it is possible to increase the number of these studies carried out in various grades of schools. The common point of these studies is the findings claiming that style preferences have a significant role in academic achievement. In this research also it is observed that, within some sub dimensions, the learning styles are the predictors of academic achievement.

According to the research results, time preference is observed to identify that persistence and learning styles significantly predicted the achievement in Social Studies course. Yurtseven (2010) analysed the relationship between the learning styles of 5th-grade primary school students and their academic success in Social Studies courses. In this study which includes a sampling group of 370 from 5th-grade primary school, Kolb's Learning Style Inventory has been applied for data collection. Moreover, to identify the students' success, their grades in the school reports have been taken into consideration. As a result of the analysis of the data collected, there has been found a significant difference between the students' Social Studies course and their learning styles. The success of the students who have the convergent learning style have been observed to be more successful in Social Studies course than other students who have different learning styles. Individuals who have the convergent learning style are the ones dominated by abstract conceptualization and active experimentation. In a study by Toğrul (2014), which aimed to investigate the relationship between the learning styles of 5th grade elementary students and their academic achievement in Turkish, mathematics, science and technology, and Social Studies using Marmara Learning Style Scale, it was found that 55.8% of the students who scored 5 in the course Social Studies preferred auditory learning, while 30% of them chose visual learning and 13.4% opted for the kinesthetic learning style.It is also possible to see similar results in the researches conducted with different scales identifying the perceptual learning style. Another study was carried out by Bengiç, Şahin & Gümüşçü (2011) who worked with 1120 students to point out the relationship between the learning styles of 6th and 7th-grade primary students and the success of those styles in Social Studies course. One of the results obtained in this research is that the students who choose the auditory learning style have the highest achievements in the Social Studies course.

On the other hand, in another study by Gueven (2008), based on the results of the test to determine the relationship between the school reports of the course Social Studies, it was pointed out that the students who had a high score on the visual learning style had the most points for the corresponding course in their school reports, while the students who had the highest score on the auditory and sensorimotor learning styles lagged behind them.This finding does not overlap with the results of the research. Sternberg (Sternberg, 1997 qtd. Fer, 2005, 464) emphasized that the styles can be "learnt and developed". In this case, the teaching style of the teacher can affect the learning style of the students, which means there is a relationship between the teaching styles of the teacher and the academic success of the students (Grasha & Yangarber-Hicks, 2000)

In this research, "Listening" is the most repeated answer for the question read "What needs to be done to be successful?". There might be two reasons for this: (1) The students really have auditory learning style. (2) The students learnt and embraced the idea from their teachers that listening is essential to be successful since the styles can be learnt and improved (Sternberg, 1997 qtd. Fer, 2005). In other words, if the teacher uses mostly visual activities in the Social Studies course, the visual learning style of the students can be improved more. The results obtained from this research show a relationship between Social Studies course and auditory learning and learning by listening, which affects academic success.

One of the research results is time preference; responsibility and persistence styles statistically predict the success in science courses at a significantly lower level. Toğrul (2014) pointed out that students who have high grades in science courses prefer not to have a snack but choose low light, warm room and auditory learning style while studying. However, the qualitative findings of this research show that the students who are successful in science course generally prefer learning by listening, explaining, and researching. Moreover, the students attribute their success in science course to the experiments they do, research they do about the earth and learning with fun. It can be suggested that the more the students who choose learning by listening become successful in science courses, the more they prefer active participation in the lesson. Also, in the Social Studies course, the students who learn by listening form a successful group. However, the students do not use the same statements for the Social Studies course as those for science courses that support active learning, such as attending a lesson or doing research. Students can prefer different learning styles for different lessons. It can be observed in the researches which have been carried out that when the learning environment is arranged considering those differences, the academic success increases. As a result of the data analysis obtained in their

study, Usta, Bodur, Yağız & Sünbül (2011) suggested that teaching activities based on learning styles in science course increase the level of academic success. In a research done by Bozkurt (2005), science course for 6th grade primary education is arranged regarding Dunn & Dunn learning style of students and its effect on the students' academic success. Their attitudes and scientific process skills are examined. As a result of the research, statistically significant relationships are identified between Dunn & Dunn learning model and students' academic success, attitudes and scientific process skills. The study by Cano-Garcia & Hughes (2000), who worked with 210 college students, demonstrates the same results as the learning style-based teaching research carried out by Burke & Dunn (2000), who worked with 2nd, 3rd and 4th grade primary school students. Those sample researches suggest that it is quite important to consider the learning styles of learners for academic success.

When the research results regarding Turkish lesson are examined, time preference is considered to predict the success in Turkish lessons significantly at a low level.

In the studies regarding the relationship between reading comprehension and learning styles, it has been emphasized that there are significant relationships between learning styles and reading comprehension (Chen, 2006; Williams, 2010). In this study, learning styles are not strong predictors for academic success in Turkish lessons. However, in one study carried out by applying a different learning style scale (Perceptual Learning Style Scale), the learning styles of 4th and 5th grades elementary school students were examined and as a result of the study, it was found out that when the average point of Turkish lesson and learning style sub-dimensions were compared, the average point of those whose points are 5 is higher than the ones whose auditory and kinesthetic points are 1, 2, 3 and 4 while it is much higher than the ones whose points in visual dimension are 1, 2 and 3 and whose points in kinesthetic dimension are 1 and 2. The average point of those whose grade is 4 is higher than those whose points in visual dimension are 1, 2 and 3, whose points in kinesthetic dimension is only 1 and those whose auditory dimension is 1.

It was found that reading literacy related to Turkish language teaching could be increased when the learning environment was designed according to learning styles, as in Science Lessons. Oezdemir (2013), in his research investigating the effects of learning styles on the correction of errors in audible reading and the development of comprehension skills of 4th and 5th grade elementary students through the use of Marmara Learning Style Scale, found that the reading and comprehension activities prepared for students considering learning styles were effective in preventing dyslexia in elementary students. Within the qualitative dimension of this research, the students who were successful in Turkish lessons stated that they were doing "lots of reading". Turkish lesson took place among the lessons in which the students who preferred homework and revision became the most successful.

In the studies conducted, it can be observed that there is a relationship between learning styles and mathematics. In a study conducted by Yazıcı (2004), the relationship between 5th grade elementary students' achievement in mathematics and learning styles was analysed. This research, using Kolb Learning Style Inventory, revealed the significant difference between 5th grade elementary students' achievement in mathematics and their learning styles. In another research, Utanır (2008) analysed the relationship between the learning styles of 5th grade elementary students and their academic achievement in mathematics as well as their attitude towards teaching. This research, which involved 750 5th grade students and applied Marmara Learning Style Scale, revealed a significant difference between students' learning styles and their academic achievement in mathematics. Another result of the research is that the students who had visual learning style were more successful in Mathematics than the ones who were not visual learners. The fact that visual learners are more successful in Mathematics than non-visual learners is also a result that has been reached in other studies (Özkan, 2013; Poyraz, et al., 2012; Utanır, 2008). In this research, on the other hand, auditory learning style has been observed to be a significant predictor in Mathematics. The qualitative results of the research shows that those who are doing well in Mathematics prefer visual learning style.

Moreover, the students attribute their success in Mathematics to their love for it, which focuses on the relationships between the success in the lesson and the attitude towards the lesson. Revision is also a learning strategy that students who are successful in Mathematics prefer.

The quantitative data obtained in this study does not prove that learning styles cannot predict academic success. However, as a result of the qualitative analysis in this study, it is an important finding that students

are aware of their own learning preferences. Since there is no style dimension that perfectly defines the way of learning, the fact that individuals tend to discover the way they learn best can be considered as a good step for qualified learning. The scales used in the literature could be considered inadequate by teachers and researchers when it comes to identifying students' learning styles. However, the fact that the student can describe the best way of learning allows the classroom applications to be designed according to the learning styles. In the study, when asked about the reasons for students' academic performance, it was found that it was due to their attitude towards teaching. Enjoyment of teaching and willingness to engage in it were cited as reasons for academic achievement. In this sense, one has to wonder to what extent the activities corresponding to learning styles will work for a student who does not show interest in class.

5. Recommendations

In the studies conducted on learning styles, it is observed that qualitative and mixed research designs were preferred in lesser numbers than quantitative research. It is recommended that researchers focus on qualitative and mixed research designs in their studies to thoroughly explore the relationship between learning styles and academic success. Considering the variety of measurement scales used in the field, it is expected that qualitative research will significantly support quantitative findings. Learning styles are personal differences that affect academic achievement.The number of studies conducted on the learning styles of students, especially elementary students, should be increased to address learning environments. In future studies to be conducted in this area, it is recommended to use different scales that measure similar styles in the same group and to investigate the relationship between the scales in terms of reliability of the results.The answer to the question "What kind of people do we want to educate?" determines the goals of educational programs. Today, the answer to this question is generally to become an individual whose higher thinking skills are developed and who can produce knowledge. It is expected that learning environments aimed at growing people with these qualities must be designed with personal differences in mind. Only in this way is it possible to provide equal learning opportunities for every learner. Therefore, primary school teachers must take into account the fact that there may be differences in the learning styles of pupils. If these differences are not taken into consideration, it may have a negative impact on the academic success of the students. Therefore, teachers are advised to be aware of their students' learning styles and prepare appropriate activities.

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