An Investigation on Secondary Education Students' Learning Styles and Use of Social Networks

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ABSTRACT

The aim of this study is to investigate the relations between secondary education students' learning styles and their use of social networks. The samples of the research designed by relational screening model consist of 1281 students reached by convenient sampling method, one of the non-probability sampling methods. In this study, "Kolb's Learning Styles Inventory" and "The Survey of the use Social networks" were used as data collections tools. Frequency, percentage and chi-square techniques were used for data analyses. As a results of the study, it was found that the most used social networks are Facebook, YouTube, Twitter and Google Plus among students. In addition, students use social networks mostly for sharing photo, followed by making friends, sharing videos and playing games respectively. Students who have assimilative learning styles use Facebook, accommodative learning styles use Google Plus, converging styles use Twitter and diverging learning styles use other social networks. Moreover, it was found that students who has accommodative and assimilative learning styles use social networks to share videos, diverging learning styles use social networks to share photos and converging learning styles use social networks to make friends. However, it wasn't found statistically significance difference between the students' learning styles and both preferring social networks and the purpose of using them. In the study, it was investigated the relation between students' learning style based on Kolb's experiential learning theory and the use of social networks. Apart from Kolb's Model, it is recommended that some other models like Myers and Briggs' type indicator model, Lawrence's learning type model, Fleming and Mill's learning style model (VARK), Felder and Silverman's learning style model or Reinert's learning styles model can be preferred by authors to reveal the relationship with the use of social networks. Thus, the relationships between learning styles, one of the most important individual differences that facilitate learning, and social networks can be revealed in more detail and contribute to the literature on integrating social networking into educational environments.

INTRODUCTION

Learning environments technology-enriched have very important role to achieve the objective of curricula and to gain the goal of learning outcomes. In this context, there has been increase in studies on the integration of web 2.0 technologies such as social networks into teaching environments, in recent years (Berestova et al., 2020; Döger, 2022; Güler & Sali, 2021; Kelleci & Tetik, 2023; Mishra, 2020; Shestak et al., 2021; Pulgar, 2021; Özkeçeci & Çiftçi, 2023; Yaşar & Öztürk, 2021). Furthermore, it is thought that revealing relationships between learning styles, one of the most important individual characteristics facilitating learning, and use of social networks based on Vygotsky's social constructivist theory is important in contributing to the literature. According to Vygotsky's social constructivist theory, individuals' social

interactions positively affect the learning and academic achievement of learners (Hamamcı & Hamamcı, 2015; Ünveren Kapanadze, 2019). Based on this theory, the studies on integration social networks, one of the most important social interaction environments of the 21st century, into the learning environments and into the learning and teaching process are needed. It is stated that social networks supported learning approaches can be used for educational purposes, in the literature (Kelleci & Tetik, 2023). In addition, it is emphasized social networks can be used as out-of-school learning environments that support face-to-face teaching, due to their active participation, effective interaction and collaborative features (Mazman, 2009; Munoz & Towner, 2009; Ghosh et al., 2023).

Social networks, are defined as web-based tool in which users information is open or partially open to other users, there have been connected users and there has been shared among users within a bounded system (Boyd & Ellison, 2007). They are ones of the most widely used Web 2.0 tools nowadays. It is stated that social networks are used for various reasons such as sharing photos and videos, making friends, playing games, receiving education and sharing messages (Başoğlu, 2017; Sarıoğlu, 2021). Instagram, WhatsApp, Facebook, Twitter, Telegram, LinkedIn, Pinterest and Google Plus are some of them. Today, there are many social networks have been developed and they are reshaping our daily life, the way of communicate, interact, collaborate work and even learn. However, it is also stated that the use of social networks has increased over the past years, users' addictions have increased and the purposes of the use have changed (Alican & Saban, 2013; Demir, 2016; Deniz & Gürültü, 2018; Chyne et al., 2023). Social networks are also considered a new learning and teaching environment that provides users with high-quality resources to support their personal development (Heiss et al., 2023). Therefore, it is stated that students use these networks as online learning environments such as creating, processing and sharing content (text, pictures, videos, etc) and communicating with the other students (Silius et al., 2011). These networks support learners to create social posts suited their interests and needs, as well as learners' individualized learning needs. For example; it is stated that social networks such as Facebook, Twitter and Flickr can be used to support collaborative learning, reseach, inquiry, discussion, critical thinking and problem-solving skills (Sarsar et al., 2015). In addition, social networks can shape students' learning process according their own learning styles, make them more effective, increase their motivations and contribute to the acquisition of permanent knowledge.

Learning styles, which are accepted to play an important role in the learning of students, are stated to facilitate the individual learning of students (Özyurt & Özyurt, 2015; Alshammari & Qtaish, 2019). Learning styles are defined as the way students choose when accessing and processing information (Felder & Silverman, 1988). Learning styles, which are one of the most important affective traits that distinguish individuals from other individuals, show how the student interacts with the learning material. However, researchers have developed many theories and models on learning styles. For example, Felder and Silverman (1998) Learning styles model, McCarthy 4MAT learning style model (1997), Vark Model (1987), Kolb's (1984) Learning styles model, Honey and Mumford (1982) model, Grasha-Reichmann (1974) learning style model are some of these theories and models. In this study, the learning styles based on Kolb's (1984), who claims that students' orientations in the learning process are influenced by four tendencies, were used. According to Kolb (1984), in order for learning to take place, students' learning experiences consist of the combination of concrete experience (CE), reflective observation (RO), abstract conceptualization (AC) and active experience (AE) tendencies. When these four learning tendencies come together, one of four different learning styles is formed: diverging, assimilating, converging and accommodating (Aşkar & Akkoyunlu, 1993; Ulfa & Permatasari, 2023).

In the literature, there are some studies to determine the relationship between learning styles and social networks. Accordingly, Wanpen (2013) examined the relationships between university students' learning styles and their behaviors of using social networks for instructional purposes. Alakurt (2016) examined the relationships between pre-service teachers' learning styles and their motivation to use social networks. Likewise, Qayyum et al. (2016) examined the learning styles of primary school students who use and non-use social networks in terms of variables such as gender, study time and desire to study. Balakrishnan and Lay (2016) examined the relationship between learning styles and intentions to use social networks for learning purposes of university students aged between 21-29 years. Gunawardena and Liyanage (2018) examined the learning styles of university students and the effect of social networks on flipped classroom activities. In another study on university students, Soetan et al. (2020) examined the relationship

between social networks and learning styles. Xu and Shen (2021) examined the effect of learning styles and social networks on information literacy in the context of gender, class, department and academic performance variables. Benabdelouahab et al. (2023) developed a model to predict students' social networks behaviors (following pages created by others, chatting, sending messages, starting a topic, expressing ideas in forums, reading comments written by others, etc.) according to their learning styles. The use of social networks in educational environments is seen one of the most important Web 2.0 technologies that is able to facilitate learning and teaching processes.

With this study, it is hoped that the factors that may be related to students' learning styles, one of the most important affective skills that facilitate learning, will be clearly revealed and will light the way for future researchers to conduct research on this subject. For this reason, this study is considered to be important in terms of trying to explain the relationships among the learning styles of secondary students and the social networks they use most, the reasons for using them and the frequency of their use. In addition, this study is expected to contribute to the literature on the integration of social networks into educational environments. In this context, the aim of the study is to investigate the relationships between secondary school students' learning styles and their use of social networks. For this purpose, answers were sought to the following questions:

- How are students' learning styles and their use of social networks?
- Is there a significant relationship between students' learning styles and the social networks they use the most, the purpose and the duration of use?

RESEARCH METHOD

Research Model

This study is the research to investigate the relationship between secondary school students' learning styles and their use of social networks. In this respect, the research is a quantitative study. In the conduct of the research, it was carried out with the relational survey model. Relational survey model is the research model that aims to determine the existence of change between two or more variables (Karasar, 2011).

Participants

The population of this study consists of secondary school students studying in public educational institutions affiliated to Diyarbakir province Directorate of National Education located in the Southeastern Anatolia Region of Turkey. The sample of the study consists of 1281 secondary school students determined according to the convenience sampling method, because it is an economical and easily accessible method.

Table 1. *Findings Related to Gender and Secondary School Type of Students*

	Groups	Frequency (f)	Percentage (%)
Gender	Female	748	58,4
	Male	533	41,6
Type of School	Anatolian School	506	39,5
	Vocational School	357	27,9
	General Secondary School	154	12,0
	Imam Hatip School	68	5,3
	Health Vocational School	64	5,0
	Science School	60	4,7
	Anatolian Teacher School	48	3,7
	Anatolian Vocational School	24	1,9
	Total	1281	100,0

According to Table-1, 58.4% of secondary school students are female and 41.6% are male. According to secondary school type, 39.5% were Anatolian high school students, 27.9% were vocational high school students, 12% were general high school students, 5.3% were Imam Hatip high school students, 5% were health vocational high school students, 4.4% were science high school students, 3.7% were Anatolian teacher high school students and 1.9% were Anatolian vocational high school students.

Data Collection Tool

In this study, *"Kolb's Learning Styles Inventory"* developed by Kolb (1984) and adapted into Turkish by Aşkar and Akkoyunlu (1993) was used in order to determine the learning style of secondary school students. The inventory has 12 items with 4 choices which students can identify own learning style. Students were asked to rate each item in the inventory as 4 for the most appropriate, 3 for the second appropriate, 2 for the third appropriate, and 1 for the least appropriate. Therefore, a score between 12 and 48 was obtained as a result of the scores given by the students to the concrete experience, reflective observation, abstract conceptualization, active experience stages of the learning cycle. The next step is to obtain the combined scores. The combined scores were obtained as abstract conceptualization-concrete experience and active experience-reflective observation. The reliability coefficients of the subscales of the Learning Styles Inventory adapted into Turkish were calculated as 0.58 in the concrete experience scale, 0.70 in the reflective observation scale, 0.71 in the abstract conceptualization scale, 0.65 in the active experience scale, 0.77 in the abstract conceptualization-concrete experience scale and 0.76 in the active experience-reflective observation scale (Aşkar & Akkoyunlu, 1993). In this study, the Cronbach's alpha reliability coefficients of the scores obtained from the learning styles cycle were calculated as 0.66 for concrete experience, 0.75 for reflective observation, 0.80 for abstract conceptualization, 0.69 for active experience, 0.49 for abstract conceptualization - concrete experience, and 0.42 for active experience - reflective observation. The learning styles of the students (Diverging, Assimilating, Converging, Accommodating) were obtained by placing the scores obtained from the learning styles cycle on the Kolb's Learning diagram. In addition, a questionnaire form developed by the researchers was used to determine students' social networking usage. There are 14 items including questions such as gender, age, high school type, availability of computer and internet at home, the social networks they use most, the purpose of using social networks and the duration of use in the questionnaire.

Data Analysis

Descriptive analyzes were performed by using frenquency and percentages to determine students' learning cyle and use of social networks. In addition, the chi-square test was performed to determine whether there was a significant difference between the learning styles of the students and their gender, the school type, social networks preferences, the purpose of using social networks and the duration of use. All data were analyzed in SPSS 22.0 package program at $p < .05$ significance level.

FINDINGS

The findings obtained to examine the relationship between the learning styles of the secondary students participating in the study and their use of social networks are presented in Table 2 and Table 3 respectively.

Table 2. *Students' Learning Styles*

Variable	Frequency (f)	Percentage (%)
Diverging	758	59,2
Accommodating	349	27,2
Assimilating	108	8,4
Converging	66	5,2
Total	1281	100,0

When Table 2 examined, it is seen that 59.2% of the students participating in the research have diverging, 27.2% accommodating, 8.4% assimilating and 5.2% converging learning styles. Moreover, as a result of the Chi-square (χ^2) test, it was determined that there was a statistically significant difference [$X^2_{(3)}$ = 943,465, $p < .01$] among the learning styles of the students.

Table 3. *Students' Use of Social Networks (SNs)*

	Variable	Frequency (f)	Percentage (%)
SNs preference	Facebook	873	68,1
	Youtube	99	7,7
	Twitter	74	5,8
	Google Plus	14	1,1
	Other	42	3,3
	Non-User	179	14
Purpose of Use of SNs	Sharing Photos	429	33,5
	Making Friends	409	31,9
	Sharing Videos	261	20,4
	Gaming	4	0,3
	Other	178	13,9
Duration of Use of SNs	Less than 30 min.	327	25,5
	30-59 min	281	21,9
	60-119 min	278	21,7
	More than 120 min	230	18,0
	Don't join	165	12,9
	Total	1281	100,0

Table 3 presents that 68.1% of the students use Facebook, 7.7% use Youtube, 5.8% use Twitter, 1.1% use Goggle Plus and 3.3% use other social networks, whereas 14% of the students do not use any social networks. Besides, 33.5% of the students used social networks for photo sharing, 31.9% for making friends, 20.4% for video sharing, 0.3% for games and 13.9% for other purposes. Also, 25.5% of the students spent less than 30 minutes in social networks, 21.9% spent between 30 and 59 minutes, 21.7% spent between 60 and 119 minutes and 18% spent more than 120 minutes.

Table 4. *Relationship Between Learning Styles and Social Networks*

Variable	Social Networks									
Learning Styles	Facebook		Youtube		Twitter		Google Plus		Others	
	f	%	f	%	f	%	f	%	f	%
Accommodating	221	25,3	35	35	24	32,4	6	42,9	12	28,6
Converging	42	4,8	6	6	7	9,5	-	0,0	1	2,4
Diverging	526	60,3	52	52	38	51,4	7	50,0	28	66,7
Assimilating	83	9,5	7	7	5	6,8	1	7,1	1	2,4
Total	872	100	100	100	74	100	14	100	42	100

As seen in Table 4, it is observed that students with accommodating learning style use Google Plus (52,9%), students with converging learning style use Twitter (9.5%), students with assimilative learning style use Facebook (9.5%) and students with diverging learning style use other social networking sites with (66.7%). However, students who don't use Social Networks weren't included in this analysis. As a result of the chi-square test determining whether there is a significant difference between the learning styles and use of social networks, it is observed that there isn't significant difference between them [$X2(3)=16,994$; $p>0.05$].

Table 5. *Relationship Between Learning Styles and Purpose of Using Social Networks*

Variable	Purpose of using social networks									
Learning Styles	Friendship		Sharing Photo		Sharing Video		Gaming		Other	
	f	%	f	%	f	%	f	%	f	%
Accommodating	112	27,4	110	25,6	76	29,1	1	25	50	28,1
Converging	16	3,9	27	6,3	13	5,0	0	0	10	5,6
Diverging	248	60,6	259	60,4	141	54,0	3	75	107	60,1
Assimilating	33	8,1	33	7,7	31	11,9	0	0	11	6,2
Total	409	100	429	100	261	100	4	100	178	100

The students with accommodating and assimilating learning style use social networks for purpose of sharing video (29.1.5 and 11.9%), students with converging learning style use for sharing photos (6.3%) and students with diverging learning style use for gaming (75%) (see Table 5). In the study, the chi-square test

used to determine whether there is significant difference between the learning styles and purpose of using social networks, it is determined that there is no significant difference between them [X^2(3)=10,444; p>0.05].

Table 6. *Relationship Between Learning Style and Duration of Using Social Networks*

Variable	Duration of using social networks							
Learning Style	0-30 min		31-60 min		61-120 min		More than 120 min	
	f	%	f	%	f	%	f	%
Accommodating	117	27,4	82	24,8	51	27,0	48	31,0
Converging	16	3,7	19	5,7	10	5,3	11	7,1
Diverging	259	60,7	206	62,2	107	56,6	79	51,0
Assimilating	35	8,2	24	7,3	21	11,1	17	11,0
Total	427	100	331	100	189	100	155	100

The students with accommodating and converging learning styles use social networks more than 121 min for a day, students with diverging learning style use 31-60 min and students with assimilating learning style use 61-120 min for a day (see Table 6). The chi-square test used to determine whether there is significant difference between the learning styles and duration of using social networks, it is determined that there is no significant difference between them [X^2(3)=11,854 p>0.05].

DISCUSSION AND CONCLUSION

This study aimed to examine relationship between the learning styles of secondary students and their use of social networks. For this purpose, it was examined the relationship between the secondary students learning styles and preference of using social networks most, purpose of using and duration of using. In the line with the results of the research, it was determined that the social network that secondary students preferred to use the most was Facebook, followed by YouTube, Twitter and Google Plus. According to We Are Social Report (2023), there are 4.76 billion social network users worldwide. It is also stated the largest social network in the world is Facebook (2 billion active users) (Gedik, 2020). And social networks are online platforms where users can define themselves and interact with the others from different culture, in addition, they express their emotions and thoughts virtually symbols that represent gestures and facial expressions used in normal life, thereby establishing communication (Tekdaş, 2014). In other words, social networks are virtual environments that allow people to share all kinds of materials (videos, photos, news, etc.) and interact with other users in the system by creating a space of their own (Kara & Coşkun, 2012). In addition, social networks are one of the most important communication tools of the 21st century. In related studies, Balaman and Karataş (2012) stated that students used Facebook most in their study of examining the use of social networks by secondary students. Dal and Dal (2015) carried out that university students between 15-24 ages use Facebook most, followed by YouTube, Twitter, Google Plus and Blogger in the study. In another study conducted by Wanpen (2013), it is stated that the majority of university students also use Facebook. However, in Akyürek (2020), it is obtained that secondary students prefer Instagram social network the most. On the other hand, the study conducted by Karadaş et al (2021), it is stated that the social network the students use the most is Whatsapp. Therefore, it can be said that there are some differences between the social networks that students prefer the most.

Another finding of the study is that the majority of secondary students have a diverging learning style, followed by accommodating, assimilating and converging learning styles. Students with diverging learning style are aware of values and meanings. They are patient, objective, careful individuals who make judgements but don't take actions, during the learning. They take their own thoughts and feelings into consideration while shaping their thoughts. Students with accommodating learning styles are individuals who like to plan, make decisions, and take part in new experiences, are open-minded and can easily adapt to changes. Learning by doing and feeling is at the forefront. Students with assimilative learning style are successful in creating conceptual models. They focus on abstract concepts and ideas while learning. Students with a converging learning style engage in problem solving, decision making and logical analysis of ideas. They are successful in problem solving. They can plan systematically while solving problems (Aşkar & Akkoyunlu, 1993; Peker, 2003; Alemdağ & Öncü, 2015). In the study, it is found that students with assimilating learning styles generally use Facebook, students with accommodating learning styles use Google Plus, students with converging learning styles use Twitter and students with diverging learning styles use other social networking

sites by the relationships between students' use of social networking sites according to their learning styles were examined. Hence, it can be said that students who are individually free and social use different social networks for different purposes (such as research, collaboration, communication, content sharing, entertainment and games) without being bound by strict boundaries. The chi-square test conducted in the study, it is determined that there is no statistically significant difference between students' learning styles and using social networks. In the literature, there are some studies examining the relationship between learning styles and social networks. In the study on the university students by Almodiel and Lacaste (2020), it is stated that there is no statistically significant difference between students' learning styles and using social networks. This result is similar to the study we conducted. However, in another study by Ocak et al. (2015), it is reported that there is a significant difference between university students' learning styles (active/reflective, sensory/intuitive, visual/verbal) and purpose of using social networks. Accordingly, it can be said that there are some differences in the studies when the relationships between students' learning styles and their purposes of using social networks are examined.

In another finding of this study, it was determined that secondary students use social networks for sharing photos, making friends, sharing videos and playing games. Tosun (2016) stated that the participants used social networks mostly for sharing photos, similar to this study. Sağlam, Ardıç and Balcı (2020) stated that students use social networks for social interaction and communication, in another study on university students 15-24 ages by Dal and Dal (2015), it is stated that students use social networks for communication, obtaining information, making friends, sharing photos, videos and music. Similarly, Balaban and Karataş (2012) reported that secondary students use social networks for commenting on post, watching videos and looking at pictures. Accordingly, it can be said that the result of the research is similar to literature. When examining the purposes of students' use of social networks according to their learning styles, it is determined that students with accommodating and assimilating learning styles use these networks for sharing videos, students with converging learning styles for sharing photos, and students with diverging learning styles for making friendships. Result of the chi-square analysis found no significant difference between the students' learning style and the purpose of using social networks. It is stated that the use of social networks in learning and teaching processes is an important tool for students to share with each other and their teachers and for peer-to-peer cooperation (Kalemkuş & Türel, 2022). When examining the duration of using social networks according to students' learning styles, it is found students with accommodating and converging learning styles used social networks for more than 121 minutes, the diverging learning styles 31 to 60 minutes, and the assimilating learning styles for 61 to 120 minutes. However, according to the chi-square result, there is no significant difference between the students' learning styles and the duration of using social networks. In similar studies, Balaban and Karataş (2012), Kurnaz and Duman (2018) stated that students spend between 1 and 3 hours a day on social networks. Additionally, Kalemkuş and Türel (2022) stated that students spend up to 4 hours a day on social networks, and an increase in the time spent on these networks positively affects sharing, social competence, and relationships with teachers.

LIMITATIONS AND RECOMMENDATIONS

Although some conclusions about the relationship between the secondary students' learning styles and using social networks reached in the study, the study also have some limitations. First of all, this research was designed by the relational screening model. Therefore, it reveals the presence and/or degree of change between two or more variables. This is an important limitation. Therefore, researchers, want to conduct similar studies, consider this limitation and could design experimental research that reveals the cause-and-effect relationship of current situations. In addition, the study was based on data obtained from a sample of secondary students in a certain place and time. This may prevent generalization to other public or private schools students in different regions and levels. Hence, it may be recommended to conduct the study with different samples. The second limitation of the research was that data were collected Kolb's Learning Styles Inventory based on experiential learning theory and the participants were informed about the study and inventory before the application. Therefore, researchers, want to conduct similar studies, could investigate relationship between the using social networks and the learning styles according to Dunn and Dunn, Canfield, Grasha and Riechmann, Gregorc or Reinert learning styles models based on personality, affective, information processing, social, physical, environmental or instructional models. The third limitation of the research was related to the variables such as the status of using social networks, the purpose of using and

the duration of using. Not including all variables that may have an effect on the dependent variable in the study may lead to the problem of omitted variable bias. Because of this reason, researchers, want to conduct similar studies, could test the effect of variables such as intention to use social networks, level of using, purposes of using, and addiction.

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