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The Kolb Learning Styles of History Undergraduates in Turkiye

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Abstract
This study investigated the learning styles of history students depending on some demographic variables. The sample consisted of 1849 students from seven history-teaching (n=875) and eight history departments (n=974) of ten universities in different regions of Türkiye. Data were collected using a personal information form and the Kolb Learning Styles Inventory (KLSI-3). According to Kolb's classification of four learning styles, participants had assimilating, converging, diverging, and accommodating learning styles, respectively. According to Kolb's classification of nine learning styles, seven in ten participants had balancing, reflecting, thinking, and analyzing learning styles. The study investigated whether the variables of "university," "major," "gender," "age," and "grade level" affected participants' "learning modes" [concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), active experimentation (AE)], "perceiving information" (CE-AC), and "processing information" (RO-AE) scores. The results showed that the variable of "university" affected what learning styles participants adopted. Participants from seven universities adopted balancing learning styles, while those from the other universities adopted reflecting learning styles. The variable "major" affected participants' CE, RO, and AC scores. The variable "gender" affected their RO, AE, and "processing information" scores. The variable "age" affected their CE, AC, AE, and "perceiving information" scores. The variable "grade level" affected all their scores except for nine learning styles and CE.

Keywords: Educational Specialization, Experiential Learning Model, History Undergraduates, Kolb's Learning Style Inventory (KLSI), Learning Styles

1. Introduction

Learning is affected by numerous factors. Everybody learns differently depending on developmental characteristics, environmental variables, prior knowledge, learning motivation, past experiences, sociocultural background, etc. (Erden, & Altun, 2006). Educators should be aware of those factors to facilitate learning for life-long learners (Kolb, & Kolb, 2005). Educators should recognize the importance of individual differences and learning styles and integrate appropriate activities into curricula (Cassidy, 2004).

Since the second half of the 1900s, researchers have focused more and more on individual differences because there has been a growing body of research on the psychological and educational aspects of learning (Veznedaroğlu, & Özgür, 2005). For example, Coffield et al. (2004) advocate that we should consider individual differences to promote students' learning. Moreover, new concepts were born out of individual differences, such as mental performance, learning orientations, and learning styles (Ekici, & Kurt, 2013; Felder, & Brent, 2005). Learning styles have been studied since the 1920s when Carl Jung proposed his theory of personality types (Sternberg, & Grigorenko, 1997). However, the field witnessed a continual accumulation of a body of knowledge around learning styles between the late 1950s and early 1970s (Yeşilyurt, 2014).

Rita Dunn was the first to use the term "learning styles." She defines them as ways of using different and idiosyncratic tactics when learning or preparing to learn a piece of new and challenging information (Boydak, 2015; Dunn, & Dunn, 1975). In the following years, scholars defined learning styles differently. For example, Kefee and Dunn define them as personal and distinctive characteristics that indicate how to act in learning settings. According to Keefe (1979), learning styles are “the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment” (Sandhu, Fong, & Rigney, 1996). Reinert (1976) defines learning styles as some kind of internal programs that regulate our behavior. For Entwistle, Kolb, and Schmeck, learning styles are psychological constructs that emerge in learners' behaviors that overlap with their dispositions. Kolb argues that people learn from their experiences. Ideas are not fixed elements of thoughts as they are reshaped by experiences (Kolb, 2014). Kolb's experiential learning theory is based on learning processes. He defines learning styles as the ways in which learners prefer to use their abilities in experiential learning (Gencel, 2007; Kolb, 1984). It is noteworthy that Felder and Silverman (1988) also emphasize “preferences” when they define learning styles as the characteristic strengths and preferences in the ways individuals take in and process information.

Researchers have focused more and more on learning styles as they have come up with the idea that individual differences are the wealth of learning settings. Therefore, Gencel (2007) maintains that we should identify students' learning styles and provide them with education accordingly to help them achieve permanent learning. Moreover, if one knows how one learns, one is more likely to adopt that learning style to learn more easily and quickly (Metin, Yılmaz, Birişçi, & Coşkun, 2011). In other words, learners who know how they learn are more likely to build up confidence in their learning (Kazu, 2009: 90). Therefore, learning styles are instrumental in helping learners discover how they learn (Carol, 2015). Learning styles are not the only factors affecting learning at different levels but are critical components of learning/teaching processes. Everybody adopts the best learning style to learn something because they have some idea of how they learn best. If there is a mismatch between the learning style and the learning environment, one is likely to reject or oppose that style (Kolb, 2014).

Teachers need to know what learning styles their students adopt because they need to plan lessons accordingly to provide equal and effective teaching (Sandhu, 1996). Nulty and Barrett (1996) argue that learning styles are not only the epistemology of a discipline, but they also affect the related educational processes. Therefore, they state that learning styles are not necessarily a result of the discipline per se but also of the way they are taught. Instructional plans suited to learning styles have different benefits: they (1) help students learn better, (2) allow teachers to answer questions about how to plan their lessons, and (3) encourage educators to prepare curricula by taking into account general learning approaches (Başıbüyük, Sülün, Bahar, & Kışoğlu, 2011). Clark and Latshaw (2012) emphasize that research on educational programs and learners' performance should not ignore what teaching styles teachers prefer. Teachers who know what teaching styles they adopt and what advantages and disadvantages they have can undertake more efficient learning-teaching processes (Gencel, 2013). If teachers match students' learning styles with topics, students can use different learning styles to complete learning tasks and improve themselves (Kazu, 2009). Activities that are appropriate for learning styles both give clues to teachers and help students perform better (Başıbüyük et al., 2011) because the latter choose study behaviors according to environmental and personal factors and forms of discourse. In other words, activities that are appropriate for learning styles allow students to choose study behaviors more comfortably (Nulty, & Barrett, 1996). In addition, learning styles explain why everyone learns differently, enabling them to take learning processes under control.

This is because one's ability to take responsibility for one's learning is an essential indicator of learning to learn. This is the only way to acquire ever-changing knowledge by oneself (Güven, & Kürüm, 2006).

1.1. Experiential Learning Model and Kolb's Learning Styles

Many measurement tools focus on different dimensions of learning styles (Cassidy, 2004; Dierking, 1991; Romanelli, Bird, & Ryan, 2009; Veznedaroğlu, & Özgür, 2005; Yadav, & Shukla, 2021). For example, the classification of learning styles in the Experiential Learning Theory developed by David Kolb has an important place in the educational sciences literature (Gencel, 2007). Kolb's Learning Style Inventory (KLSI) is different from other learning-style and personality tests because it is based on a comprehensive theory of learning and development. Kolb bases his model on how human experiences are transformed into concepts and how transformations help people select new experiences (De Bello, 1990).

An essential principle of Experiential Learning Theory is that everybody learns differently (Gencel, 2008). Some turn concrete representations into abstract concepts, some reflect on concepts, some work on concrete objects, and some involve their emotions in the process (McCarthy, 1997). Kolb's theory stipulates that learning consists of four interconnected structures:

"Concrete experience (CE) involves using direct experience, feelings, and emotions to engage with the world. Reflective observation (RO) involves looking back on the extant experience, recollecting details of the experience, and gathering new information about the experience; (3) Abstract conceptualization (AC) involves creating meaning out of the experience and creating plans to guide future actions; (4) Active experimentation (AE) involves testing the plan by putting it into action (Kayes, 2005)."

The vertical axis in Kolb's model represents a continuum of preferences for how information is perceived, ranging from grasping "concrete experiences" to "abstract concepts" (a combination of CE-AC). The horizontal axis represents how once-perceived information is turned into meaning. At one end is "reflective observation," and at the other end is "active experience" (a combination of RO-AE). The intersection of those two continuums creates Kolb's four main learning styles (Given, 1996). These two independent dimensions support each other. Learning styles are determined by combining scores from the CE/AC and AE/RO modes. These four styles are called diverging (CE/RO), assimilating (RO/AC), converging (AC/AE), and accommodating (AE/CE). In this way, we can identify one's learning style. These four styles follow each other in a cycle (Figure 1).

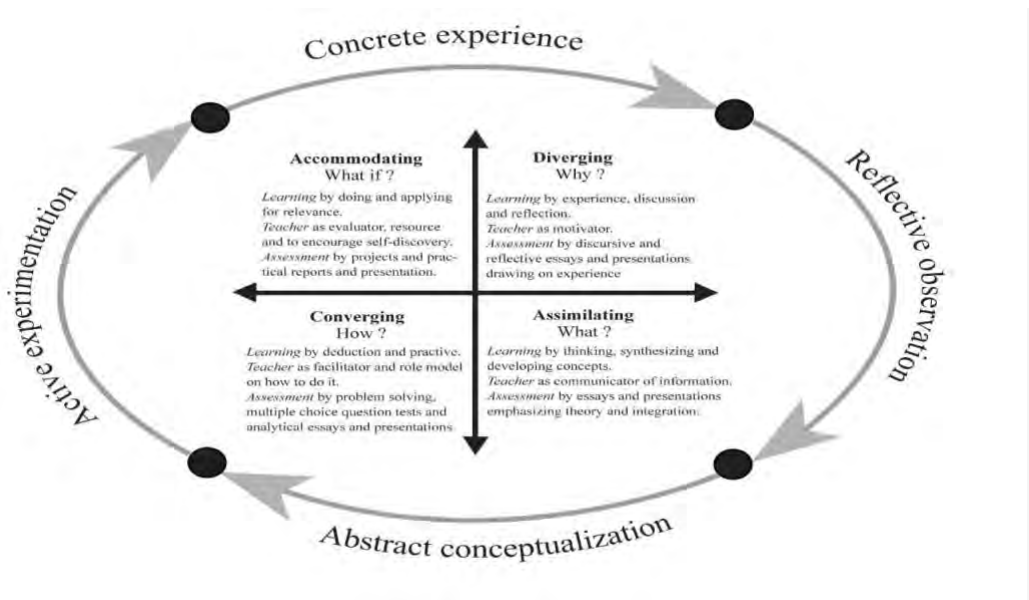

Figure 1: Teaching, Learning, and Assessment Activities Suitable for Kolb's Learning Styles (Özdemir, 2015: 84)

When the cycle starts, learners have a concrete experience that involves them emotionally, and then they begin reflecting on the experience from different perspectives (Mansfield, & Murrell, 1991). The learning cycle should first be structured from concrete experience to reflective observation and then from abstract conceptualization to active experience (Kolb, 1984). If teachers think of the learning cycle as a conical structure rather than as simple stages to be followed in sequence, the experiential learning model serves students' best interests and thus helps them develop higher-order thinking skills (Kolb, & Kolb, 2005). One can enter the cycle at any point, but one must follow the stages in sequence. In this way, the learning cycle provides feedback, which is the basis for evaluating a new action and its consequences (Healey, & Jenkins, 2000). Learning occurs when one uses one or more of the four modes to solve a learning problem.

1.2. Interdisciplinary Differences in Learning Styles

Culture, personality type, educational specialization, career choice, and current job roles and tasks influence learning styles (Kolb, & Kolb, 2013; Kolb, 1984). Research on interdisciplinary differences in learning styles shows that experiences with education help students develop positive attitudes towards specific learning skills, learn how to learn, and adopt individual learning styles. Bradbeer (1999) states that the principal axes of disciplinary differentiation are also the basis of learning styles. Therefore, he does not find it surprising that students gravitate towards disciplines appropriate to their learning styles. Alice Y. Kolb (2005) argues that people with the same profession adopt different learning styles because they have different experiences during their undergraduate years. Kolb (2014) also maintains that what learning styles students adopt depends on the processes of choosing a discipline and socializing during their undergraduate years.

According to Kolb (1984), specializing in education and social work is characterized by accommodating learning styles, specialization in medicine and engineering is characterized by converging learning styles, specialization in humanities and social sciences is characterized by diverging learning styles, and specialization in mathematics and natural sciences is characterized by assimilating learning styles. Kolb, Boyatzis, and Mainemelis (2014) also found a relationship between learning styles and areas of specialization. They reported four findings based on the results of earlier research. First, people majoring in art, history, political science, English, and psychology are more likely to adopt diverging learning styles. Second, people majoring in abstract and applied fields (medicine and engineering) are more likely to adopt converging learning styles. Third, people majoring in education, communication, and nursing are more likely to adopt accommodating learning styles. Fourth, people majoring in math and physics are more likely to adopt assimilating learning styles. Jones, Reichard, and Mokhtari (2003) found that students majoring in English, math, science, and social studies had interdisciplinary differences in dominant learning styles.

Studies using the KLSI-TR reported that specialization areas were associated with specific learning styles. Aşkar and Akkoyunlu (1993) found that most participants specializing in social and natural sciences adopted assimilating learning styles, while most participants specializing in engineering adopted converging learning styles. Gürpınar, Hilal, and Tetik (2011) found that most medical students adopted assimilating and converging learning styles. Özdemir (2015) determined that most Turkish preservice geography teachers adopted assimilating and converging learning styles. Alp, Uzuner, and Sertbaş (2020) reported that most students from sports sciences faculties adopted diverging learning styles. Çelikler (2020) found that most Turkish undergraduate chemistry students had converging and assimilating learning styles, while Güneş (2018) reported that most Turkish undergraduate biology students adopted assimilating learning styles. Most preservice teachers adopt assimilating learning styles, but their learning styles depend on their majors. For example, Özdemir and Kesten (2012) determined that most preservice social studies teachers adopted assimilating and converging learning styles, while Numanoğlu and Şen (2007) found that most students majoring in computer and instructional technologies adopted converging learning styles. Demir (2008) found that most preservice Turkish teachers adopted converging and assimilating learning styles.

Bulut and Hasırcı (2012) also documented that almost four in five social studies teachers adopted converging and assimilating learning styles.

There are very few studies on the learning styles of history students in the literature on the subject. According to Colins (1999; cited in Gencel, 2008), education based on experiential learning theory helps college students achieve high performance in history classes, which does not depend on their learning styles. Carol (2015) used the KLSI, revised by Honey and Mumford (2006), to determine the learning styles of first-year history students at the University of Bucharest. He found that most students had "reflector" and "theorist" learning styles, while only a few students had an "activist" learning style. Elban (2018) used the Grasha-Reichmann Learning Style Scale to determine the relationship between preservice history teachers' learning styles and academic performance.

This study investigated the learning styles of history students depending on some demographic variables. We think our results will contribute to the literature and pave the way for further research. The sample consisted of 1849 students from seven history-teaching (n=875) and eight history departments (n=974) of ten universities in different regions of Türkiye. Data were collected using a personal information form and the Kolb Learning Styles Inventory (KLSI-3).

1.3. Research Hypotheses

1. Which learning styles have most participants adopted according to Kolb's classification of four and nine learning styles?
2. Do demographic variables (gender, age, university, department, grade level, etc.) affect participants' "learning modes" (CE, RO, AC, AND AE), "perceiving information" (CE/AC), and "processing information" (RO/AE) scores?

The study sought answers to the following subproblems:

1. Do participants' learning styles differ by demographic variables (gender, age, university, department, grade level, etc.)?
2. Do participants' "learning modes" (CE, RO, AC, and AE) scores differ by their demographic variables (gender, age, university, department, grade level, etc.)?
3. Do participants' "perceiving information" (AC-CE) scale scores differ by their demographic variables (gender, age, university, department, grade level, etc.)?
4. Do participants' "processing information" **(**AE-RO) scale scores differ by their demographic variables (gender, age, university, department, grade level, etc.)?

2. Method

This quantitative study adopted a general survey model. The sample consisted of 1849 students from seven history-teaching (n=875) and eight history departments (n=974) of ten universities in different regions of Türkiye.

Table 1: Descriptive Characteristics

Universities	F %	Departments		Total
		History- teaching	History	
Van Yüzüncü Yıl University (VYYU)	N	100	136	236
	%	42	58	13
Dokuz Eylül University (DEU)	N	128	101	229
	%	56	44	12
Dicle University (DU)	N	115	121	236
	%	49	51	13

Gazi University (GU)	N	114	121	235
	%	49	51	13
Marmara University (MU)	N	116	0	116
	%	100	0	6
Atatürk University (ATAU)	N	169	118	287
	%	59	41	16
Necmettin Erbakan University (NEU)		133	0	133
	%	100	0	7
Ondokuz Mayıs University (OMU)	N	0	143	143
	%	0	100	8
Akdeniz University (AU)	N	0	85	85
	%	0	100	5
Balıkesir University (BU)	N	0	149	149
	%	0	100	8
Gender				
Man	N	430	464	894
	%	49	48	48
Woman	N	445	510	955
	%	51	52	52
Grade Level (year)				
First	N	190	246	436
	%	22	25	24
Second	N	188	258	446
	%	22	27	24
Third	N	160	239	399
	%	18	25	22
Fourth	N	164	231	395
	%	19	24	22
Fifth	N	173	0	173
	%	20	0	9
Age (year)				
17-19	N	169	160	329
	%	19	16	18
20-22	N	451	610	1061
	%	52	63	57
23-25	N	255	204	459
	%	29	21	25
Total within departments	**N**	**875**	**974**	**1849**
	%	**47**	**53**	**100**

The “history-teaching” group consisted of 430 men (49%) and 445 women (51%), while the “history” group consisted of 464 men (48%) and 510 women (52%). Students in the history teaching departments of faculties of education in Türkiye study for five years. Therefore, the sample included 173 fifth-year students from history-teaching departments.

2.1. Data Collection and Analysis

The data were collected using a personal information form and the Kolb Learning Styles Inventory (KLSI-3). The personal information form consisted of sociodemographic items on gender, major, grade level, age, etc. The Kolb Learning Styles Inventory was developed by Kolb (1971). Many researchers have used the inventory on samples from different countries. Kolb revised the inventory several times. However, the items in KLSI 2 and its later versions (KLSI 3, KLSI 3.1, and KLSI 3.2) remained the same. He only made changes in normative sampling, coding, and learning style names but kept the rationale of the inventory as it was. He mainly modified how the scale scores were evaluated.

The Kolb Learning Styles Inventory-2 was adapted into Turkish by Aşkar and Akkoyunlu (1993). However, this study employed the KLSI 3, which was adapted into Turkish by Gencel (2007). The inventory (version 3) consists of 12 items, each with four options rated on a four-point Likert-type scale. The total score ranges from 12 to 48. The scores of the "learning modes" (CE, RO, AC, and AE) are calculated. Then, AC-CE and AE-RO equations are used to calculate the combined scores, ranging from -36 to +36. A positive AC-CE score indicates abstract learning, while a negative AC-CE score indicates concrete learning. An AE-RO score indicates active or reflective learning (Kolb, & Kolb, 2005a; Gencel, 2007; Diken, 2019).

Experimental and clinical research shows that the classification of nine learning styles is better at identifying learning styles than the classification of four learning styles because the former causes less confusion than the latter. A.Y. Kolb (2013) recruited a larger and more diverse sample with higher representative power (n=6977) to test the psychometric properties of the KLSI 3.1 and 3.2. The format, items, scoring, and interpretation booklet of the KLSI 3.2, the version of the scale revised in 2013, are the same as the KLSI 3. The KLSI 3.2 provides reference ranges for identifying Kolb's nine learning style types. The intercept scores of the KLSI 3.2 are as follows (Kolb and Kolb, 2013, p. 46):

Initiating	AC-CE <2	AE-RO> 11
Experiencing	AC-CE <2	AE-RO >0 and <12
Imagining	AC-CE <2	AE-RO <1
Reflecting	AC-CE >1 and <13	AE-RO <1
Analyzing	AC-CE >12	AE-RO <1
Thinking	AC-CE >12	AE-RO >0 and <12
Deciding	AC-CE >12	AE-RO >11
Acting	AC-CE >1 and <13	AE-RO >11
Balancing	AC-CE >1 and <13	AE-RO >0 and <12

The nine learning styles were manually calculated based on these reference ranges. Many researchers have established the validity and reliability of the KLSI. Kayes (2005, p. 255) stated that the CE, RO, AC, and AE scores were at acceptable levels. Gencel (2006) provided information on the reliability of the Turkish version of the KLSI 3 and reported that the learning modes (CE, RO, AC, & AE) had reliability coefficients of 0.71 to 0.80.

A non-parametric test (chi-square) was used to determine the relationship between learning styles and demographic variables because learning styles take nominal values. On the other hand, the scores of the learning modes (CE, AC, RO, & AE) and the combined scores of the AC-CE and AE-RO take numerical values based on the scale data. Therefore, we need to conduct a normality test to determine whether the data are normally distributed. The scores of the learning modes have the same or similar arithmetic means, modes, and medians. Moreover, skewness and kurtosis values are close to 0 and between -1 and +1. Skewness and kurtosis values in the range of -2 to +2 indicate normal distribution (Mallery and George, 2000). In addition, the histograms and normal q-q plot graphs of the scores of the learning modes show that it may be appropriate to use parametric tests for data analysis. Based on these results, parametric tests were used for data analysis. Independent sample t-test was used for bivariate comparisons, while One-way analysis of variance (ANOVA) was used for three or more variables. A Scheffe's test was used to make posthoc comparisons to determine the source of significant differences

3. Results

3.1. The Effect of Independent Variables on Learning Styles

3.1.1. University

Almost half of the participants adopted assimilating learning styles (n=834; 45%). More than a quarter of the participants adopted converging learning styles (n=539; 29%). Less than a quarter of the participants adopted diverging (n=320; 17%) or accommodating (n=156; 9%) learning styles. The chi-square test based on four learning styles showed that university affected participants' learning styles [$\chi 2$= 65.31; p = 0.015; p<0.05]. Table 2 shows that only 156 participants adopted accommodating learning styles. Most participants from the MU (n=116) adopted either converging (n=50, 45%) or assimilating learning styles (38%; n=45). Most participants from all universities but the OMU adopted assimilating or converging learning styles. Most participants from the OMU (n=143) adopted assimilating (n= 68; 47%) or diverging (n=41, 29%) learning styles. According to the classification of nine learning styles, more than half of the participants adopted balancing (n=411, 22%), reflecting (n=340, 18%), or thinking (n=297, 16%) learning styles. Participants from all universities but the MU adopted initiating (n=34, 2%) and deciding (n=74, 4%) learning styles the least. The chi-square test based on nine learning styles showed that university affected participants' learning styles [$\chi 2$=162.68; p=0.000; p<0.05]. Participants from seven universities (VYYU, DEU, DU, MU, AU, ATAU, and BU) adopted balancing learning styles the most, while those from three universities (GU, NEU, and OMU) adopted reflecting learning styles the most.

Table 2: The Distribution of Learning Styles by University (chi-square)

University	F %	Diverging	Assimilating	Converging	Accommodating	Initiating	Experiencing	Imagining	Reflecting	Analyzing	Thinking	Deciding	Acting	Balancing
VYYU	N	30	97	85	24	5	21	13	32	20	45	14	32	54
	%	13	41	36	10	2	9	6	17	7	19	6	14	23
DEU	N	36	121	52	20	3	21	22	47	39	33	3	10	51
	%	16	52	23	9	1	9	10	21	17	14	1	4	22
DU	N	40	101	70	25	4	18	20	40	19	46	9	16	64
	%	17	42	30	11	2	8	9	17	8	20	4	7	27
GU	N	47	111	57	20	5	27	24	51	25	40	7	8	48
	%	20	47	24	9	2	12	10	22	11	17	3	3	20
MU	N	14	45	50	7	3	4	7	14	13	26	15	5	29
	%	12	38	43	6	3	3	6	12	11	22	13	4	25

ATAU	N	57	110	92	28	7	21	33	51	35	33	8	35	64
	%	20	38	32	10	2	7	12	18	12	12	3	12	22
NEU	N	23	63	35	12	2	13	12	28	21	18	7	10	22
	%	17	47	26	9	2	10	9	21	16	14	5	8	17
OMU	N	41	68	30	4	2	7	25	43	11	19	3	8	25
	%	29	47	21	3	1	5	18	30	8	13	2	7	18
AU	N	14	35	29	7	2	3	12	11	12	12	4	8	21
	%	17	41	34	8	2	4	14	13	14	14	8	9	25
BU	N	18	83	39	9	1	8	11	23	32	25	6	10	33
	%	12	56	26	6	1	5	7	15	22	17	4	7	22
Total	N	320	834	539	156	34	143	179	340	227	297	76	142	411
	%	17	45	29	9	2	8	10	18	12	16	4	8	22
$\chi2$= 6565.31; p = 0.015*						$\chi2$=162.68; p = 0.000*								

3.1.2. Major

Less than half of the participants majoring in history teaching had assimilating learning styles (44%). More than a quarter of the participants majoring in history teaching had converging learning styles (32%). Less than a quarter of the participants majoring in history teaching had diverging (15%) or accommodating (9%) learning styles. Less than half of the participants majoring in history had assimilating learning styles (46%). More than a quarter of the participants majoring in history had converging learning styles (27%). Less than a quarter of the participants majoring in history had diverging (19%) or accommodating (8%) learning styles. The chi-square test based on four learning styles showed that major affected participants' learning styles [$\chi2$= 10.597; p = 0.014; p<0.05]. Participants majoring in history teaching had balancing learning styles the most, followed by thinking (18%), reflecting (17%), analyzing (12%), acting (9%), imaging (8%), and experiencing learning styles (7%). Participants majoring in history had balancing learning styles the most, followed by reflecting (20%), thinking (15%), imaging (11%), analyzing (11%), experiencing (8%), and acting learning styles (7%). There was a significant difference between the groups according to nine learning styles [$\chi2$= 26.291; p = 0.001].

Table 3: The Distribution of Learning Styles by Major (chi-square)

Major	F/%	Diverging	Assimilating	Converging	Accommodating	Initiating	Experiencing	Imagining	Reflecting	Analyzing	Thinking	Deciding	Acting	Balancing	Total
History teaching	N	132	384	280	79	17	63	68	150	122	156	45	78	176	875
	%	15	44	32	9	2	7	8	17	12	18	5	9	20	100
History	N	188	450	259	77	17	80	111	190	105	141	31	64	235	974

	%	19	46	27	8	2	8	11	20	11	15	3	7	24	100
$\chi2$= 10.597; p = 0.014*						$\chi2$= 26.291; p = 0.001*									

3.1.3. Gender

Less than half of the male participants had assimilating learning styles (n=369; 41%). More than a quarter of the male participants had diverging (n=182; 20%) or converging learning styles (n=254; 29%). Less than a quarter of the male participants had accommodating learning styles (n=89; 10%). Almost half of the female participants had assimilating learning styles (n=465; 49%). More than a quarter of the female participants had converging learning styles (n=285; 30%). Less than a quarter of the female participants had diverging (n=138; 14%) or accommodating learning styles (n=67; 7%). More female participants (n=465; 49%) adopted assimilating learning styles than their male counterparts (n=369; 41%). On the other hand, more male participants adopted diverging and accommodating learning styles than their female counterparts. The chi-square test results based on four learning styles showed a significant difference between male and female participants [$\chi2$= 19.995; p = 0.00; p≤0.05]. Both male and female participants had balancing, reflecting, and thinking learning styles the most. There was also a significant difference in the distribution of the other learning styles between male and female participants [$\chi2$= 21.099; p = 0.007].

Table 4: The Distribution of Learning Styles by Gender (chi-square)

Gender	F/ %	Diverging	Assimilating	Converging	Accommodating	Initiating	Experiencing	Imagining	Reflecting	Analyzing	Thinking	Deciding	Acting	Balancing	Total
Male	N	182	369	254	89	20	72	108	163	99	123	35	75	199	894
	%	20	41	29	10	2	8	12	18	11	14	4	8	22	100
Female	N	138	465	285	67	14	71	71	177	128	174	41	67	212	955
	%	14	49	30	7	2	7	7	19	13	18	4	7	22	100
$\chi2$= 19.995; p = 0.000*						$\chi2$= 21.099; p = 0.007*									

3.1.4. Age

Participants were divided into three age groups: 17-19 years of age (Group 1), 20-22 years of age (Group 2), and 23≥ years of age (Group 3) (Table 5). Participants of all age groups had assimilating learning styles the most, followed by converging, diverging, and accommodating learning styles. Proportionally, the converging learning style was more dominant in Group 1 (n= 104, 32%) and Group 2 (n=145, 32%) than in Group 3 (n=290, 27%). The difference between the age groups was significant according to both four and nine learning styles [$\chi2$= 14.87; p = 0.028 and $\chi2$= 25.899; p=0.045; p<0.05]. The proportional distribution of the nine learning styles was similar in all age groups. Balancing was the most dominant learning style in all age groups. However, the reflecting learning style was more dominant in Group 2 (20%) than in Groups 1 (15%) and 3 (17%). On the other hand, the acting learning style was more dominant in Group 3 (11%) than in Groups 1 (8%) and 2 (6%).

Table 5: The Distribution of Learning Styles by Age (chi-square)

Age groups	Ƒ/ %	Diverging	Assimilating	Converging	Accommodating	Initiating	Experiencing	Imagining	Reflecting	Analyzing	Thinking	Deciding	Acting	Balancing	Total
17-19	N	55	141	104	29	8	30	29	50	45	53	17	26	71	329
	%	17	43	32	9	2	9	9	15	14	16	5	8	22	100
20-22	N	195	501	290	75	21	78	116	211	121	172	43	64	235	1061
	%	18	47	27	8	2	7	11	20	11	16	4	6	22	100
23+	N	70	192	145	52	5	35	34	79	61	72	16	52	105	459
	%	15	42	32	11	1	8	7	17	13	16	4	11	23	100
$\chi2$= 14.187; p = 0.028*						$\chi2$= 25.899; p = 0.045*									

3.1.5. Grade Level

Regardless of grade level, the most dominant learning style was assimilating, followed by converging, diverging, and accommodating. The proportional distribution of learning styles was close to each other at all grade levels. Fifth graders were students majoring in history teaching. Only twenty-four fifth graders adopted accommodating learning styles (14%). However, the test results showed no significant difference in the distribution of four learning styles between grade levels [$\chi2$= 13.890; p = 0.308; p>0.05]. On the other hand, the test results were statistically significant according to nine learning styles [$\chi2$=46.823; p = 0.044; p<0.05]. More fifth graders adopted acting learning styles than other grade levels. On the other hand, fewer fifth graders adopted imagining learning styles than other grade levels.

Table 6: The Distribution of Learning Styles by Grade Level (chi-square)

Grade Level	Ƒ	Diverging	Assimilating	Converging	Accommodating	Initiating	Experiencing	Imagining	Reflecting	Analyzing	Thinking	Deciding	Acting	Balancing	Total
First	N	75	197	127	37	11	41	41	76	49	71	24	36	87	436
	%	17	45	29	9	3	9	**9**	**17**	**11**	**16**	6	8	20	100
Second	N	81	202	128	35	9	30	47	81	57	67	13	25	117	446
	%	18	45	29	8	2	7	**11**	**18**	**13**	**15**	3	7	26	100
Third	N	73	189	112	25	3	30	39	77	46	80	14	22	88	399
	%	18	47	28	6	1	8	**10**	**19**	**12**	**20**	4	6	22	100

Fourth	N	71	172	117	35	7	32	43	78	44	55	16	36	84	395
	%	18	44	30	9	2	8	**11**	**20**	**11**	**14**	4	9	21	100
Fifth	N	20	74	55	24	4	10	9	28	31	24	9	23	35	173
	%	12	43	32	14	2	6	**5**	**16**	**18**	**14**	5	**13**	**20**	100
$\chi2$= 13.890; p = 0.308						$\chi2$= 46.823; p = 0.044									

3.2. The Effect of Independent Variables on Learning Characteristics (CE, RO, AC, AE, perceiving information AE-RO, and processing information AC-CE)

According to Kolb's Experiential Learning Theory, one perceives information through either concrete experience (CE) or abstract conceptualization (AC) and processes that information through reflective observation (RO) and active experimentation (AE). AE-RO (x-axis) and AC-CE (y-axis) scores were calculated on learning style grid coordinates to identify learning styles. Table 7 shows the results.

Table 7: The Effect of Independent Variables on Learning Characteristics (CE, RO, AC, AE, AE-RO, and AC-CE)

Variables	Sub-variables	N	CE		RO		AC		AE		AC-CE		AE-RO	
			$\overline{x}$	Sd	$\overline{x}$	sd	$\overline{x}$	Sd	$\overline{x}$	sd	$\overline{x}$	Sd	$\overline{x}$	Sd
Universities	VYYU	236	24.9	4.71	28.6	5.18	33.5	4.80	33.2	5.81	8.6	7.84	4.6	9.30
	DEU	229	25.3	5.03	30.2	5.09	33.8	5.01	30.7	4.94	8.4	8.73	.5	8.74
	DU	236	25.7	4.38	28.7	4.93	33.5	5.11	32.1	4.55	7.8	7.95	3.5	7.91
	GU	235	26.2	5.18	29.6	4.97	33.6	5.38	30.8	4.93	7.5	8.72	1.16	8.13
	MU	116	24.3	4.48	28.0	4.98	35.1	5.36	32.6	5.35	10.8	7.91	4.6	8.44
	ATAU	287	25.5	4.95	29.4	5.48	32.8	5.24	32.3	5.59	7.3	8.21	2.9	9.29
	NEU	133	25.8	5.56	29.5	5.39	33.6	5.43	31.1	5.37	7.8	9.02	1.5	8.72
	OMU	143	25.6	4.94	31.3	5.48	32.3	5.25	30.7	4.78	6.7	8.31	-.5	8.43
	AU	85	25.4	5.41	29.0	5.42	33.7	5.32	32.1	5.18	8.3	8.69	3.1	8.64
	BU	149	24.8	5.19	29.7	5.24	34.2	5.34	31.3	4.82	9.5	8.76	1.6	8.22
one-way ANOVA			***p*=0.033**		***p*=0.000**		***p*=0.001**		***p*=0.000**		***p*=0.002**		***p*=0.000**	
Major	HE	875	25.1	4.87	29.1	5.41	33.9	5.36	31.9	5.43	8.9	8.33	2.8	9.10
	H	974	25.7	5.02	29.7	5.08	33.1	5.05	31.6	5.04	7.4	8.44	1.9	8.43
	t-test		***p*=0.011**		***p*=0.011**		***p*=0.000**		*p*=0.187		***p*=0.000**		***p*=0.021**	
Gender	M	894	26.0	4.92	29.2	5.35	33.3	5.35	31.5	5.50	7.3	8.56	2.4	9.17
	F	955	24.8	4.93	29.6	5.15	33.7	5.09	31.9	4.95	8.9	8.22	2.2	8.37
	t-test		***p*=0.000**		*p*=0.06		*p*=0.124		*p*=0.193		***p*=0.000**		*p*=0.726	
Age	17-19	329	25.4	5.40	29.3	5.06	33.5	5.38	31.9	5.15	8.1	9.18	2.6	8.53
	20-22	1061	25.4	5.02	29.7	5.29	33.5	5.21	31.5	5.28	8.1	8.41	1.8	8.77
	23+	459	25.4	4.45	28.8	5.25	33.6	5.13	32.1	5.16	8.2	7.87	3.3	8.83

	one-way ANOVA		*p*=0.997		**p=0.020**		*p*=0.931		*p*=0.056		*p*=0.975		**p=0.008**	
Grade Level	1	436	25.6	5.48	29.3	5.23	33.5	5.25	31.6	5.18	7.9	9.15	2.3	8.79
	2	446	25.2	4.89	29.9	5.08	33.3	5.26	31.8	5.45	8.1	8.47	1.9	8.74
	3	399	25.4	4.53	29.5	5.12	33.8	5.45	31.4	4.90	8.4	8.05	1.9	8.07
	4	395	25.6	5.08	29.3	5.34	33.3	4.79	31.8	5.17	7.7	8.08	2.5	8.96
	5	173	25.1	4.35	28.4	5.66	34.2	5.39	32.4	5.57	9.1	7.93	4.1	9.65
	one-way ANOVA		*p*=0.530		**p=0.031**		*p*=0.225		*p*=0.254		*p*=0.366		*p=0.062*	

3.2.1. University

The ANOVA results revealed a significant difference for each learning characteristic. Participants from the GU had the highest CE score ($\bar{X}$=26.16), while those from the MU had the lowest CE score ($\bar{X}$=24.31) (F=2.026 and $p< 0.05$). The post-hoc analysis showed that the difference was statistically significant. In other words, participants from the GU had a significantly higher mean CE score than those from the MU. Participants from the OMU ($\bar{X}$=31.27) had a significantly higher mean AC score than those from the MU ($\bar{X}$=28.01) (F=3.055 and $p< 0.05$). Participants from the OMU ($\bar{X}$=31.27) had a significantly higher mean RO score than those from the MU ($\bar{X}$=28.01) (F=4.948 and $p<0.05$). The post-hoc analysis showed that the difference was between participants from the OMU and those from the VYYU, DU, and MU. Participants from the VYYU had the highest mean AE score ($\bar{X}$=33.17), while those from the DEU had the lowest mean AE score ($\bar{X}$=30.67). The significant difference in AE scores was between participants from the VYYU and those from the DEU, GU, and OMU (F=5.093 and $p< 0.05$). According to the results of the analysis of the mean scores calculated for the learning style grid coordinates (x: AE-RO, y: AC-CE) according to demographic variables (Table 7), there was a significant difference in AE-RO and AC-CE scores [(AE-RO: F=6.988 and $p< 0.05$), AC-CE: F=2.864 and $p< 0.05$)]. According to the posthoc analysis, there was a significant difference in AE-RO scores between participants from the VYYU and those from the DEU, GU, OMU, and BU; between participants from the DEU and those from the DU and MU; between participants from the GU and those from the MU; between participants from the OMU and those from the DU, MU, and ATAU. There was a significant difference in AC-CE scores between participants from the MU and those from the DU, GU, ATAU, and OMU.

3.2.2. Major

An independent samples t-test was performed to determine the difference in CE, RO, AC, AE, AC-CE, and AE-RO scores between participants majoring in history teaching and those majoring in history (Table 7). Participants majoring in history (n=974 and $\bar{X}$= 25.69) had a significantly higher mean CE score than those majoring in history teaching (n=875 and $\bar{X}$= 25.10) ($t_{(1847)}$= 2.552 and $p< 0.05$). However, participants majoring in history ($\bar{X}$=33.13) had a significantly lower mean AC score than those majoring in history teaching ($\bar{X}$= 33.99) ($t_{(1847)}$=3.54 and $p< 0.05$). Participants majoring in history ($\bar{X}$=29.69) had a significantly higher mean RO score than those majoring in history teaching ($\bar{X}$=29.07) ($t_{(1847)}$= 3.54 and $p<0.05$). However, there was no significant difference in AE scores between participants majoring in history ($\bar{X}$=31.55) and those majoring in history teaching ($\bar{X}$=31.88) ($t_{(1847)}$=1.31 and $p> 0.05$). There was a significant difference in AC-CE and AE-RO scores between participants majoring in history and those majoring in history teaching (Table 7).

3.2.3. Gender

There was a significant difference in CE and AC-CE scores between male and female participants. Male participants (n=894 ve $\bar{X}$=26.03) had a significantly higher mean CE score than their female counterparts (n=955

and $\bar{X}$=24.84) ($t_{(1847)}$= 5.16 and p<0.05). However, male participants ($\bar{X}$=7.3) had a significantly lower mean AC-CE score than their female counterparts ($\bar{X}$=8.9) ($t_{(1847)}$= 3.99 and p< 0.05).

3.2.4. Age

All participants had similar scores in all learning characteristics but RO and AE_RO scores. There was no significant difference in RO scores between participants 17-19 years of age (n=329 and $\bar{X}$=26.03) and those 20-22 (n=1061 and $\bar{X}$=29.66). Participants over 23 years of age had an RO score of $\bar{X}$=28.84 (n=459), indicating that they made reflective observations less often than the other groups (F=3.927 and p< 0.05). According to the posthoc results, there was a significant difference in AE-RO scores between participants 20-22 years of age ($\bar{X}$=1.81) and those 23-25 years of age ($\bar{X}$=3.30) (F=4.827 and p< 0.05).

3.2.5. Grade Level

The ANOVA results showed that grade level affected participants' RO scores (F=2.660 and p<0.05). According to the posthoc analysis, second graders ($\bar{X}$=29.87) had a significantly higher mean RO score than fifth graders ($\bar{X}$=28.38).

Table 7: Results

	4LS	9LS	CE	RO	AC	AE	AC-CE	AE-RO
University	X	X	X	X	X	X	X	X
Major	X	X	X	X	X		X	X
Gender	X	X	X				X	
Age	X	X		X				X
Grade Level		X		X				

X= Significance

4. Discussion

The results showed that participants adopted all four or nine learning styles developed by Kolb. Almost half of the participants adopted assimilating learning styles, followed by converging, diverging, and accommodating learning styles. Kolb (1984) and Kolb, Boyatzis, and Mainemelis (2014) argue that most people who specialized in history adopt diverging learning styles. On the other hand, Aşkar and Akkoyunlu (1993) found that more than half of students majoring in social sciences had assimilating learning styles. According to Kolb's classification of nine learning styles, about two-thirds of our participants adopted balancing, reflecting, thinking, or analyzing learning styles. According to Kolb's Experiential Learning Theory, those learning styles are combinations of abstract conceptualization and reflective observation learning styles of the learning cycle. Therefore, people who adopt these learning styles learn by thinking and observing. People with assimilating learning styles can organize extensive and comprehensive information into a logical whole, make plans, and identify problems. However, they often find it challenging to adopt a systematic approach in practice (Kolb, 1981). Less than a quarter of our participants adopted balancing learning styles characterized by adaptability. People with balancing learning styles tend to be more satisfied in learning environments where they can use all four learning modes. They learn from lessons, discussion groups, brainstorming sessions, lab activities, and hands-on methods. Moreover, they can learn from teachers with different teaching approaches because they can adapt to different learning environments.

The results showed that what learning styles participants adopted depended on which university they went to. Research also shows that geography (Healey, Kneale, & Bradbeer, 2005; Özdemir, 2015), chemistry (Çelikler, 2020), and biology (Güneş, 2018) students from different universities have different learning styles.

There was a significant difference in all "learning mode" scores but AE between participants majoring in history and those majoring in history teaching. However, Güneş (2018) reported that major did not affect undergraduates' learning styles. On the other hand, Özdemir (2014) and Çelikler (2020) determined that undergraduates from different departments had different learning styles. Gürsoy (2008) also focused on the effect of majors (classroom teaching, science teaching, and Turkish teaching departments) on preservice teachers' learning styles. He found that students majoring in different departments had different learning styles.

There was a significant difference in CE and AC-CE scores between male and female participants. Çavaş (2010) also detected a significant difference in AE and AE-RO scores between male and female preservice science, classroom, and math teachers. On the other hand, Karademir and Tezel (2010) documented a significant difference in RO scores between male and female preservice classroom teachers. Kolb (2005a) reports significant differences in AC-CE and AE-RO scores between male and female students. However, he states that we should not make gross generalizations, such as "women learn concretely, while men learn abstractly." In line with this, Cevher and Yıldırım (2020) conducted a meta-analysis of 341 academic articles on learning styles published between 2000 and 2016 in Türkiye. They documented those 54 articles investigated the relationship between gender and learning styles. More than half of those 54 articles reported no relationship between gender and learning styles (61%; n=33). However, some researchers argue that men and women have different learning styles (Çaycı, & Ünal, 2007; Demirkol, 2009; Karademir, & Tezel, 2010; Çiğdem, & Memiş, 2011; Zengin, & Alşahan, 2012; Yeşilyurt, 2014), while others report no difference in learning styles between men and women (Güven, 2003; Demir, 2006; Mutlu, 2008; Durdukoca, & Arıbaş, 2010; Koçakoğlu, 2010; Deniz, 2011; Özdemir, & Kesten, 2012; Güneş, 2018; Çelikler, 2020).

Age affected our participants' learning styles. For example, participants over 23 years of age had a significantly higher mean AE score than other age groups, indicating that they used active experimentation when processing information more often than other age groups. Grade level led to a significant difference in nine learning styles and RO scores between participants. Fifth graders had the lowest mean RO score and the highest mean AE score. This result is consistent with longitudinal studies suggesting that students move from reflective to active learning styles throughout their undergraduate years (Kolb, 2005; Kolb, & Kolb, 2013). Mentkowski and Strait (1983) conducted a longitudinal study in a sample of university students majoring in history and philosophy to investigate the relationship between cognitive development levels and learning styles. They found that students had higher cognitive development levels and adopted better learning styles in the last year than in the first year of college. They preferred CE learning styles in the first year, while they adopted AC and converging learning styles in the last year of college. In other words, they moved from CE and RO (diverging learning style) to AC and AE (converging learning style). Özdemir, Kesten, and Işkın (2017) conducted a longitudinal study to determine preservice social studies teachers' learning styles. They reported that students moved from assimilating to accommodating learning styles but that there was no significant difference in "learning modes" and CE-AC and RO-AE scores between pretest and posttest scores. Özdemir and Kesten (2012) investigated preservice social studies teachers' learning styles and reported two findings. First, students of all grade levels (from the first to the fourth year) adopted the four learning styles. Second, assimilating learning styles were the most dominant learning styles among almost half of first-year students, while converging learning styles were the most dominant learning styles among almost half of fourth-year students. Özdemir (2015) documented that grade level and age affected preservice geography teachers' learning styles. Güneş (2018) reported that preservice biology teachers of different grade levels had different learning styles. Çelikler (2020) found that age significantly affected chemistry students' learning styles. On the other hand, some researchers argue that these variables do not affect Turkish undergraduates' learning styles (Kaf Hasırcı, 2006; Arsal, & Özen, 2007; Ergür, 2010; Can, 2011; Başıbüyük, Sülün, Bahar, & Kışoğlu, 2011; Kiriş Avaroğlu, & Şaman, 2020).

Our results showed that participants majoring in history adopted different learning styles. Students who know the advantages and disadvantages of their learning styles can develop learning strategies in line with the learning needs of their majors. Historians need to use different learning modes in the dimensions of perceiving and processing information to analyze, synthesize, and evaluate historical developments. They should use different learning modes, from abstract conceptualization to concrete experience and from reflective observation to active experimentation, to transform abstract historical events into concrete representations or to relate new knowledge to the present. Academics should recognize that every student has a different learning style. In line with this, they should ensure that their lesson plans integrate different strategies to provide students with a more democratic learning environment.

In Türkiye, most students who graduate from history and history teaching departments work as teachers. Therefore, they should deliver their lectures according to their students' learning styles to turn them into individuals who can think and put their ideas into practice to contribute to individual and social development in the long term.

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