Exploring the Learning Style Characteristics of Turkish Freshman Architecture Students with the Evidence of Learning Style Inventory

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Abstract

Individuals learn in different ways, therefore every student has different learning styles. The more instructors understand the students' differences in learning, the better the opportunity to increase success in architectural education. Consequently, determining the learning styles of architecture students is an important factor for their academic success. This study aims to explore the learning styles of freshman architecture students in Turkey, and correlates their learning styles with, gender, age, and type of university. In this study, data were collected from architecture students who are still studying in undergraduate programs at seven different universities throughout Turkey by using the Kolb Learning Style Inventory. The questionnaire was administered to students directly and 442 data were collected and analyzed with percentage and frequency distributions, correlation analysis and ANOVA. This study furthered the understanding of learning styles of freshman architecture students and the results of the study revealed the correlation between learning styles, age, and type of university.

Keywords: *Architectural education, learning style, freshman architecture students, experiential learning theory.*

Türkiye'de Mimarlik Bölümü Birinci Sınıf Öğrencilerinin Öğrenme Stillerinin Belirlenmesi

Özet

Bireyler farklı şekillerde öğrenir ve doğal olarak her öğrencinin öğrenme stili bir diğerine göre farklılık gösterir. Her öğrenci kendi öğrenme stili bağlamında verilen

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bilgiyi farklı ortamda ve farklı şekilde alarak kullanır. Tüm mesleki eğitim alanlarında olduğu gibi Mimarlık Eğitiminde de arzu edilen başarıya ulaşmada eğitmenlerin, öğrencilerin öğrenme farklılıkları konusunda bilgi sahibi olmalarının önemli ve gerekli olduğu düşünülmektedir. Bilginin öğrenciye doğru bir biçimde aktarılabilmesi ve bunun sonucunda akademik başarının artırılabilmesi düşüncesi ışığında çalışmanın ana eksenini Mimarlık Eğitimi alan birinci sınıf öğrencilerinin öğrenme stillerinin belirlenmesi oluşturmaktadır. Bu amaçla çalışma kapsamında Türkiye'de Mimarlık Lisans Eğitimi veren yedi adet üniversitede Mimarlık Bölümü öğrencilerinin öğrenme stili araştırılmıştır. Kolb'un Öğrenme Stili Envanteri (LSI2) kullanılarak, 442 adet anket toplanmıştır. Anketler yüz yüze görüşme tekniği ile uygulanmıştır. Toplanan verilerin yüzde ve frekans dağılımları incelenip, korelasyon ve tek yönlü ANOVA analizleri yapılmıştır. Birinci sınıf öğrencisileriyle gerçekleştirilen çalışmada ayrıca öğrenme stili ile cinsiyet, yaş ve eğitim görülen üniversite arasında bir ilişki olup olmadığı sorgulanmıştır. Çalışmanın sonuçları Türkiye'de Mimarlık Bölümü öğrencilerinin öğrenme stili ağırlık olarak özümleyeci olduğu şeklinde belirlenirken, mimarlık öğrencilerinin öğrenme stili ile yaş ve üniversite çeşidi arasında anlamı bir ilişkinin olduğu ortaya konulmuştur.

Anahtar kelimeler: *Mimarlık eğitimi, öğrenme stili, birinci sınıf mimarlık öğrencileri, deneyimsel öğrenme teorisi*

1. Introduction

Learning is one of the most important individual processes that occur in every part of human life, as in organizations, education and training programs. There are various type of person, however each one is inimitable and differ from each other with their skills, characteristics, choices and ways of thinking and doing [1]. Preferred ways of perception, organization and retention of new information are distinctive and consistent for each learner [2, 3]. This distinctive situation of person in learning process is named as learning style and defined as the specific method of perceiving and converting and transforming information. [4]. As there are various type of persons, there are different learning styles that are shown in different academic strengths, weaknesses, skills, and interests. [5].

Numerous reports about the application of the learning styles in architectural education have been found in the pertinent literature show clearly that the benefits of its implementation are significant [e.g. 6-10]. Therefore, understanding and defining the learning style preferences is an important stage for ordering the stabilized instruction which is effective and efficient for all students and also architecture students [5].

This study aimed to focus on learning in architectural education using Kolb's learning styles and explored the relationship between learning styles and students' gender, age, and type of university. Within the scope of the study, survey forms were collected from freshman undergraduate architecture students who were being educated at seven different universities throughout Turkey. The reason for choosing the freshman students were that the profession had not yet affected their learning styles. SPSS 18 software was used in the analysis of data; reliability analyses were mad, percentage and frequency distributions were analyzed, correlation analysis, and ANOVA were examined, in addition to this, some proposals were brought forward.

1.1. Learning process

Learning can be defined as an internal process that is different for every individual. Generally most people think that attending some formal courses or classes and receiving a certificate at the end is the only and the best way of learning. These efforts are named as external factors of the learning process, but they alone are not sufficient for effective learning. There are also internal factors in the learning process such as individual differences. These factors are considered under the topic of learning styles of the individuals. Educational leaders nowadays recognize that the process of learning is critically important and the way of individuals' learning style is the key for an educational improvement [11, 12]. "An individual's preferred method for receiving information in any learning environment is the learning style of that individual" [13]. There are many papers and studies on learning styles in the literature [e.g. 14-24]. Although all the styles classify different learning types in different manners, their aim and approach are similar. In this study, Kolb's Learning Styles Inventory (LSI 2), which is revised version of Kolb's Learning Styles Inventory, is used as an instrument.

1.2. Experiential learning theory and learning styles inventory (LSI)

Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience" [17]. From the standpoint of the theory; learning activity can be regarded as a cycle which initiate with humans' experience, continues with reflection and finally prompts to action that becomes a concrete experience for reflection [17, 25].

Kolb [17] portrays four learning modes within the context of experiential learning theory (Figure1). *The concrete experience* (CE) mode describes people who feel more than they think. Individuals in this mode tend to be very good at relating to others and they tend to be intuitive decision-makers. *The reflective observation* (RO) mode describes people who would rather watch and observe others rather than be active participants. Individuals in this mode tend to appreciate exposure to differing points of view. *The abstract conceptualization* (AC) mode describes people who think more than they feel. Such people tend to have a scientific approach to problem solving as opposed to a more artistic approach. *The active experimentation* (AE) mode describes individuals who take an active role in influencing others as well as situations. These individuals welcome practical applications rather than reflective understanding as well as actively participating rather than observing.

Each two of the modes dialectically relates and bipolar positions. Concrete experience and abstract conceptualization are dialectically related modes of grasping experience; reflective observation and active experimentation are dialectically related modes of transforming experience. The theory suggests that learning requires abilities that are polar opposites and the learner must continually choose a set of learning abilities that will be used in a specific learning situation. Heredity equipment, former experiences and the conditions of present environment direct the learner to prefer a mode. The chosen mode is patterned and it is characteristic for the learner. Kolb and others [26] called these patterned ways "learning styles".

Each person's learning style is a combination of two of the four learning modes mentioned above [27]. For example the learner who learns by the way of reflective observation (RO) and abstract conceptualization (AC) is assimilator while who learns by the way of reflective observation (RO) and concrete experience (CE) is diverger.

Finally, learners can thus be classified into one of four learning styles, namely, converger, diverger, assimilator, and accommodator, mapped in one of the four quadrants [28].

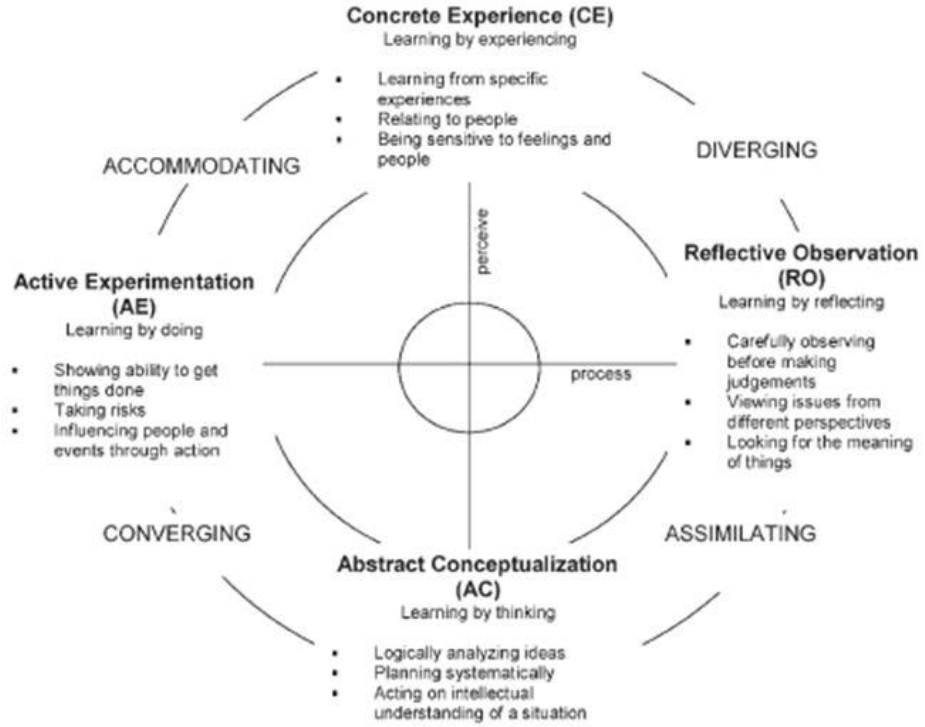

Figure 1. Four learning modes of experiential learning theory [6].

Characteristics of the learners according to the learning styles can be given as below:

- *Accommodating learners* are best at CE and AE. Accommodating learners' interest lie in doing things [17, 29]. Accommodators learn primarily from 'hands-on' experience. Accommodating learners are risk takers and they enjoy seeking out new experiences. They prefer to act on feelings rather than on logical analysis. In solving problems, they rely more heavily on people for information than on their own technical analysis [3, 30]. They are people oriented, open-minded, and risk- takers. While they rely on other people for information, they are sometimes impatient and perceived as controlling [27].
- *Divergering learners* combine CE and RO. Divergers are best at viewing concrete situations from different points of view, they prefer brainstorming situations to taking action [30]. These kinds of learners are interested in people and tend to be imaginative and emotional [29]. Diverging learners are good at seeing many perspectives and generating many ideas [27]. "They have the ability to synthesize and/or assimilate a wide-range of totally different observations into a comprehensive explanation that enables them to generate many ideas" [3]. Whereas, this group of learners are less able to make decisions and apply ideas and are less systematic or scientific [27].
- *Assimilating learners'* dominant learning abilities are AC and RO. Assimilators are best at understanding a wide range of information and organizing them into concise, logical form. They are good organizers of information [27]. Assimilative learners can create multiple perspectives. In addition, they are more interested in abstract ideas and concepts rather than people. "They value more of

the logical soundness of a theory than its practical value" [30]. Assimilative learners focus on thoughtful understanding and analytic, abstract and quantitative tasks. Whereas, they are less focused on people and feelings, less able to apply theories and make decisions [27].

- *Convergering learners* are best at AC and AE. Convergers are best at finding practical use to theories and ideas and are good at solving problems and making decisions. Kolb suggests they prefer dealing with technical tasks than with social and interpersonal issues [30]. While they are less intuitive, understanding, and artistic, they are also close-minded and unimaginative [27].

Individuals have different developmental stages; consequently they orientate themselves into different modes of learning according to their self-development. Having changes in developmental stages are inevitably reflected in to learning styles of the individual. Kolb [16] asserts that at the aforementioned change, especially at the second stage of life which is named the specialization stage, individuals try to adopt their learning styles. This determination underlines the relationship between learning styles and academic success when appropriate learning environment is provided.

2. Research Method

To determine learning styles of architecture students and effective factors of learning styles, data were collected from freshman architecture students who are being educated at seven different universities in Turkey by using a questionnaire. In this context, "Learning style inventory (LSI 2)" which was developed by A. David Kolb, containing 12 questions, was used. The Turkish version of LSI 2, which was translated into Turkish and reliability analysis were tested by Aşkar and Akkoyunlu [31], was utilized in this research.

The Learning Style Inventory II test is in the form of twelve ranking questions that have four alternative responses. The ranking questions ask respondents to compare items to each other by placing them in order of preference. At the Learning Style Inventory II test, each twelve question asks respondents to rank-order four sentence endings in a way that best describes their learning style. Order of the responses ranks 1 to 4 and 4 means the most appropriate sentence and 1 means the least appropriate sentence.
Following the applying process of the survey, answers of the questions scores are calculated according to the key of the test. The score of the each sentence defines learning modes of respondents. Total score of the first sentences gives the Concrete experience (CE) score, total score of the second sentences gives reflective observation (RO) score, total score of the third sentences gives abstract conceptualization (AC) score and total score of the fourth sentences gives abstract conceptualization (AE) score for all 12 questions.

After that phase it is needed to determine the combined scores of modes to explain which of the four determinant learning styles best describes the respondent. For this stage, the scores of four learning modes (AC, CE, AE, and RO) are used in the formula below in order to obtain the two combination scores:

$$(AC) - (CE) = (AC\text{-}CE)$$
$$(AE) - (RO) = (AE\text{-}RO)$$

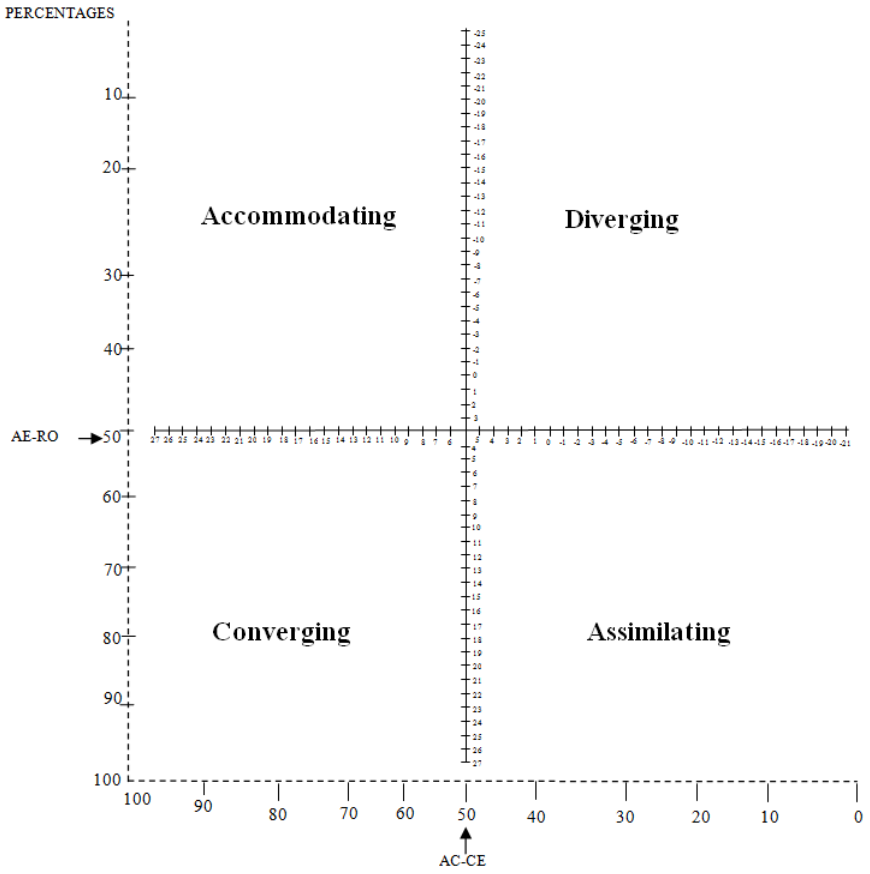

Figure 2. Learning style type grid [32].

Then, according to Kolb's theory [32], the found combined scores are located on the Learning Style Type Grid and the learning styles of participants are established as accommodator, diverger, assimilator, or converger (Figure 2).

The closer the data point is to the center of the grid, the more balanced the learning style. If the data point falls near any of the far corners of the grid, a particular learning style is heavily relied on. The results do not show whether the respondent is a good or bad in learning. They only show the learning style preferences of the learners in particular way.

During the study 442 surveys were applied to the first year students of the department of architecture of seven universities in Turkey. Using the SPSS 18 statistical software for analysis of obtained data; the reliability of the data was analyzed, percentage, and frequency distributions were examined.

3. Results and Discussion

3.1. Results

Findings of the study are grouped under six subheadings. First, data about participants; second, determining the learning styles of sample group; third, analyses for reliability of inventory and the last three are related to correlations between learning style characteristics of students and different variables.

3.1.1. Participants

The sample is comprised of the 2013-2014 academic year freshman architecture students of the Department of Architecture at: Çukurova University, Gaziantep University, Yıldız Teknik University, Mustafa Kemal University, Anadolu University, Zirve University, and Hasan Kalyoncu University in Turkey. Five of these universities (Çukurova University, Yıldız Teknik University, Gaziantep University, Mustafa Kemal University and Anadolu University) are state universities and the two others are private universities. Kolb [17] suggests that learning styles are shaped gradually by individual learning experience and age. In substance, learning style may be changed, according to changing conditions and individuals can alter their adaptation modes. For that reason the survey is applied to the freshman students whose learning styles are not yet affected by the architectural education program.

Table 1. Details of participants

Properties of participants		Student Number (*N*)	Percentage (%)
Gender	Female	265	60.0
	Male	177	40.0
Age	17-19	264	59.7
	20-22	164	37.1
	23-25	14	3.2
Type of University	State	352	79.6
	Private	90	20.4
Type of High School Graduated From	Anatolian	317	71.7
	State	84	19.0
	Private	37	8.4
	Vocational	4	0.9
Total		442	100.0

Participation was on a voluntary basis, and most of participants were informed by e-mail about their learning style preferences at the end of the research. There were 442 subjects whose age range was between 17 and 25 in the sample group. There were 264 (59.7%), 17-19 years old participants. The mean age was 19.45 and the standard deviation was 1.366. There were 177 (40.0%) males and 265 (60.0%) females. Most of the participants 352 (79.6%) are being educated at state university. The distribution of the participants according to the type of high school that they graduated were 317 (71.7%) students from an Anatolian high school, 84 (19.0%) students from state high schools, 37 (8.4%) students from private high school, while only 4 (0.9%)students were from vocational high school (Table 1).

3.1.2. Determining the learning styles of sample group

First, the learning styles of the architecture students were determined by using the Learning Style Inventory test of Kolb. According to the LSI test, concrete experience (CE), reflective observation (RO), abstract conceptualization (AC) and active experimentation (AE) scores of each participant were established. After this process, by subtracting each student's CE scores from AC scores and RO scores from AE scores, the exact learning styles of the participants were established as accommodator, diverger, assimilator, and converger.

According to the results of the LSI 2 test, the distribution of the subjects in the four learning styles was determined. The number of accommodator students was 44 (10.0%) lower than the other learning style preferences, where most of the students' learning

style preferences were 228 (51.6%) assimilator, 109 (24.7 %) converger and 61 (13.8%) diverger (Figure 4).

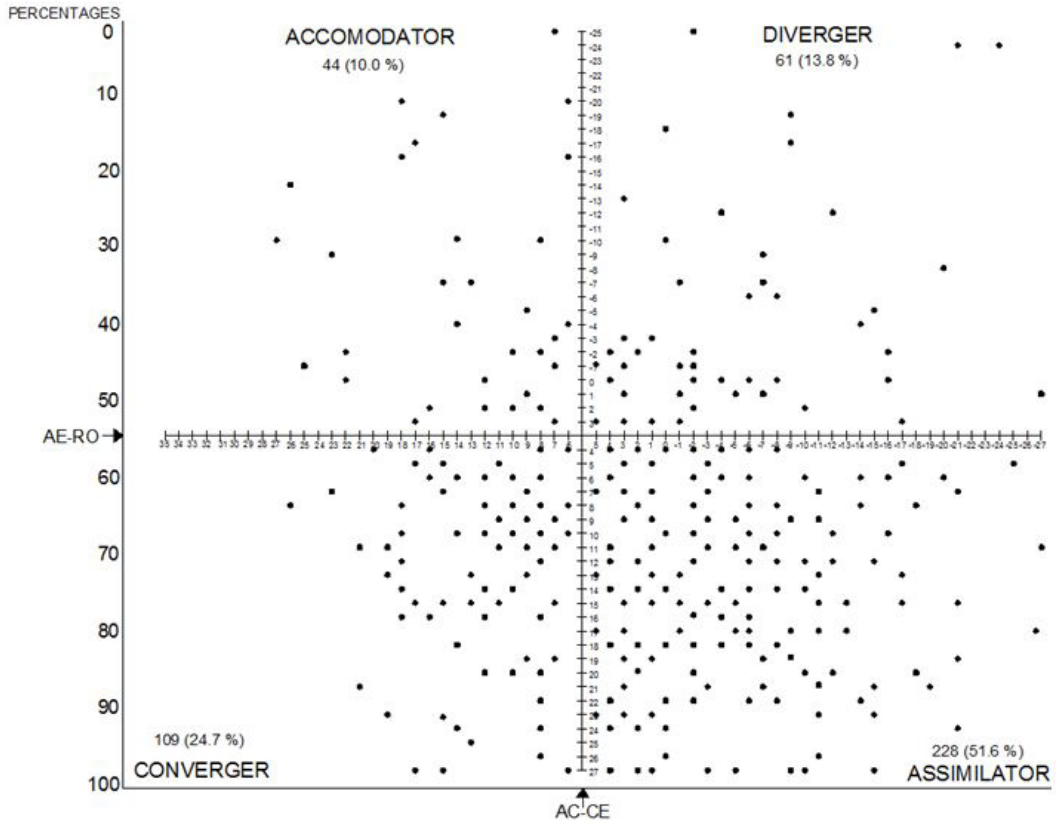

Figure 4. The distribution of participants through the learning styles.

3.1.3. Reliability analysis and Pearson correlation in LSI

Cronbach Alpha reliability of the Learning Style Inventory is shown in Table 2. These alpha scores are quite satisfactory [33]. It is thought that the lower percentage of accommodator and diverger students is due to the lower reliability scores of Reflective Observation (RO) and active experimentation (AE) (Figure 1).

Table 2. The reliability scores

Learning Modes	**Cronbach's standardized score alpha**
Concrete Experience (CE)	0.720
Reflective Observation (RO)	0.599
Abstract Conceptualism (AC)	0.722
Active Experimentation (AE)	0.633
Abstract-Concrete (AC-CE)	0.748
Active-Reflective (AE-RO)	0.582

Correlation between the four learning styles and two combined scores are seen at Table 3. The highest correlation score was noticed between the correlations on AC to AC-CE as 0.831. This correlation showed that when abstract conceptualization score is high, learning activity on the vertical axis of learning cycle shifts towards learning by

thinking (Figure 1). In addition to this, there is a strong negative correlation between CE and AC-CE as -0.827.

Table 3. Pearson correlations among learning modes and combined scores

Learning Modes	**RO**	**CE**	**AE**	**AC**	**AE-RO**	**AC-CE**
RO	1					
CE	-0,397**	1				
AE	-0,370**	-0,226**	1			
AC	-0,230**	-0,374**	-0,386**	1		
AE-RO	-0,827**	0,105*	0,827**	-0,096*	1	
AC-CE	0,099*	-0,827**	-0,099*	0,831**	-0,122*	1

3.1.4. Learning style characteristics according to gender

The chi-square test showed that architecture students' learning styles and gender were independent (Table 4). The frequencies of learning style preference were not significantly different by gender in the group.

Table 4. Learning styles of students' by gender

Learning Styles	**Gender**				***p***
	Female		**Male**		
	(N)	(%)	*(N)*	(%)	
Accomodator	26	5.9	18	4.0	0.798
Converger	63	14.2	46	10.4	0.597
Diverger	39	8.8	22	4.9	0.494
Assimilator	137	31.0	91	20.8	0.953
Total	265	59.9	177	40.1	

3.1.5. Learning style characteristics according to age group

The analysis of variance (ANOVA) tests were conducted in order to find out if age groups had any effect on learning styles. The One-Way ANOVA showed that learning styles of students and their age were dependent variables; there was a statistically significant mean difference across age group and learning styles. The Turkey test explained the source of the difference (Table 5). The mean differences across age group in the learning styles of assimilator ($F_{assimilator}$ = 3.386, df = 2, p = 0.035), but not in accommodator, converger and diverger.

Table 5. Learning styles of students by age group

Learning Styles	**Age Group**									***p***
	(17-19)			**(20-22)**			**(23-25)**			
	(N)	*(%) in group*	(%)	*(N)*	*(%) in group*	(%)	*(N)*	*(%) in group*	(%)	
Accommodator	26	9,9	5.90	15	9,1	3.40	3	14,3	0.40	0.820
Converger	71	27	16.10	37	22,6	8.50	1	7,1	0.20	0.183
Diverger	43	16,3	9.80	16	9,8	3.70	2	14,3	0.40	0.164
Assimilator	123	46,8	27.90	96	58,5	21.70	9	64,3	2.00	0.035*
Total	263	100	59.70	164	100	37.30	15	100	3.00	

When crosstab analyze examined the reason of significant mean difference which is valid for assimilator students are clearly seen at Table 5. The older the students, the more percentage are determined at assimilator students. In addition to, there is a decrease at the percentage and number of converger students with increase of age. These findings refer that learning styles can change along with the age.

3.1.6. Learning style characteristics according to type of university

The chi-square test showed that learning styles of architecture students and type of university which students study were dependent variables, and there was a statistically significant mean difference across university type and learning styles (Table 6). The mean differences across university type in the learning styles of diverger (p = 0.003) but not in accommodator, converger, and assimilator.

Table 6. Learning styles of students' by type of university

Learning Styles	**Type of University**						p
	State			**Private**			
	(N)	*(%) in group*	(%) *in total*	(N)	*(%) in group*	(%) *in total*	
Accommodator	38	10,5	8,40	6	6,7	1,40	0.272
Converger	92	26,2	20,80	17	18,9	3,90	0.155
Diverger	40	11,4	9.0	21	23,3	4,80	0.003*
Assimilator	182	51,9	41.3	46	51,1	10,40	0.920
Total	352	100	79,5	90	100	20,5	

The cross tabulation analysis conducted to find learning style differences in university types. With the evidence of the results; it is revealed that, at both type of universities the main learning style is assimilator. However, converger learners take second place at state universities, whereas diverger learners are the second majority group at private universities (Table 6).

3.2. Discussion

There are a few similar studies were published in literature [e.g. 6-8, 10, 34] use the same theoretical basis, Kolb's Experiential Learning Theory; however there are some significant differences between our study and others.

The design profession has also been separated as urban design, architecture, interior architecture, industrial design and so on. Today, all of these branches have become separate professions and some new separations are occurring within them.

Demirbaş and Demirkan [6] and Tucker [8] searched on design students which were attending interior design and product design program. However, our study and Kvan and Yunyan's [7] study examined only architecture students.

The other two studies conducted their research each by focusing at one university, however this research comprised the sample group from seven different universities throughout Turkey.

The major difference that distinguishes this study from the formers is sample size. Mentioned researches worked with similar sample size, approximately from 80 to 150,

due to class population of the design program of the focused university. However, in this study, architecture students throughout Turkey were reached for making a general decision on architecture students' learning style.

There are some researches in literature which search the relationship between gender and learning styles [e.g. 29, 35]. Both of these studies emphasized that there was no significant relationship between gender and learning style. In this study, it is found that learning style and gender are independent for architecture students.

In that manner the study aims to present the diversity of the Learning Style of freshman architecture students. In this context, the learning style characteristics of 442 freshman architecture students from seven different universities were examined. Investigation of the learning styles of the architecture students showed that assimilators were the majority group (51.6%). Kolb and Wolfe [36] reported that there are disciplinary differences in learning styles and that the dominant style in architecture students is accommodator. However, this finding is in contrast to the studies of Demirbaş and Demirkan [6]; Kvan and Yunyan [7]; Tucker [8], and Yazıcı and Yazıcı [10] who reported accommodators in the minority for architecture students, whereas the majority of their participants were comprised of assimilators and convergers. Our results are in line with the results of these latter three studies. However, there is a distinct difference between this study and the other three; they found very close values for assimilator and converger, therefore they reported both learning styles. Notwithstanding, there is a big space at the value of assimilator learners (51.6%) and converger learners (24.7%). The only common ground of these three studies was the use of freshman students.

4. Conclusion

Students' individual learning styles can play a critical role in the learning process. In this regard, understanding learning style differences is an important step in enhancing success that is effective for architecture students. For instance, assimilating students should be encouraged for analyzing key ideas, selecting information sources, validating source, predicting outcomes, inferring causes, and evaluating implications; converging students should be encouraged for setting learning goals, outlining, repeating materials to be recalled, researching and asking questions and, determining main idea. Diverging students should be emboldened for searching for information, evaluating current information, generating metaphors, generating example, inferring causes and, imaging or illustrating knowledge. Accommodating students should be heartened for providing concrete examples to apply information, focusing on doing rather than reflection, relating information to personal experiences, and using narrative sequence.

The obtained results of the study present very important findings for the architecture instructors to be aware of the learning style preferences of their students in order to organize the course materials that would be comprehensible and learnable for all of the learners. Therefore, educating students in accordance with their learning styles can be a good solution in achieving academic success. With this aim the Kolb's Learning Style Inventory test, one of the most popular instruments for defining learning styles was used to determine which learning styles were predominant among freshman architecture students in Turkey.

This study presents learning styles of first year architecture students. In this context, the learning style characteristics of 442 freshman architecture students were examined. The results of the study are discussed in two sections; results and suggestions for future research.

Previous studies in the literature reveal that students learning styles differ from each other in academic areas. It is concluded that, there was a specific distribution of learning styles for architecture students in the study. Although Kolb and Wolfe's [36] study, shows that the prevailing learning style of architecture students is accommodating, this study is found that the number of assimilating architecture students is much greater than the others in Turkey (51.6%). This peculiar finding of the study shows parallelism with Demirbaş and Demirkan's [6]; Tucker's [8] and, Yazıcı and Yazıcı's [10] studies. These studies stated that the dominant learning style is assimilating and converging among design and architecture students.

Meanwhile another significant result of the study is that, there is a relationship between learning style and university type, especially for diverging learners. According to this, it was found that population of assimilating students at state universities is greater than at private universities'. In addition, second place was taken by converger learners at state universities, and diverger learners at private universities. It is thought that the previous education experience of the students and the conditions of university acceptance exams affected this result.

Furthermore some studies in the literature which search the relationship between gender and learning styles emphasized that there was no significant relationship between gender and learning style. This study was achieved similar results according to previous researches. It was found that learning style and gender are independent for architecture students.

Pioneering studies in the area suggest that learning styles are shaped gradually by individual experience and age depending on life stages. This study reveals that there is a relationship between age and learning style, especially for assimilating learners.

The literature knowledge regarding to the experiential learning theory mentioned in former sections underpinning that, each learning style is a combination of two learning modes. Although just one of the styles is primacy, an individual has four learning styles and each learning style have different abilities emanate from learning modes. For that reason, the course materials and contents should be prepared extensively and in rich content that addresses the four learning modes for effective learning. In respect to findings; it is obvious that the architectural education program requires a holistic approach that sustains each learning mode.

As a part of our ongoing research the authors are working to determine whether architectural education affects the learning style of students by following approximately 60 architecture students from the first to the fourth year of their education. Through the continued studies conducted by the authors it is planning to further ascertain how architectural education affects the learning styles of architecture students.

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