High School Students' Learning Styles in North Cyprus

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ABSTRACT

The present study aimed to identify high school students' learning styles, high school students' and teachers' awareness of students' learning styles, and how much teachers take those styles into consideration in their instruction in North Cyprus.

The mixed research design was used in this research. Both qualitative and quantitative methods were used in order to collect data. The population of the study included 9,500 students who enrolled in high schools and 1,500 teachers who engaged in teaching at those schools, and the sample of the study included 629 high school students and 8 teachers. The Turkish adapted form of the Grasha and Reichmann Learning Style Scale was used to gather information from students about their learning styles. Quantitative data were analyzed by arithmetic mean, standard deviation, Multivariate Analysis of Variances (MANOVA), Analysis of Variance (ANOVA) and Least Significant Difference Test (LSDT) techniques. Also, semi-structured interviews were administrated to both students and teachers to explore students' learning style awareness, teachers' awareness of their students' learning styles and their consideration of those styles in their instruction. Through content analysis the thematic coding was implemented to analyze the qualitative data obtained from interviews.

The results of the study revealed that students mostly preferred collaborative and competitive learning styles. Besides, it was found that students' learning styles vary with respect to their gender, grade level and school type. Accordingly, female students are more competitive, collaborative, participant and dependent than male

students whereas male students are more avoidant than female students. Grade 12 students are more independent than the other three grade levels' students. General and science and English-medium high school students are more collaborative and more dependent than vocational high school students whereas vocational high school students are more avoidant than general and science and English-medium high school students. Furthermore, it was understood that students and teachers are not exactly aware of learning styles. Besides, teachers consider their students' few learning styles, but not all the learning styles in their instruction.

Keywords: Individual differences, learning styles, high school students.

ÖZ

Bu araştırma ile Kuzey Kıbrıs'taki lise öğrencilerinin öğrenme stillerinin, öğrencilerin kendi öğrenme stilleri ile ilgili farkındalıklarının, öğretmenlerin öğrencilerinin öğrenme stilleri ile ilgili farkındalıklarının ve bu stilleri öğretimlerinde ne ölçüde göz önünde bulundurduklarınının belirlenmesi amaçlanmıştır.

Araştırmada, karma araştırma deseni kullanılmıştır. Veri toplamak için hem nitel hem de nicel veri toplama yöntemlerinden yararlanılmıştır. Araştırmanın evrenini liselerde öğrenim gören 9500 öğrenci ile öğretim yapan 1500 öğretmen, örneklemini de 629 lise öğrencisi ile 8 öğretmen oluşturmuştur. Öğrencilerin öğrenme stilleri ile ilgili bilgi elde etmek için Grasha ve Reichmann'ın Öğrenme Stilleri Envanteri'nin Türkçeye uyarlanmış formu kullanılmıştır. Niceliksel verilerin analizinde aritmatik ortalama, standart sapma, çok yönlü varyans analizi (MANOVA), tek yönlü varyans analizi (ANOVA) ve en küçük anlamlı fark testi (LSDT) kullanılmıştır. Öğretmenlerin ve öğrencilerin öğrenme stilleri ile ilgili farkındalıklarını ve öğretmenlerin öğretimlerinde öğrencilerinin öğrenme stillerini ne ölçüde göz önünde bulundurduklarını saptayabilmek için öğrenci ve öğretmenlerle yarı-yapılandırılmş görüşmeler yapılmıştır. Bunlara dayalı olarak elde edilen nitel veriler, içerik analizi yoluyla tematik kategoriler oluşturularak analiz edilmiştir.

Araştırma sonunda öğrencilerin en çok tercih ettikleri öğrenme stilleri "işbirlikçi" ve "yarışmacı" olarak belirlenmiştir. Aynı zamanda öğrencilerin öğrenme stillerinin cinsiyet, sınıf düzeyi ve okul türüne göre farklılık gösterdiği saptanmıştır. Bununla ilgili olarak, kız öğrenciler erkek öğrencilere göre daha çok yarışmacı, işbirlikçi,

katılımcı ve bağımlı öğrenme stillerine, erkek öğrenciler ise kız öğrencilere göre kaçınan öğrenme stiline sahiptirler. Sınıf düzeyine göre bakıldığı zaman, 12. sınıf öğrencilerinin öteki sınıf düzeylerindeki öğrencilere göre daha çok bağımsız öğrenme stiline sahip oldukları görülmüştür. Ayrıca, genel lise ile fen ve İngilizce ağırlıklı olan liselerdeki öğrencilerin, meslek liselerindeki öğrencilere göre daha çok işbirlikçi ve bağımlı, meslek liselerindeki öğrencilerin ise genel ile fen ve İngilizce ağırlıklı olan liselerdeki öğrencilere göre daha çok kaçınan öğrenme stiline sahip oldukları belirlenmiştir. Öte yandan, öğrencilerin kendi öğrenme stilleri ile, öğretmenlerin de öğrencilerinin öğrenme stilleri ile ilgili farkındalıklarının tam olmadığı ortaya çıkmıştır. Ayrıca, öğretmenlerin öğrencilerinin öğrenme stillerinin tümünü değil, ancak birkaçını öğretimleri sırasında göz önünde bulundurdukları görülmüştür.

Anahtar kelimeler: Bireysel farklılıklar, öğrenme stilleri, lise öğrencileri.

To my family...

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LIST OF ABBREVIATIONS

LSI : Learning Style Inventory

LSQ : Learning Style Questionnaire

LSD : Learning Style Delineator

PLSPQ : Perceptual Learning Style Preferences Questionnaire

ILS : Index of Learning Style

GRSLSS: Grasha and Reichmann Learning Style Survey

Chapter 1

INTRODUCTION

This chapter contains information about individual differences in learning, learning styles' concept, scope and characteristics, learning style models, learning style instruments and role of learning styles in learning and teaching processes. Also, it includes problem statement, purpose of the study, significance of the study, assumptions, limitations and definition of the terms.

1.1 Individual Differences in Learning

Recently one of the considerable features of learning is individual differences. Learning, which is a complex process, is affected by cognitive processes, emotions, environment, family and culture of a person. Thus, differences occur within individual's learning process (Erden & Altun, 2006). How skills and contents can influence individual's learning is the concentration points of individual differences lenses (Johassen & Grabowski, 1993).

Learning process is peculiar to the individual. Açıkgöz, (2007) asserts that each person has his or her own learning preferences in learning. According to Özden (2000) every person can learn if the appropriate learning atmosphere is supplied to them. Moreover learners differ in respect to their learning types, speed and capacity.

"Learning styles" is one of the most important subjects of individual differences.

"Learning style is often used as a metaphor for considering the range of individual differences in learning" (Price, 2004, p.681). When individual differences are taken into consideration, effective instruction can be provided to students by teachers because every student prefers to learn in a different way. In other words each student has different learning style from others. As Pashler et al. (2009) mention every person has the potential to learn in an effective way. However, learning styles of the learners should be accommodated into instruction.

1.2 Concept, Scope and Characteristics of Learning Styles

Firstly "learning style" concept was introduced by Rita Dunn in 1960 (Boydak, 2008; Can, 2009). Recently in the education area, the concept of "learning style" has gained great impact too. Pashler et al. (2009) claim that learning style is a factor which is usually confronted from kindergarten to university for each level of students.

The conceptual structure of the learning style is still being argued in educational area. Various researchers explain the concept of learning styles differently. Logan and Thomas (2002) note that in the literature learning style and cognitive style have been used interchangeably. Despite, they are not exactly the same. Thus, first of all there is a need for explaining what learning style and cognitive style are.

Kefee is one of the theorists who defend that learning style and cognitive style are different terms. According to Kefee (1987) "learning style, in fact, is the broader term and includes cognitive along with affective and physiological styles" (p.6). Thus, learning style is a broader term which includes cognitive style too. On the

other hand, every person perceives, organizes and remembers in a different way. These coherent and distinctive features of the individuals are labeled as cognitive styles (Kefee, 1987). Furthermore, Messick (1976) states that the cognitive styles are "information processing habits representing the learners' typical mode of perceiving, thinking, problem solving and remembering" (p.14). As similarly the preferences of learners on how they perceive, remember, think and solve problems that contain cognitive function is cognitive style (Logan & Thomas, 2002).

There are various definitions about what learning style is. Learning style implies personal preferences that concern learning (Nunan, 1995; Richardson, in press). According to Kefee (1987), learning styles "are characteristic cognitive, affective and physiological traits that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment" (p.14). In addition, Kinsella (1995) defines learning styles as "an individual's natural, habitual and preferred way of absorbing, processing and retaining new information and skills which persist regardless of teaching methods or content area" (p.171).

Students' preferred way while they concentrate on process and internalize and retain new and difficult information is defined as learning styles by Dunn and Dunn (Dunn et al. 1995). Similarly Kolb describes learning styles as individual preferred ways while they receive and process information (Johassen & Grabowski, 1993). In addition, Grasha (1996) describes learning styles differently as "personal qualities that influence a student's ability to acquire information to interact with peers and the teacher, and otherwise to participate in learning experiences" (p.41).

According to Felder and Silverman (1988), learning style is an individual characteristic strengths and preferences that they prefer while processing information. Thus, learning style is the way which an individual prefers while acquiring, retaining and retrieving information (Felder & Henriques, 1995).

Moreover, Gregorc's definition is "learning styles are symptoms of underlying psychological frames of reference and of driving mental qualities of the mind" (Butler, 1987, p.12). Also he states that "learning styles are distinctive and observable behaviors that provide clues about the mediation abilities of individuals and how their minds relate to the world and, therefore, how they learn" (Hawk and Shad, 2007, p.5).

Boydak (2008) asserts that knowing a person's learning style is as important as knowing her or his blood type. When a person knows her or his own learning style, it gives sense to her or him meaningless actions. Besides, Kefee (1987) states that "learning style is consistent way of functioning that reflects underlying causes of learning behavior" (p. 5). Furthermore, enhancement on students' self-awareness can be provided by using learning style knowledge. At the same time, as learners, students can learn their weaknesses and strengths (Coffield et al. 2004).

Learning style characteristics are classified into three broad categories. In other words, learning styles have three dimensions: Cognitive, affective and physiological (Kefee, 1987; Kefee and Jenkins, 2000). Information processing habits constitute the cognitive dimension of the learning styles. These habits are listed by Kefee and Jenkins (2000) as perception, organization and retention. Affective learning styles

include traits of personality such as attention, emotion, valuing and motivation. Affective style isn't observable. Only interaction between person and environment provides inferences about affective styles (Kefee, 1987). The third learning style dimension is physiological style. The elements of this dimension spring up from individual traits. These are sex related differences, personal nutrition and health, needs for mobility and time-of-day rhythms (Kefee, 1987; Kefee & Jenkins, 2000). In addition, Özer (2009) states that internalization of the environment constitutes the learning style of a person. Internalization includes cognitive, affective and physical activities. So, students' learning styles contain cognitive, affective and physical activities together.

"Each person's individual learning style is as unique as her or his signature" (LeFewer, 1995, p.17). So, "these styles are unique to the individual, each person has his/her own way of learning best" (Brownfield, 1993, p.6). Distinct learning styles and learning situations are preferred by students who differ from each other. Also, these students' abilities, weaknesses and strengths are different (İnan, 2007). Learning style has also an inborn characteristic and it influences the life of the person intensively (Boydak, 2008). Besides, learning style of a person can be changed during life period (Şimşek, 2004). Galloway and Labarca (as cited in Bayrak & Altun, 2009) mention that there isn't a learning style which is superior to others. In addition, Ekici (2003) claims that there isn't good or bad learning style.

In short, everybody has preferred learning styles which show how they learn best. In other words people's learning styles imply how they learn more effectively and efficiently. So, the concept of "learning styles" can be summarized as individual's

peculiar characteristics in learning process.

1.3 Learning Style Models

Various classifications exist as a result of both theoretical and practical studies which are conducted regarding learning styles. 71 models of learning style were listed by Coffield et al. (as cited in Matheoudakis & Alexiou, 2010) in their review. Hence, there are different approaches that exist about the classifications of learning styles. These approaches are based on different characteristics of students in learning process. De Bello (as cited in Hein & Budny, 1999) points out that some models are multidimensional which include cognitive, affective and psychological characteristics, and the others have only one dimension. Also, each approach emerged provides a source for the next approach related to learning styles (Güven, 2004). Some of the well known learning style approaches and the models which are based on these approaches are as follows:

- Dunn and Dunn Learning Styles Model
- Kolb's Learning Styles Model
- Honey and Mumford's Learning Styles Model
- Gregorc's Mind Styles Model
- Reid's Perceptual Learning Style Preferences
- Felder and Silverman Learning Style Model
- Grasha and Reichmann's Learning Style Model

1.3.1 Dunn and Dunn Learning Styles Model

Dunn and Dunn Learning Styles Model is one the well known model within learning style models. According to this model, both biological and individual developmental

characteristics possessed by an individual and how a person learns new information and skills are indicated by this peculiar characteristic of that person (Babadoğan, 2008).

Five learning style stimuli and some elements for each stimulus are identified by Dunn and Dunn (Hawk & Shah, 2007). These stimuli are *environmental, emotional, sociological, physiological* and *psychological processing.* Also the elements which are within the stimuli are sound, light, temperature, and room design which are identified as the environmental stimuli. Motivation, persistence, responsibility and structure are identified as emotional stimuli. Learning alone, in a pair, with peers, with a teacher and such are identified as sociological stimuli. Perceptual, intake while learning, energy patterns during the day and mobility needs are identified as physiological stimuli. Global or analytic, hemisphericity and impulsive or reflective are identified as psychological processing stimuli. These stimuli and elements are illustrated in Figure 1.1.

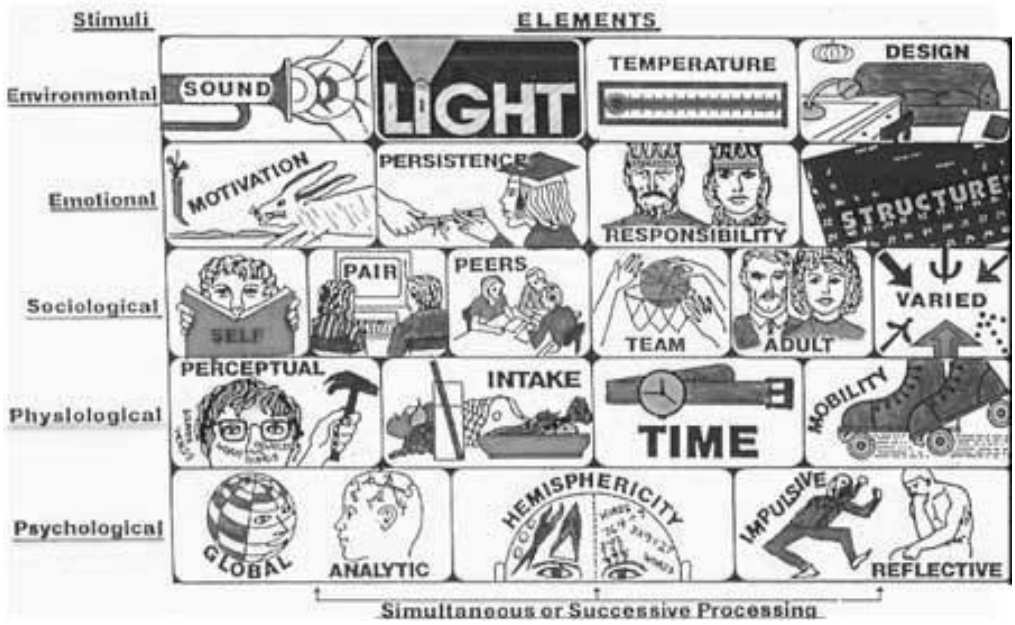

Figure 1.1. Learning style stimuli and their some elements (Dunn, 1996, p.14)

The 21 elements which are grouped in five stimuli are described below.

Dunn and Dunn (1979) state that each learner reacts differently toward their environment. *Sound* is one of these elements. Some students need absolute silence when they concentrate on something. On the other hand, others need sound while learning. Moreover, they react differently to the *light*. Some students need excessive light to think better while others prefer less illumination. People also react differently to *temperature*. Some students are more comfortable in warm situations while others prefer cool places. Lastly, *design of the room* is important. Some learners are more successful when they are in an informal physical environment (carpeting, couch or bed). On the other hand, some learners can learn more effectively in a formal environment (desks, hard chairs).

Motivation is one of the elements of emotional stimuli. Students are motivated by intrinsically or motivated by feedback and reward. The other element is *persistence***.** This element concerns with attention span of the learners and their persistence while learning and doing a task. Moreover, students' preference about how much they are taking their own learning responsibility is related with *responsibility* element (UCLA Research Paper, 2006). Motivated, persistent and responsible people need feedback and information about the objectives or tasks. After the completion of their work they expect reward and feedback. However, unmotivated people who are not persistent and less responsible prefer brief assignments and several objectives. Moreover, frequent feedback is needed and intimate reward is expected by these people as a result of their work. Furthermore, some learners who need specific directions, frequent feedback and tasks arranged in an order need *structure* while

learning. However, some of them do not (Dunn & Dunn, 1979).

Some students prefer to learn on their own because they learn more effectively while they are *alone*. Some of them prefer to learn as a *pair* or some of them work with their *peers* or interact with an *adult*. Also *variety* of tasks while learning can be preferred by students. All these elements are named as sociological stimuli (Dunn & Dunn, 1979).

Perceptual element is one of the elements of physiological stimuli. Some students prefer pictures or maps as visual equipments, some of them prefer music and lectures as auditory activities, and the others prefer to be tactually or kinesthetically active while they learn information (UCLA Research Paper, 2006). While concentration on something to learn, *intake* element is important for students. Some students prefer to eat or drink something while others not. Furthermore, *time of day* when learners' energy is the highest also has part in students' learning (Dunn & Dunn, 1979). A part of the learners can concentrate on task at different times during the day: Morning, afternoon or evening (UCLA Research Paper, 2006). In addition, some students who prefer *mobility* need to move from place to place while dealing with a task (Dunn & Dunn, 1979).

Global and analytic elements are within psychological stimuli. Global learners learn best when they focus on the overall topic (UCLA Research Paper, 2006). Dunn (as cited in Cambiano, De Vore & Denny, 2000) states that the short stories, illustrations, and graphics are global learners' learning preferences. On the other hand, Dunn claims that the information should be provided to analytic learners

sequentially when they learn new information. In order to comprehend the overall picture, these learners need to learn all parts of the information by bringing small pieces together. Moreover, left and right brain dominance is related to the *hemisphericity* element. Analytic learners have left brain dominance whereas global learners possess right brain dominance. In addition, *impulsive* learners prefer to take a decision in a quick way while *reflective* learners tend to utilize all options and alternatives before decision making (UCLA Research Paper, 2006).

1.3.2 Kolb's Learning Style Model

Kolb's learning style model which is based on Kolb Experiential Learning Theory was developed by Kolb. Based on this experiential model, learning is defined by Kolb as "process whereby knowledge is created through the transformation of experience" (as cited in Baker, Jensen & Kolb, 2002, p.52). In this model, individual' learning styles are like a circle which includes four learning stages. These stages are *concrete experience* (CE), *reflective observation* (RO), *abstract conceptualization* (AC) and *active experimentation* (AE) (as cited in Kaya, Özabacı & Tezel, 2009). The Kolb's learning cycle is illustrated in Figure 1.2.

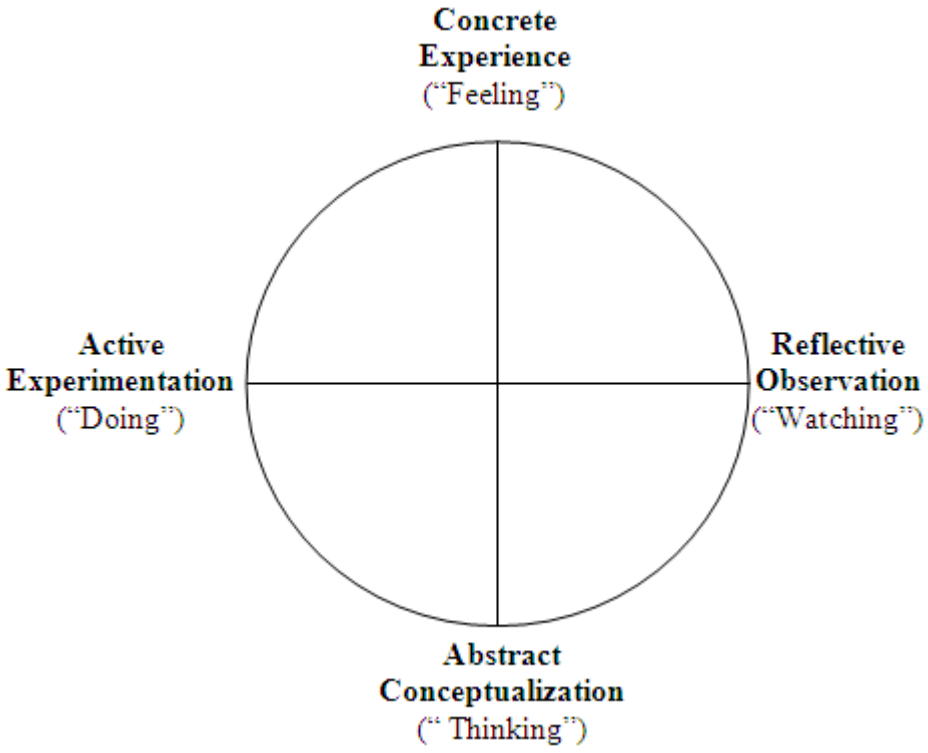

Figure 1.2. The Kolb's learning cycle (Güven, 2004, p.27)

According to Kolb (as cited in Kolb & Goldman, 1973), the process of learning contains two primary dimensions. First dimension is reaching from abstract conceptualization to concrete experience and second dimension is reaching from active experimentation to reflective observation. Kolb models demonstrate how knowledge is perceived by an individual through concrete experience and abstract conceptualization and how knowledge is integrated by an individual through reflective observation and active experimentation. An individual learns by "feeling" (concrete experience), "watching" (reflective observation), "thinking" (abstract conceptualization) and "doing" (active experimentation). Therefore, knowledge is perceived by an individual through thinking and feeling. Also, knowledge is integrated by an individual through watching and doing. Furthermore, Kolb (as cited in Kaya, Özabacı & Tezel, 2009) asserts that, in this model, a cycle of four learning

modes is required for all learning. However, one of the four modes of the cycles is found as the most appropriate by each person (as cited in Groat, 1998). Four learning styles which are based on this learning cycle are identified by Kolb. These styles are *converger, diverger, asssimilator* and *accommodator* (Kolb & Goldman, 1973). Learning styles which are based on Kolb's learning model is shown in Figure 1.3.

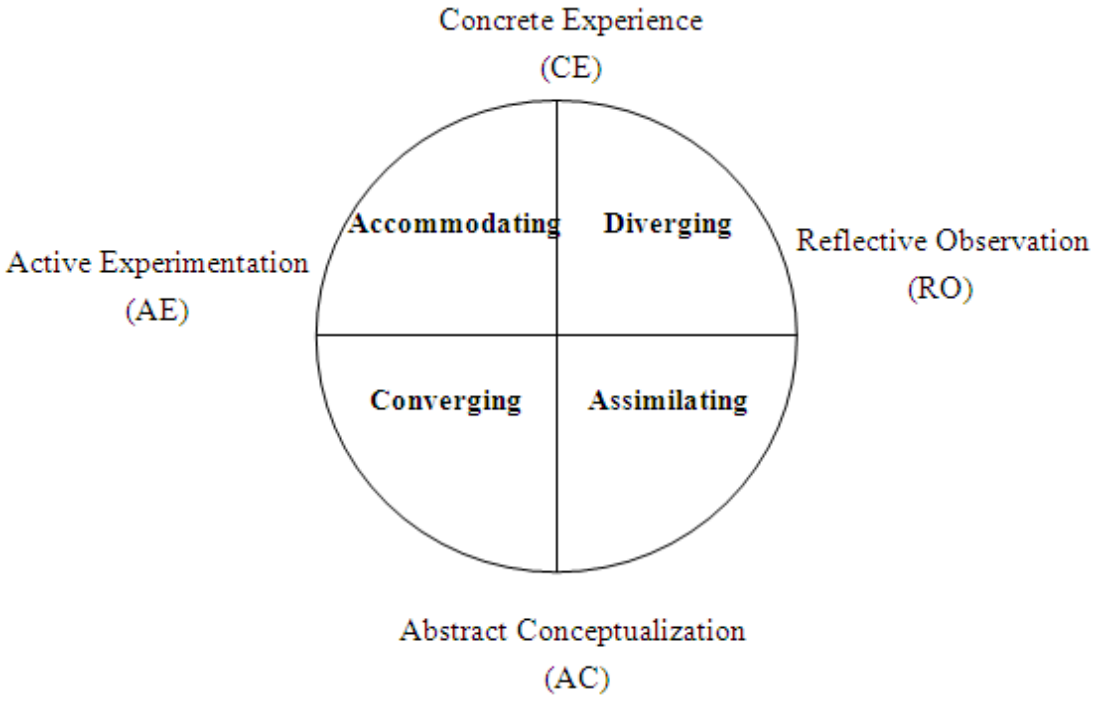

Figure 1.3. Learning styles which are based on Kolb's learning model (Kaya, Özabacı & Tezel, 2009, p. 13)

Converging learning style contains abstract conceptualization and active experimentation abilities (Kaya, Özabacı & Tezel, 2009). Information is perceived via abstract conceptualization and material is processed in an active way (Hein & Budny, 1999). These people prefer to solve problems, make decisions, engage in logical analysis about thoughts and make plans in a systematic way. Also, they prefer to learn by doing. Their occupation preferences are medicine, engineering, economy,

computer and science which required technological talents (Kaya, Özabacı & Tezel, 2009).

Diverging learning style is opposite to converging learning style. The learning abilities of the people who have diverging learning styles are concrete experience and reflective observation (Kolb & Goldman, 1973). Information is perceived via concrete experience and material is processed through expressing feelings by divergers (Hein & Budny, 1999). They have talents to view concrete situations from various perspectives and they can put relationships into meaningful whole (Kolb & Goldman, 1973). They are good at using their creative ability because they are creative people. Their occupation preferences are journalism, psychology and literature (Kaya, Özabacı & Tezel, 2009).

Assimilating learning style contains abstract conceptualization and reflective observation skills (Kaya, Özabacı & Tezel, 2009). Information is perceived via abstract conceptualization and material is processed through reflective observation by assimilators (Hein & Budny, 1999). When they learn something they concentrate on abstract concepts. Also, they can create theoretical models. Biology, education, teacher education, law, sociology and mathematics are their job preferences (Kaya, Özabacı & Tezel, 2009).

Accommodating learning style is opposite to assimilating learning style. People who have accommodating learning styles have concrete and active experimentation abilities (Kolb & Goldman, 1973). Information is perceived via concrete experience and processed via active experimentation by accommodators (Hein & Budny, 1999).

Execution of plans, involving in new experiments and new experiences are their powerful sides. These people tend to take more risks than other people who have converging, diverging and assimilating learning styles (Kolb & Goldman, 1973). Salesmanship, public administration, education administration and banking are these people's occupational preferences (Kaya, Özabacı & Tezel, 2009).

1.3.3 Honey and Mumford's Learning Styles Preferences

Honey and Mumford's learning styles model is based on Kolb's experiential learning model in terms of description and measurement of learning style (Cassidy, 2004). In other words, this model is derived from Kolb's experiential learning model. Honey and Mumford identified four learning styles. These are *activists, reflectors, theorists* and *pragmatists*. In the learning cycle, four stages are designated by Honey and Mumford to show learning style preference of a learner. The Honey and Mumford learning styles which are associated with learning cycle are shown in Figure 1.4.

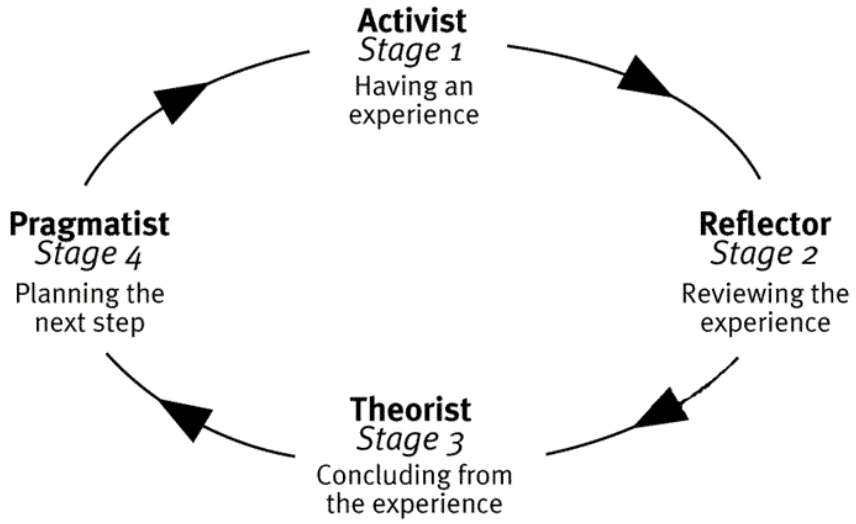

Figure 1.4. Honey and Mumford's learning styles associated with learning cycle (McLoughlin, 1999, p.227)

The first stage is activist stage. At this stage, the student has an experience. Scrutiny of the experience occurs at the reflector stage. At the theorist stage the student draws a conclusion from that experience. The last stage is pragmatist stage. At this stage the student makes a plan for the following step.

According to Honey and Mumford, *activists* like to take part in new experiences. Thus, they prefer to learn by doing. Also they get bored while implementing something. *Reflectors* prefer to review their experiences through analyzing before they come to the conclusion. Therefore, learning is realized via reflection. *Theorists* learn by integrating their observations into theories through models and concepts. *Pragmatists* are decision makers and problem solvers. Also, they apply their ideas into practice (Goldfinch & Hughes, 2007).

1.3.4 Gregorc's Mind Styles Model

Gregorc's mind styles model is derived from phenomenological research as well as experiential learning cycle of Kolb. Gregorc (as cited in Butler, 1987) mentions that his style can be explained through understanding natural qualities, mediation abilities and mind channels. According to Gregorc, each person has learning inclinations along with four bipolar and continual characteristics of the mind. Perception (abstract/concrete), ordering (sequential/random), processing (deductive/inductive) and, relationships (separative/associative) are mind characteristics of people. These characteristics function as mediators (Hawk & Shad, 2007). Thus, the mind styles are operated in a way taking into consideration how the mind works (Butler, 1987).

Gregorc's model concerns with two of these four mediation abilities: Perception and

ordering. According to Gregorc obtaining information is the ability of perception. Arranging, systemizing and disposing information in an authoritative way are ordering abilities. Moreover, to perceive world in concrete and abstract forms and to order the world in sequential and random ways, perceptual and ordering abilities are involved in each mind. All four of these characteristics are used by people but in a different quantity (Butler, 1987).

Each individual differs from others. Through the mind characteristics, each person expresses his or her peculiar essence. How they demonstrate these four characteristics are identified by his or her mind style (Butler, 1987). The learning styles are categorized into four by Gregorc as c*oncrete sequential (CS), abstract sequential (AS), abstract random (AR)* and *concrete random (CR)*. Gregorc's learning style model is illustrated in Figure 1.5.

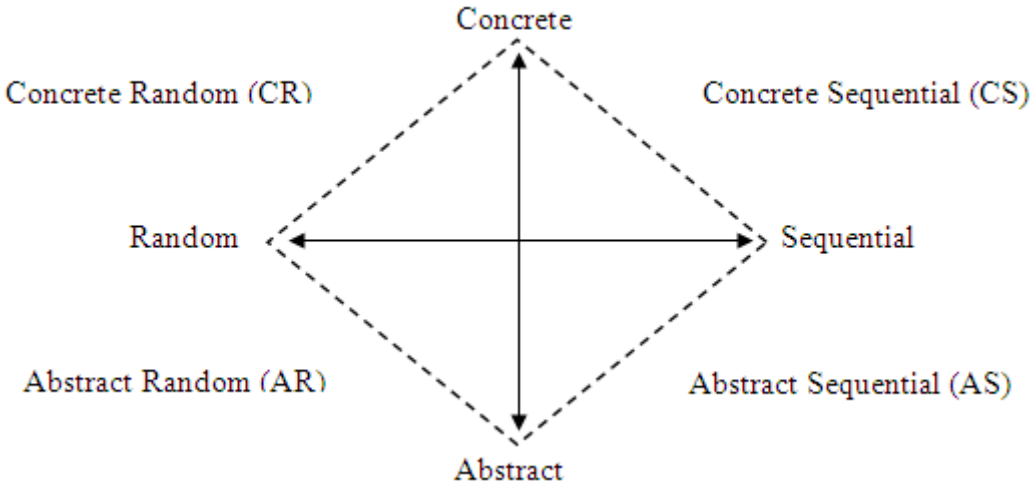

Figure 1.5. Gregorc's learning style model (Keefe, 1987, p.18).

Four learning styles were explained by Butler as follows (Şimşek, 2004): *Concrete sequential* learners are practical and they pay attention to details. Also, they are

structured naturally. Thus, well-structured learning environments are their preferences. They perceive concrete things through their senses and think sequentially.

Abstract sequential learners are logical and analytic people. They prefer ordered and mentally stimulating environment. These people create new ideas and they organize concepts and ideas in logical manner. They prefer to learn from an authority such as from a teacher. Therefore, teacher based learning and teaching methods are their preferences.

Learners who prefer *abstract random* learning style deal with their senses intensively. These people are emotional and critical. Distinct and non-passive learning situations are their preferences. Moreover, they learn best when they are involved in a group work, participating in a discussion or making observation.

Concrete random learners are risk-takers. These people prefer to think intuitionally, action intrinsically and behave independently. They like situations that give them the opportunity to discover. Moreover, they prefer to learn through their own criterions. Details are not required for these learners during problem solving.

1.3.5 Reid's Perceptual Learning Style Preferences

Another learning style model is Reid's perceptual learning style preferences. This model was developed by Reid (1987) especially for foreign language learners who enrolled at universities to reveal their preferred learning styles. Reid (1995) mentions that perceptual learning styles identify the differences among learners considering

their senses in order to understand, arrange and remain experiences.

Mulalic, Shad and Ahmad (2009) state that in this classification, the learning styles of learners such as visual, auditory, kinesthetic and tactile are classified according to their perceptions. The other two social aspects, group and individual preferences are listed focusing on how learners learn best. According to Reid (1995) there are six major learning style preferences. These are *visual, auditory, kinesthetic, tactile, group* and *individual* major learning style preferences. Individuals can perform well by using these learning style preferences.

Students who prefer *visual* learning style as their major style preference learn best by seeing from books, chalkboard and workbooks. They can easily retain and comprehend instructions and information through reading (Reid, 1995). *Auditory* major learning style preference is another learning style. Mulalic, Shad and Ahmad (2009) report that auditory learners can learn well through listening information in lectures. Moreover, Reid (1987) mentions that students who prefer auditory learning style retain knowledge through reading new material loudly. Audio tapes, lectures and class discussions are beneficial for auditory learners. The other learning style is *kinesthetic* major learning style preference. Drama, role-play and moving around are the examples of active involvement preferences of kinesthetic learners (Mulalic, Shad & Ahmad, 2009). Hence, kinesthetic learners learn well by experiencing and involving in classroom practices physically. In this respect, kinesthetic learners need to take part in the activities such as field trips and role playing to keep in mind the information (Reid, 1995). There is one more learning style: *Tactile* major learning style preference. Reid (1995) indicates that tactile learners can learn well if they have

the chance to deal with hands-on experiences with materials such as experiments in a laboratory, handling and building models.

In addition, the other learning styles which create the social aspects of the Reid's learning style preferences is *group* major learning style preference. According to Reid (1995) students who prefer group learning style as their major preference learn easily when they study at least with one of their classmates. Also, when they study with other students they finish their work more successfully. The last learning style which has part in the social aspects of Reid's learning style preferences is *individual* major learning style preference. Learners with individual learning style preference gain knowledge best when they study alone. Furthermore, when they learn on their own they comprehend new material easily (Reid, 1995).

Reid (1995) categorizes learning styles as major, minor and negligible. Each student has major, minor and negligible learning style preferences. Major learning styles point out the area in which the learner could perform well. Minor learning styles show areas in which students still can perform well. On the other hand, negligible learning styles show the areas in which students may have trouble in learning.

1.3.6 Felder and Silverman Learning Style Model

The Felder and Silverman Learning Style Model was developed by Felder and Silverman especially for engineering students. This model incorporates five learning style dimensions which are dichotomous. These dimensions are *sensing/intuitive* (perception), *active/reflective* (processing), *visual/verbal* (input), *inductive/deductive* (organization) and *sequential/global* (understanding) (Felder & Silverman, 1988;

Felder, 1993; Felder & Henriques, 1995).

Five questions are proposed to describe five learning style dimensions of Felder and Silverman learning style model (Felder, 1993). These questions and the answers of the defined dimensions are shown in Table 1.1.

Table 1.1

Five Questions That Describe Learning Style Dimensions of Felder and Silverman Learning Style Model (adapted from Felder, 1993, p.287)

Questions	**Learning Style Dimensions**
What type of information does the student preferentially perceive?	*Sensory*- sights, sounds, physical sensations, or *intuitive*- memories, ideas, insights.
How does the student prefer to process information?	*Actively*- through engagement in physical activity or discussion, or *reflectivity*- through introspection.
Through which modality is sensory information most effectively perceived?	*Visual*- pictures, diagrams, graphs, demonstrations, or *verbal*- written and spoken words and formulas.
With which organization of information is the student most comfortable?	*Inductive*- facts and observations are given, underlying principles are inferred or *deductive*- principles are given, consequences and applications are deduced.
How does the student progress toward understanding?	*Sequentially*- in a logical progression of small incremental steps, or *globally*- in large jumps, holistically.

Learners who prefer to perceive information by their senses like to be involved in an experiment or prefer to make observation. Also, *sensors* enjoy working with data and facts. They use standard methods while solving problems. They dislike encountering with obstacles and they are careful, but slow. On the other hand, *intuitive* learners prefer to deal with principles and theories. They comprehend new concepts easily. They are quick but careless (Felder & Silverman, 1988).

Active learners prefer to learn by doing in an active way. They cannot learn in

situations that need passive involvement. Also, they prefer group work while working because they learn better within a group. However, *reflective* learners prefer to learn by introspection. They learn well when they work themselves or with one person at most (Felder & Silverman, 1988; Felder, 1993).

Furthermore, *visual* learners prefer to learn and retain information by seeing from pictures, diagrams and symbols whereas *verbal* learners learn through spoken or written explanations. Eventually, visual learners learn through visual images, on the other hand verbal learners learn through verbal materials (Felder, 1993; Felder & Henriques, 1995).

In addition**,** *inductive* learners firstly prefer to deal with specific parts in order to learn the entire body of knowledge. Also these people favor less structured presentations. On the other hand, *deductive* learners who prefer highly structured presentations start with general principles in order to understand results and applications (Felder, 1993).

Moreover, *sequential* learners prefer to learn information which is presented in a sequential manner whereas *global* learners cannot learn in this way. They can learn through unconnected knowledge presentation. Global learners need to understand whole information however sequential learners can solve any problems with partial understanding (Felder & Silverman, 1988; Felder, 1993).

1.3.7 Grasha and Reichmann Learning Style Model

Grasha and Reichmann Learning Style Model is based on social interaction approach. This model examines students' responses toward classroom activities instead of evaluating students' personality and cognitive characteristics (Kumar, Kumar & Smart, 2004). Hence, this model especially focuses on the social and affective dimensions of the learning preferences in defining learning styles. According to this model, six learning styles are classified as three categories. Each category is arranged on a bipolar continuum. These learning styles are *competitive-cooperative, avoidant-participant*, and *dependent-independent* (Şimşek, 2004). As Grasha (1995) emphasizes a student can possess more characteristics of one learning style than another style. Observation of these dominant characteristics is easy in class. Each learner has a dominant learning style. However, each person possesses more than one style in addition to his or her dominant learning style (Kazu, 2009).

Each learning style of the Grasha and Reichmann Learning Style Model was explained by Grasha (1996). Table 1.2 illustrates the definitions of each learning style and general classroom preferences of the students.

Table 1.2

Grasha Learning Styles Descriptions and Classroom Preferences (Grasha, 1996, p.128)

Competitive Students who learn material in order to perform better than others in the class. Believe they must compete with other students in a course for the rewards that are offered. Like to be the center of attention and to receive recognition for their accomplishments in class. *General Classroom Preferences* Become a group leader in discussions… Teacher-centered instructional procedures… Singled out in class for doing a good job… Class activities where they can do better than others.
Collaborative Typical of students who feel they can learn by sharing ideas and talents. They cooperate with teachers and like to work with others. *General Classroom Preferences* Lectures with small group discussions... Small seminars… Students-designed aspects of course… Group projects.
Avoidant Not enthusiastic about learning content and attending class. Do not participate with students and teachers in the classroom. They are uninterested and overwhelmed by what goes on in class. *General Classroom Preferences* Generally turned off by most classroom activities… Would prefer no tests… Pass-fail grading systems… Does not like enthusiastic teachers… Does not want to be called on in class.
Participant Good citizens in class. Enjoy going to class and take part in as much of the course activities as possible. Typically eager to do as much of the required and optional course requirements as they can. *General Classroom Preferences* Lectures with discussion…. Opportunities to discuss material… Class reading assignments… Teachers who can analyze and synthesize information well.
Dependent Show little intellectual curiosity and who learn only what is required. View teacher and peers as sources at structure and support and look to authority figures for specific guidelines on what to do. *General Classroom Preferences* Outlines or notes on the board… Clear deadlines and instructions for assignments… Teacher-centered classroom methods… As little ambiguity as possible in all aspects of course.
Independent Students who like to think for themselves are confident in their learning abilities. Prefer to learn the content that they feel is important and would prefer to work alone on course projects than with other students.

General Classroom Preferences
Independent study… Self-placed instruction… Assignments that give students a chance to think independently… Projects that student can design… Student-centered rather than teacher-centered course designs.

Competitive students need to be rewarded so they compete with their peers. Also, they prefer to perform well above their classmates. For their class achievements, recognition is expected by these students. Moreover, they enjoy being at the focal point of the attention. Some of their general classroom preferences are being a leader in a group in discussions, teacher-centered instruction and activities which enable them to be superior to their peers. On the other hand, *collaborative* students learn through cooperating with their peers and teachers. Thus, they prefer to learn by sharing. Therefore small group projects and discussions are these learners' inclinations (Grasha, 1996).

Students who have *avoidant* learning style are unwilling to participate in lectures. They are not curious about what is going on in class either. Therefore, they do not prefer caring teachers. Pass and fall grading systems and tests are not within their general learning classroom preferences. Unlike avoidant students, *participants* like to attend courses and classroom activities as much as possible. They are also enthusiastic to fulfill both the necessary and the optional requirements of the courses. Moreover, discussions and reading assignments are among their general classroom preferences (Grasha, 1996).

Learners with *dependent* learning style want an authority such as a teacher or a peer because they need clear instructions and guidelines to do something. In other words their source of structure is their teachers and peers. They just learn what they need to

learn. Moreover, teacher-centered instruction is their general classroom preference. On the contrary, students, who have *independent* learning style, prefer to study on their own, rely on their learning abilities and they like independent assignments rather than group projects. They prefer student-centered learning as their general classroom preference (Grasha, 1996).

1.4 Learning Style Instruments

Learning styles are classified into various models by theorists. Most of these theorists also developed learning style instruments to identify learning styles which they specified in their models. Individual's learning preferences and needs are assessed by these instruments. Learning style instruments which are developed for assessing learning style of individual are extremely diverse. Pashler et al. (2009) state that students are classified by the learning style instruments into various categories in regard to their learning styles.

To fulfill student differences diagnostic information is necessary. Some of the instruments which are used for assessing students' learning style differences are as follows:

- Dunn and Dunn's Learning Style Inventory (LSI)
- Kolb Learning Style Inventory (LSI)
- Honey and Mumford's Learning Styles Questionnaire (LSQ)
- Gregorc Style Delineator (GSD)
- Reid's Perceptual Learning Style Preferences Questionnaire (PLSPQ)
- Felder and Soloman's Index of Learning Style (ILS)
- Grasha and Reichmann Learning Style Scale (GRSLSS)

1.4.1 Dunn and Dunn's Learning Style Inventory (LSI)

Dunn and Dunn developed their learning style inventory to diagnose different learning styles of learners. Learning Style Inventory (LSI) which was developed by Dunn, Dunn and Price in 1974 aims to diagnose students' learning styles in grades 3-12 through a comprehensive approach. Also, this learning style instrument is used widely in the USA. Besides, there are other forms of LSI for assessing students' learning preferences in different grade levels (Dunn, 1996).

Dunn, Dunn and Price claim that LSI investigates the preferences of learners in the areas of physical environment (sound, light, temperature and design), emotional stimuli (motivation, persistence, responsibility, structure), social needs (self learning, learning in a pair, with peers, with an adult, team work or varied), physiological factors (perceptual modalities, food or liquid intake, time-of-day, mobility needs) and psychological factors (hemisphericity, either global or analytic, either impulsive or reflective (Dunn, 1996). LSI identifies students' learning style preferences according to five elements and twenty one stimuli.

Dunn (1996) claims that the inventory includes 104 items which are rated on a Likert scale. There are five points from (1) strongly agree to (5) strongly disagree. Both individual and class profiles are provided by the instrument in order to create specific learning environment for individuals, group students with similar preferences and create optimal learning atmosphere for certain groups (Kauchak & Eggen, 2003). The items in the instrument are identical that aim to analyze the consistency of the learners' answers. Moreover, the usage and interpretation of the LSI is handy (Dunn, 1996).

1.4.2 Kolb Learning Style Inventory (LSI)

David A. Kolb is one of the known theorists who has the most studies on learning styles. As Güven (2004) said Kolb's learning style studies enlightened the rest of the studies after him. Moreover, Kolb Learning Style Inventory is the most widely used and the most effective instrument introduced in literature. Learning style inventory was developed to assess learners' learning styles which are derived from Kolb's experiential learning theory. This inventory is suitable for teenagers and adults not for younger children. The inventory consists of 12 sentences and each sentence has four options. Respondents range these options according to their learning style preferences. Four learning modes: Concrete experience (CE), reflective observation (RO), abstract conceptualization (AC) and active experimentation (AE) are corresponded by these sentences. Scores demonstrate students' learning modes as (CE), (RO), (AC), (AE) and two combinations scores which determine abstractness over concreteness (AC-CE) and active experimentation over reflection (AE-RO) preferences of an individual. Eventually, participant's learning styles are defined as a *diverger, assimilator, converger* and *accommodator* (Kolb & Kolb, 2005).

1.4.3 Honey and Mumford's Learning Styles Questionnaire (LSQ)

Honey and Mumford's learning styles questionnaire (LSQ) is an alternative to Kolb's work. Especially the LSQ was developed to assess the preferences of management trainees' learning styles (Duff & Duffy, 2002). LSQ which is a self reported questionnaire consists of 80 items (20 items for per style). LSQ includes mostly behavioral items which identify learners' action that they might take or might not take (Duff & Duffy, 2002). Thus, the items rated as 1 or 0. Honey and Mumford developed this LSQ to assess learner's preferences in four learning styles: *Activist,*

reflector, theorist and *pragmatist* style.

1.4.4 Gregorc Style Delineator (LSD)

Gregorc Style Delineator is a self report inventory. It assesses perception and ordering abilities of a person. This delineator is based on a bi-dimensional model. Styles identified as concrete versus abstract and random versus sequential. Thus, learners' styles are specified as *concrete sequential (CS), abstract sequential (AS), abstract random (AR)* and *concrete random (CR)*.

It is a short inventory which consists of 40 words in total, 4 in each 10 sets. The words in each set are ranked by learners through their individual impressions (Kefee, 1987). Scores are between 10- 40 for each learning style and maximum score is 100 for all four styles (Hawk & Shad, 2007). Through a bi-dimensional matrix, scores are profiled to demonstrate variety of learning style inclinations (Kefee, 1987).

1.4.5 Reid Perceptual Learning Style Preferences Questionnaire (PLSPQ)

Reid Perceptual Learning Style Questionnaire was developed in 1984. It was designed to describe the ways which students learn best and ways they prefer to learn.

The questionnaire consists of 30 items which are self reporting questions. In order to indicate how much students agree with each item when they learn English, they are asked to rate items on a five- point Likert scale from 1 to 5, (5) strongly agree, (4) agree, (3) undecided, (2) disagree and (1) strongly disagree. There are five categories as visual, auditory, kinesthetic, tactile, group and individual. For each category, there

are five questions and these questions are distributed randomly in the questionnaire (Reid, 1995). PLSPQ shows learners' dominant learning styles in ranges between 38-50. 25-37 point out their secondary learning style preference and 0-24 show the learning style of the learner which is negligible (Beşoluk & Önder, 2010). As Mulalic, Shad and Ahmad (2009) state the administration and interpretation of PLSPQ is easy. Besides, the questionnaire is self scoring so it can be administered and completed quickly.

1.4.6 Felder and Soloman's Index of Learning Style (ILS)

Felder and Soloman developed the index of learning style questionnaire to diagnose learners' preferences according to Felder and Silverman's learning style model. The inventory is self-scored, self-administered and self-interpreted. Also, it consists of 44 items. For each learning style dimension *sensing-intuitive, active-reflective, visual-verbal, inductive-deductive* and *sequential-global*, scoring starts from 1 to 11 on a continuum. A point among 1-3 demonstrates that there is a balance between two dimensions. 5-7 shows moderate preference of the learners and 9-11 shows the learner's strong preference (Hawk and Shad, 2007).

1.4.7 Grasha and Reichmann Learning Style Scale (GRSLSS)

Grasha (1996) asserts that particular learning dimension can change through instructional intervention. GRSLSS was developed as an instrument for obtaining information concerning students' inclinations toward independence, dependence, collaboration, competition, participation and avoidance (Grasha, 1990).

This inventory was especially designed for assessing high school and college

learners' learning styles (Şimşek, 2004; Richlin, 2006). The Grasha and Reichmann learning style scale is based on interactions of teachers and students and classroom methods (Uzun & Şentürk, 2008). Grasha and Reichmann (as cited in Uzun & Şentürk, 2008) claim that the instrument consists of 60 items which included six scales and 10 questions per scale. The inventory is self-reported and the responses of people scored on five- point Likert scale from 1 to 5 where (5) strongly agree, (4) agree, (3) undecided, (2) disagree and (1) strongly disagree. Also for each styles three preference levels, low, moderate and high are designated (Logan & Thomas, 2002).

1.5 Learning Styles in Teaching-Learning Process

Researches exposed that effective learning is obtained by situations which are considered students' individual characteristics (Dunn, 1990; Babadoğan, 2008; Bozkurt & Aydoğdu, 2009). Learning style is one of the individual characteristics that has a great impact on students' learning.

Pashler et al. (2009, p. 105) emphasize that "the instructional method that proves most effective for students with one learning style is not the most effective method for students with a different learning style." Therefore, both teachers and students should be aware of learning styles and teachers should consider different learning styles during their instruction. Both teachers and students can control their own learning if they know what their learning styles are (Banner & Rayner, 1997). Learning increases if both students and teachers know how they learn and what their learning preferences are (Csapo & Hayen, 2006). Thus, identifying students' learning styles enables teachers to organize their instruction according to their students'

individual needs. Moreover, identifying learners' learning styles facilitates their learning. Also, learners become more self-confident (Ekici, 2003). In addition, "teaching to our students' learning styles can help students get more excited about the subject, explore and understand the facts, enjoy grappling with the implications, and most importantly, be more willing to put what they have learned into practice" (LeFewer, 1995, p.18). Besides, Lefever (1995) emphasizes that active participation in the class, motivating toward learning, learning in a quick way and good relations in a group can be realized by students if they are given the opportunity to show their learning preferences in class. Given (as cited in Tatar, 2007) asserts that according to researches, students' tolerance toward cognitive variation, their academic achievements and attitudes toward instruction increase when students learning preferences are taken into consideration in instruction. Therefore, preferences of students should be accommodated for convenient instruction. So, first of all it is necessary to assess students' learning styles for organizing instruction accordingly. Coffield et al. (2004) state that students' learning styles should be identified by teachers and instructional designers by assessing students' individual learning needs and designing particular learning and teaching interventions which encourage learners to demonstrate their styles. Moreover, Reiff (as cited in Boydak, 2008) mentions that in order to prepare an effective curriculum students' learning styles should be taken into consideration.

Learning style researches expose that students become more successful if they learn in their own preferred way. However, teachers impose their own preferred learning styles to students during instruction (Dunn & Dunn, 1979; Erden & Akman, 2003). Açıkgöz (2007) notes that harmony between learning styles of students and their

teachers' teaching styles leads to effective learning. Thus, consideration of learners' learning style preferences is helpful for both instructional planning and program development.

Dunn (1990) mentioned that "students are not failing because of the curriculum. Students can learn almost any subject matter when they are taught with methods and approaches responsive to their learning style strength" (p.15). Thus, learners can learn in a most effective way if variant learning styles of learners accommodate in their learning (Li et al. 2011).

Kefee (as cited in Reid, 2005) lists a procedure for planning learning styles based teaching. According to this procedure, first of all students' learning styles are assessed. Then the profile of the class' inclinations and preferences are identified. Later, group strengths and weaknesses are designated. Also subject content is examined to investigate the areas which may cause difficulty for students' learning bearing in mind that students have both strong and weak skills. By using assessment methods such as skills tests and portfolios and students' prior achievement scores, their weaknesses can be determined to see the deficient cognitive skills of learners. After determination, the remediation of these deficient skills is needed. Also, teaching methods should be assessed to determine if they are sufficient or whether there is a need for more flexibility. In order to create personalized learning experiences, students' learning environment should be modified by teachers.

According to Babadoğan (2008), while designing a learning style based course the priority is the identification of learning objectives and the materials that will be used

by teachers. Then, learning style of the student should be diagnosed to constitute a bridge between learning styles of the students and teaching styles of the teachers. In addition to these steps, Stewart (as cited in Ehle & Price, 1999) states that student's progress should be evaluated and required changes should be made. In addition, Ekici (as cited in Ekici, 2003) proposes some suggestions to teachers which are supportive for effective learning of students. She mentions that various teaching approaches should be considered while designing instructional activities, both individual and group work activities should be provided to students with respect to their preferences and various materials should be used in order to stimulate different sensory organs of the learners. Also, opportunities should be provided to students to put their strengths into practice and to improve their powerless sides by choosing the necessary activities.

1.6 Problem Statement

Learning is a process and it occurs individually. Each student prefers to learn in a different way. "How people prefer to learn is their learning style preference" (Dunn, 1996, p.1). Being aware of students' learning styles is important in education. Therefore, teachers should be aware of different learning styles in their classrooms and they should consider their students' learning styles in order to be able to provide the most effective instruction to their students. Teachers should be well equipped with the necessary knowledge about the learning styles.

On the other hand, students also need to be aware of their own learning styles so that they know how they learn in the most effective and efficient way. Awareness of their own learning styles provides them ability to take responsibility of their own learning.

Thus, they acquire confidence about their strengths and they easily start to coping with challenging situations by developing various strategies. Hence, the awareness of students' learning styles is vital both for teachers and students.

However, in North Cyprus, there are not any empirical studies conducted on students' learning styles at any school level. On the other hand, nothing has been done to investigate students and teachers' awareness about students' learning styles and teachers' consideration of those styles in their instruction.

In the light of these facts, in North Cyprus high school students' awareness of their own learning styles and teachers' awareness of their students' learning styles should be investigated in order to provide information for authorities in education about high school students' learning styles and teachers' awareness about their students' learning styles. Because of this necessity, the present study is designed.

1.7 Purpose of the Study

The main purpose of this study is to identify high school students' learning styles, teachers' and students' awareness of students' learning styles and how much teachers take these styles into consideration in their instruction. On the basis of this main purpose, research questions to be answered are as follows:

1. What are the students' learning styles?
2. How do students' learning styles vary with respect to their (a) gender, (b) grade level and (c) school type?
3. How much are students aware of their own learning styles?
4. How much are teachers aware of their students' learning styles?

5. How much do teachers take their students' learning styles into consideration in their instruction?

1.8 Significance of the Study

Learning styles have a great impact on students' learning. Unfortunately, learning style awareness of high school students, their teachers' awareness and consideration of their students' learning styles in instruction in North Cyprus is not known. Hence, research about students' learning styles will provides information for authorities including Ministry of Education, Youth and Sports, curriculum developers, teacher trainers, inspectors, principals and teachers for making instruction more effective in schools.

In the light of the present research findings, it is hoped that Ministry of Education, Youth and Sports may implement a learning style program in school settings which provide opportunity for teachers to assess students' learning styles. Thus, teachers may enhance their existing instruction by considering their students' learning styles. Also students can be aware of their strengths and weaknesses in learning. Furthermore, students can be aware of how they learn in the most effective way. Hence, they have a chance to overcome their weaknesses in learning. On the other hand, activities which are effective and supportive to promote all learning styles can be designed by the instructional designers or teachers. Overall, the result of this present study has many beneficial implications in educational settings in terms of learning styles.

1.9 Assumptions

Assumptions in this study are as follows:

- Teachers and students responded to both questionnaire and interview questions honestly and sincerely.
- Sample of the study represents the population.

1.10 Limitations

This study entails some limitations. Here are those limitations:

- The study was conducted with 629 high school students and 8 high school teachers in general, science and English medium and vocational high schools in North Cyprus in fall 2010.
- This study is limited to only public high schools. Ergo, findings of the study are limited with the participant groups in those schools.
- This study is limited to learning styles which are identified by Grasha and Reichmann (*competitive, cooperative, avoidant, participant, dependent* and *independent*).

1.11 Definition of the Terms

Definition of the terms which are used frequently in this study are as follows:

Individual differences: Ability, interest and need differences between individuals in learning.

Learning style: "Personal qualities that influence a student's ability to acquire information to interact with peers and the teacher, and otherwise to participate in learning experiences" (Grasha, 1996, p.41).

Learning style model: Classification of learning styles as a result of theoretical and practical studies.

Learning style instrument: Assessment tool to assess individual's learning preferences and needs.

Cognitive style: "Information processing habits representing the learners' typical mode of perceiving, thinking, problem solving and remembering" (Messick, 1976, p.14).

Perceptual learning style: The differences among learners considering their senses in order to understand arrange and remain experience (Dunn, as cited in Reid, 1995).

Chapter 2

LITERATURE REVIEW

In this chapter related studies regarding learning styles are explored. Studies on students' learning styles relative to gender, grade level and school type and also studies related to students' and teachers' awareness of learning styles and teachers' consideration of their students' learning styles are summarized.

Researchers conducted many studies on learning styles aimed to investigate what students' learning styles are. For example, Reid (1987) conducted a study to investigate 152 English as a second language students' learning style preferences with respect to their gender and grade level. In his study, he used the Perceptual Learning Style Preference Questionnaire which he prepared in order to collect the necessary data. The data collected through the use of the questionnaire revealed significant differences between learning styles and gender. The findings of the study demonstrated that male students scored higher for visual and tactile learning style preferences than female students. Also, the results showed that graduate students had higher scores for visual and tactile learning style preferences than undergraduates. Moreover, graduate students had higher score than undergraduates for auditory learning style preference.

In another study, Lim (1995) explored secondary school students' learning styles through the use of Kolb Learning Style Inventory. 173 secondary school students participated in the study. The study showed that most of the students were

assimilators and divergers.

Literature on learning styles contains many studies that aimed to investigate the relationship between learning styles and gender. However, the findings of these studies revealed contradictory results. Logan and Thomas (2002) conducted a study to find out the learning styles of distance education students at university level. The Honey and Mumford's learning style questionnaire and Grasha and Reichmann Learning Style Scale were used to determine Open University's distance education students' learning styles in relation to their gender. According to the results of Honey and Mumford's learning style questionnaire there were significant differences between students' learning styles and their gender. According to the data gathered, female students had more pragmatic, theorist and reflector styles than males. However, the result of the Grasha and Reichmann Learning Style Scale showed no significant difference between students' learning styles and their gender.

In a similar study, Kumar, Kumar and Smart (2004) conducted a study on 65 students who were enrolled at two medium-sized mid-western universities. In their study they used Grasha and Reichmann Learning Style Scale as a data collection tool. According to the results, the students' learning style preferences were identified as participant, dependent and collaborative.

In a later study, Uzuntiryaki (2007) investigated high school students' learning styles by using Grasha and Reichmann Learning Style Scale. 265 tenth grade high school students participated in this study. The result of the study showed that students had participant, dependent and collaborative styles.

Another study was conducted by Demirbaş and Demirkan (2007) at Bilkent University in the same year. 273 freshman students who were enrolled at Interior Architecture and Environmental Design Department participated in the study. The data collected through Kolb Learning Style Inventory indicated that majority of the participants were assimilating and converging whereas only few of them were accommodating learners. This study also revealed that students' learning styles were not different with respect to gender for design students.

Uzun and Şentürk (2008) carried out another study to investigate students' learning styles. 177 students who were enrolled at Faculty of Education in Uludağ University participated in this study. Through Grasha and Reichmann Learning Style Scale data regarding students' learning styles were collected. Findings of the study showed that most of the students were collaborative and competitive style learners.

Another research study conducted by Tüysüz and Tatar (2008) at the Faculty of Education in Mustafa Kemal University in which 186 first year teacher candidates enrolled at Primary Teacher Education Department revealed similar results. The data collected through the use of Grasha and Reichmann Learning Style Scale demonstrated that the learning styles of students were collaborative and competitive.

Recently, Kaya, Özabacı and Tezel (2009) investigated 687 second grade primary school students' learning styles. Kolb Learning Style Inventory was used to find out the students' learning styles. In the study students' learning styles were identified as diverging and assimilating. Also, the findings of the study revealed that there was no significant difference between students' learning styles and their gender.

In the literature there are studies that focused on the differences between students' learning styles and their grade level. Bayrak and Altun (2009) conducted a study on 172 teacher candidates that aimed to find out their learning styles in relation to their gender and grade. Renzulli, Smith and Rizza's learning style survey used in the study showed meaningful differences between students' learning style and their gender. Furthermore, the data showed that female students had higher points than male students. The results also demonstrated meaningful differences between first grade and fourth grade teacher candidates' learning styles. The study revealed that first grade students had higher points than fourth grade students.

Similarly Can (2009) investigated 273 teacher candidates' learning styles with respect to their gender and grade level in the faculty of education. The Kolb Learning Style Inventory results indicated that gender is an effective element in determining the learning styles of students. It was found that half of the female students had assimilating and one third of them had converging learning styles. On the other hand, most of the male students had assimilating and one third of them had diverging learning style. The study also revealed that there is no significant difference between students' learning styles and their grade level.

Another study which was conducted by Sidek, Noor and Jusoff (2009) investigated learning styles of students in Malaysia through the use of Grasha and Reichmann Learning Style Scale. In total 407 senior high school and college students participated in the study. The findings of the study revealed that there are significant differences between learning styles and gender in a way that male students had significantly lower score than female students in collaborative, participant, dependant

and competitive learning styles. Also, college students whose ages were between 18-20 had higher scores in avoidant and independent learning styles than other older age students.

Mulalic, Shad and Ahmad's (2009) study on the other hand focused on 160 students who were studying English as a Second Language (ESL). The aim of the study was to find out differences between students' perceptual learning styles and their gender. According to the results of Reid's Perceptual Learning Style Preference Questionnaire, male students had significantly higher scores than female students in kinesthetic and auditory learning style preferences. Besides, they mentioned that most of the teachers were not aware of their students' learning style preferences.

In another study, Padem and Eriş (2010) conducted a research study on 822 technical teacher candidates who were enrolled at Faculty of Technical Education in Düzce University. The aim of the study was to investigate learning styles of the teacher candidates with respect to their gender. The Kolb Learning Style Inventory was implemented in the study. The findings revealed that most of technical teacher candidates had assimilating and converging learning styles. However the results did not demonstrate significant differences between teacher candidates' learning styles and their gender.

Yıldız's (2010) study on 390 teacher candidates who were enrolled at the Faculty of Education in Cumhuriyet University revealed similar results with previous research studies as the participants mostly had assimilating and converging learning styles.

Another study is conducted by Koçakoğlu (2010) aimed to investigate the relationship between primary school teachers' learning styles and their gender. 223 primary school teachers from various departments participated in the study. The data collected through Kolb Learning Style Inventory revealed that most teachers had converger learning style and only few of them had divergent learning style. Also, the results revealed no correlation between gender and learning style.

Tuncer and Berkant (2010) conducted a study in which they explored 383 primary school mathematics teacher students' learning styles with respect to their grade levels. The results of Kolb Learning Style Inventory showed significant differences between students' learning styles and their grade level. According to the results, first grade students scored lower in assimilating and divergent dimensions, second grade students scored higher in converger, assimilator, accommodator and assimilating dimensions and fourth year students scores lower in converger and accommodator dimensions.

Not any studies were found in the literature that focuses on the differences between students' learning styles and their school type.

Similarly, not any studies on students' awareness of their learning styles and teachers' awareness of their students' learning styles were found, either.

A few authors researched on teachers' consideration of their students' learning styles in their instruction. Hull (2008) is one of them who studied with Missisippi Delta area teachers in order to find out how much they addressed their students' learning

styles in their instruction. 57 teachers were interviewed in the study. The result of the interviews showed that 19 of them addressed learning styles at a high extent, and 32 of them addressed learning styles at a medium extent. After the instruction 4 teachers were observed by the researcher. The observation results showed that all teachers addressed the learning styles of their students at high extent.

According to Dunn and Dunn (1979) teachers tend to teach in the way they learn. They stated that the easiest and the best way to teach their students is the way how they have learned. Furthermore, Sims and Sims (as cited in Csapo & Hayen, 2006) emphasized that most of the postsecondary level teachers are not aware of the importance of students' learning styles in education. That may be the reason why students' learning styles are not considered by teachers during classroom learning and teaching.

Barbe and Milone (as cited in Beşoluk & Önder, 2010) stated that teachers organize all learning and teaching activities according to their own learning styles and not for their students' learning styles. Also, most of the teachers were not aware of their own learning styles either, and thus they taught as they were taught.

Chapter 3

METHODOLOGY

This chapter consists of research design, population and sampling, instrumentation, data collection procedures and data analysis sections.

3.1 Research Design

The aim of this research is to identify high school students' learning styles, teachers' and students' awareness of learning styles and also how much teachers take these styles into consideration in their instruction in high schools in North Cyprus. This study will identify high school students' learning styles with respect to their gender, grade level and school type. Mixed research design (Tashakkori & Tedddlie, 2003) was used in this study. Therefore, both quantitative and qualitative methods were used to gather the necessary data required for the study. The quantitative data were collected through the survey method and the qualitative data were collected through semi structured interviews.

3.2 Population and Sampling

The population of the study includes the students who enrolled in different types of 29 public high schools and their teachers in North Cyprus in 2010-2011 academic year. In total, there were 9,500 students and 1,500 teachers in high schools in North Cyprus. As the population was large, a sample was chosen from the population. The sampling method used was random sampling.

In order to identify the sample the students were clustered into three groups according to their school types. The school types included general high schools, science and English-medium high schools and vocational high schools. Then, eight high schools were chosen through stratified random sampling method from the clusters. Out of 29 high schools, there were 11 general high schools, 7 English-medium high schools and 11 vocational high schools. 3 general high schools, 2 English medium high schools and 3 vocational high schools were chosen for this study. Later on, one class from each grade level in each school was selected in a random way. As a result, the sample of students consisted of 629 high school students. The characteristics of the sample of students are shown in Table 3.1.

Table 3.1

Characteristics of Research Sample of Students for Quantitative Data

Characteristics	**N**	**%**
Gender		
Male	299	47.5
Female	330	52.5
Grade		
9th graders	199	31.6
10th graders	181	28.8
11th graders	131	20.8
12th graders	118	18.8
School Type		
General high schools	217	34.5
Vocational high schools	215	34.2
Science and English-medium high schools	197	31.3
Total	629	100.0

As it can be seen in Table 3.1, the sample included 47.5 % of male and 52.5% of female students. The sample contains 31.6% of the students were from the ninth

grade, 28.8% were from the tenth grade, 20.8% were from the eleventh grade and 18.8% students were from the twelfth grade. 34.5% students were from general high schools, 34.2% were from vocational high schools and 31.3% students were from science and English-medium high schools. Totally 629 students participated in the study.

In order to collect the qualitative data, sixteen students in total were selected from the same sample of students. Two students from each school were chosen randomly. The characteristics of the sample of students are shown in Table 3.2.

Table 3.2

Characteristics of Research Sample of Students for Qualitative Data

Characteristics	**N**
Gender	
Male	5
Female	11
Grade	
9th graders	5
10th graders	4
11th graders	3
12th graders	4
Departments	
Preparatory	5
Science	4
Turkish-Mathematics	3
Social Sciences	1
Electric-Electronic	1
Mechanical	1
Trade	1
School Type	
General high schools	6
Vocational high schools	6
Science and English-medium high schools	4
Total	16

As seen in Table 3.2, the sample included 5 male and 11 female students which made 16 students in total. The sample comprised 5 students from the ninth grade, 4 students were from the tenth grade, 3 students were from the eleventh grade and 4 students were from the twelfth grade. Also, there were 5 students from the preparatory department, 4 from science department, 3 from Turkish-mathematics department and 1 from social sciences, electric-electronic, mechanical and trade departments. In addition to that there were 6 students were from general high schools

and vocational high schools and 4 from science and English-medium high schools.

On the other hand, 8 teachers in total, 1 teacher from each school, were included in the sample. The characteristics of the sample of teachers are shown in Table 3.3.

Table 3.3

Characteristics of Research Sample of Teachers

Characteristics	**N**
Gender	
Male	0
Female	8
Branch	
Turkish Language and Literature	4
History	2
English	1
Biology	1
School Type	
General high schools	3
Vocational high schools	3
Science and English-medium high schools	2
Total	8

As seen in Table 3.3, the sample included 8 female teachers. 4 of them were Turkish language and literature teachers, 2 were history teachers, 1 was an English language teacher and 1 was a biology teacher. Three of the teachers were teaching at general high schools, three of them were teaching at vocational high schools and two of them were teaching at science and English-medium high schools.

3.3 Instrumentation

Various instruments were used for data collection in this study. One of the instruments was Grasha-Reichmann Learning Style Scale (GRSLSS) which was used to identify students' learning styles. The other instruments were two interview forms that aimed to identify students' and teachers' awareness of learning styles and teachers' consideration of their students' learning styles in their instruction.

3.3.1 Grasha-Reichmann Learning Style Scale (GRSLSS)

Grasha-Reichmann Learning Style Scale (GRSLSS) consists of two parts. The first part is about personal information. The second part includes the items of Grasha-Reichmann Learning Style Scale (GRSLSS). GRSLSS is used for this study because it is especially designed to use with high school students.

The original form of this scale was developed in 1974 by Grasha and Reichmann and it consisted of 90 items. Later on (1990, 1996) Grasha further developed the scale. GRSLSS is an adapted form (1996) that consists of 60 Likert type items on a five point scale. The people's responses to the items are ranged from 1 to 5 where (5) refers to strongly agree, (4) agree, (3) undecided, (2) disagree and (1) strongly disagree. Through the use of GRSLSS six different learning style preferences can be identified. These preferences are competitive, collaborative, avoidant, participant, dependent and independent. Ten items for each learning style preference is included in the GRSLSS. Moreover, Grasha and Reichmann classifies assessment scores of each learning styles into three in order to identify scores that are considered as low, moderate or high. The classification of each learning style as low, moderate or high is given in Table 3.4

Table.3.4

Learning Styles and Classifications as Low, Moderate or High (Grasha, 1996)

Learning Style	Low	Moderate	High
Competitive	[1.0-1.7]	[1.8-2.8]	[2.9-5.0]
Collaborative	[1.0-2.7]	[2.8-3.4]	[3.5-5.0]
Avoidant	[1.0-1.8]	[1.9-3.1]	[3.2-5.0]
Participant	[1.0-3.0]	[3.1-4.1]	[4.2-5.0]
Dependent	[1.0-2.9]	[3.0-4.0]	[4.1-5.0]
Independent	[1.0-2.7]	[2.8-3.8]	[3.9-5.0]

As seen in Table 3.4, competitive style scores are between the ranges 1.0-1.7 which are considered as low, 1.8-2.8 as moderate and 2.9-5.0 as high. Scores between ranges 1.0-2.7 are considered as low, 2.8-3.4 as moderate and 3.5-5.0 as high for collaborative style. Also, avoidant style scores ranges between 1.0-1.8 are considered as low, 1.9-3.1 as moderate and 3.2-5.0 as high. Scores between ranges 1.0-3.0 are considered as low, 3.1-4.1 as moderate and 4.2-5.0 as high for participant style. Moreover, dependent style scores are between the ranges 1.0-2.9 which are considered as low, 3.0-4.0 as moderate and 4.1-5.0 as high. Scores between ranges 1.0-2.7 are considered as low, 2.8-3.8 as moderate and 3.9-5.0 as high for independent style.

Since the participants of the present study were Turkish high school students, GRSLSS form (1996) was translated into Turkish through back translation procedure. According to Chapman and Carter (1979) back translation is the most suggested method to verify the translation of an inventory. For the present study, firstly, GRSLSS was translated into Turkish by an expert translator and Turkish form of the scale was assessed in terms of meaning and understanding. Then, by another

translator, the Turkish version of the inventory was back translated into English. In order to ensure that the original English version and translated English version of GRSLSS's items convey the same meaning, both versions of GRSLSS were reviewed. Finally, discriminated items were modified in order to make sure that both items convey the same meaning.

After completion of the back translation procedures, pilot study was conducted by the researcher in order to assess the validity and reliability of the Turkish version of the GRSLSS. Participants of the pilot study were 256 high school students enrolled in three different types of high schools, namely general high schools, science and English-medium high schools and vocational high schools. After collecting data for the pilot study, Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett test of sphericity were used in order to determine the appropriateness of the data for factor analysis. Kaiser-Meyer-Olkin, measure of sampling adequacy of 0.6 or above is acceptable for factor analysis (Büyüköztürk, 2005). The result of the Kaiser-Meyer-Olkin measure showed the measure of sampling adequacy which is .837 and Barlett's Test significance level was found significant (p= .000<.01) for factor analysis of the GRSLSS. The prior hypothesis was that the inventory had six dimensions. To determine the number of the factors, the scree plot was used. The scree plot test result is given in Figure 3.1.

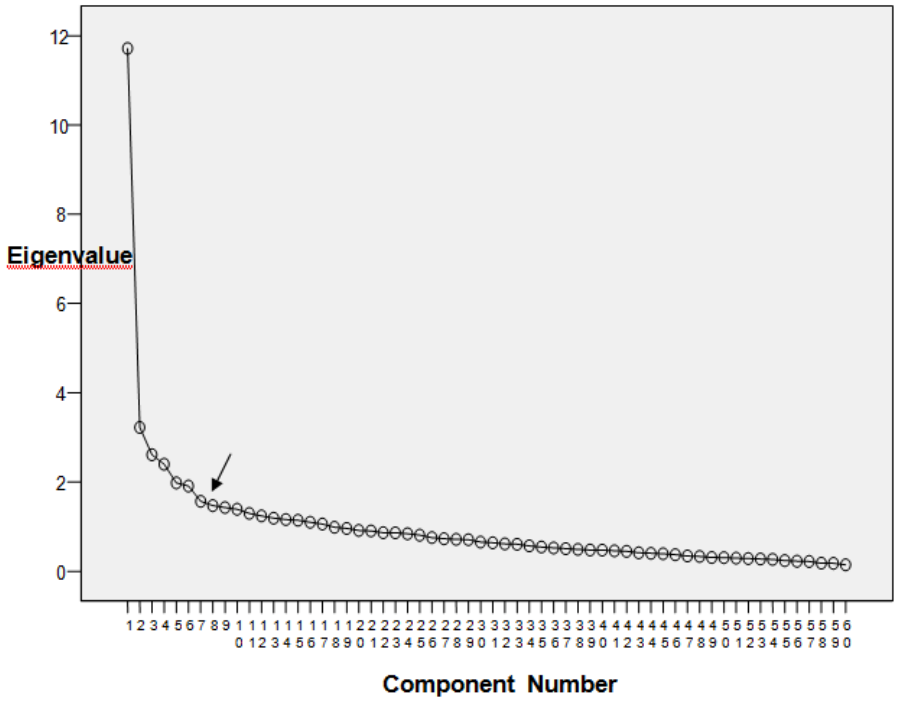

Figure 3.1. Scree plot test result

The scree plot indicated that the hypothesis was correct. Scree plot showed that six learning style dimensions are identified by this instrument.

Factor analysis indicated that six factors explained 40% of the total variance. Then factors were rotated by using Varimax rotation (see Appendix A) to identify which items are under in which dimensions. After Varimax rotation**,** Equamax rotation (see Appendix B) was used. As Equamax rotation solution, 44 items out of 60 were rotated under six dimensions. As a result of the factor analysis revealed that the Turkish version of GRSLSS consists of 44 items on a five point Likert scale (see Appendix C).

In the Turkish version of the GRSLSS, the competitive dimension consisted of six items (4, 10, 14, 26, 37 and 43), collaborative dimension eight items (2, 8, 12, 18, 22,

24, 32 and 41), avoidant dimension six items (1, 7, 17, 21, 29 and 40), participant dimension seven items (5, 15, 27, 31, 34, 38 and 44), dependent dimension nine items (3, 9, 13, 19, 25, 30, 33, 36 and 42) and independent dimension eight (6, 13, 16, 20, 23, 28, 35 and 39) items.

Cronbach alpha coefficients of the Turkish version of the GRSLSS was calculated in order to assess the reliability of the inventory. The results of the inter-item reliability analysis of the inventory revealed .85 Alpha coefficients for the whole scale. The cronbach alpha internal consistency values for each sub-dimension were, .69 for competitive, .72 for collaborative, .59 for avoidant, .66 for participant, .83 for dependent and .54 for independent. As a result, the Turkish version of the GRSLSS was found to be a valid and reliable scale to be used for the present study.

3.3.2 Interview Forms

In the study semi-structured interviews which consisted of open ended questions were administrated in Turkish in order to yield in-depth answers from both students and their teachers about learning style awareness. Two interview forms were prepared for the interviews: Students' Interview Form and Teachers' Interview Form. The Students' Interview Form (see Appendix D) contained four questions and Teachers' Interview Form (see Appendix E) contained eight questions. The students' questions were about their learning style awareness whereas the teachers' questions were related to their awareness of their students' learning styles and their consideration of those styles in their instruction. The questions for the interviews were prepared by the researcher. Then, expert help was received to increase the interview questions' quality. After necessary feedback was given by the expert,

minor changes were made to improve the questions.

3.4 Data Collection Procedures

The data of the study were collected from eight public high schools during the fall semester of 2010-2011 academic year. The necessary permission for data collection was requested by the researcher from the Ministry of Education, Youth and Sport before data collection (see Appendix F).

In order to prevent students from gaining awareness about learning styles, the interviews in each school were completed with two students and a teacher before the participants responded the GRSLSS. All interviews were tape-recorded. Each student's interview took about 15 minutes and each teacher's interview took about 25 minutes.

Then, in each class students were informed about the purpose of the study by the researcher and the ambiguities about the response format of GRSLSS were clarified. The completion of the scale took about 20 minutes for the participants. During the study 646 inventories were distributed. However, 629 of them were found to be filled in properly.

Data collection procedure was completed in two weeks in December 2010.

3.5 Data Analysis

Quantitative data which were gathered through Grasha and Reichmann Learning Style Scale were analyzed by using SPSS program. Before the analysis of the

quantitative data, all the forms of the inventory were controlled to identify whether there were any questions to be omitted. As a result, 17 inventories were found as inappropriate for data analysis because of the omitted questions. Therefore, 629 inventories out of 646 were used for data analysis.

Firstly, inventories were numbered from 1 to 629. Then, numerical codes were given to students' personal information. After that, students' responses to each item which had positive meaning in the inventory were coded as Strongly Disagree-1, Disagree-2, Undecided-3, Agree-4 and Strongly Agree-5. Finally the students' data were transferred to SPSS 15.0 version to be analyzed.

In order to find out the answers to the research questions the transferred data were appropriately analyzed. Firstly, descriptive statistics were applied to find out the means and standard deviations of the students' learning styles. Multivariate analysis of variance (MANOVA) was used to determine whether there are any differences between independent groups on learning styles. Then, analysis of variances (ANOVA) was used to compare more than two groups. In addition, to determine which groups differed from each other Least Significance Difference Test (LSD) was carried out.

SPSS version 15.0 was used for the quantitative data analysis procedure.

Furthermore, during the analysis of interviews, qualitative data were transcribed to be formatted into a useable form for data analysis. Through content analysis the thematic coding (Miles & Huberman, 1994) was implemented to find answers to the

research questions. Before analysis, each learning style was identified as a theme. Under the category of students' learning styles the sub-themes were produced. These were identified as "participant", "avoidant", "dependent", "independent", "collaborative" and "competitive". Then, thematic category and sub-themes were grouped accordingly and sub-themes were written in a matrix. In total there were 16 students' and 8 teachers' interview forms. A letter from A-P was given to each student. As similarly a number from 1-8 was given for each teacher in the matrices to put the students' and the teachers' answers in an order which were related with themes. In the end, they were translated into English (see Appendix G and Appendix H).

Chapter 4

RESULTS

In order to find out answers to the research questions, results of the statistical analysis, their interpretations and findings emerged from quantitative and qualitative data were explained in this chapter. In respect to the order of the research questions, the results and their interpretations were presented.

4.1 High School Students' Learning Styles

In the first research question, the researcher tried to identify the high school students' learning styles. For this purpose, the mean and the standard deviations of students' learning style scores were calculated. The mean score and the standard deviation for each learning style are given in Table 4.1.

Table 4.1

High School Students' Mean Scores in Learning Styles (N=629)

Learning styles	**M**	**SD**	**Preference**
Competitive	3.2	.80	High
Collaborative	3.5	.68	High
Avoidant	2.7	.77	Moderate
Participant	3.4	.69	Moderate
Dependent	3.8	.70	Moderate
Independent	3.0	.56	Moderate

As shown in Table 4.1, the mean score of students with competitive learning style is

3.2 and the mean score of students with collaborative learning style is 3.5.Those mean scores indicate that, according to predetermined learning style preference levels in the section of the Methodology (see Table 3.4), high school students prefer competitive and collaborative learning styles at high extent. Besides, the mean score of students with avoidant learning style is 2.7 and the mean score of the students' with participant learning style is 3.4. The mean score of students with dependent learning style is 3.8 and the mean score of students with independent learning style is 3.0. Those mean scores show that students prefer avoidant, participant, dependent and independent learning styles moderately.

Overall, the findings indicate that high school students mostly have higher scores in competitive and collaborative learning styles than avoidant, participant, dependent and independent learning styles. It shows that high school students have competitive and collaborative learning styles at a high level. Besides, they prefer avoidant, participant, dependent and independent learning styles moderately.

These results support the findings in the literature. Tüysüz and Tatar (2008) stated that most of the students were competitive and collaborative. Similarly, findings of another study which was conducted by Uzun and Şentürk (2008) revealed that most of the students were competitive and collaborative.

4.2 High School Students' Learning Styles and Their Personal Characteristics

In the second research question, the researcher investigated whether there were differences in students' learning styles depending on their personal characteristics,

namely gender, grade level and school type. For this purpose, first the multivariate analysis of variance (MANOVA) was implemented to determine whether significant differences between personal characteristics and learning styles exist or not. Then, the means and standard deviations of the students' learning style scores were calculated according to their personal characteristics. Moreover, to specify differences, analysis of variances (ANOVA) was used for gender, grade levels and school types. Finally Least Significant Difference test (LSD) was conducted to find which gender type, grade level and school type affect learning styles the most.

4.2.1 High School Students' Gender and Learning Styles

In the second research question, first the researcher tried to find out whether high school students' learning styles vary depending on their gender.

For this purpose, firstly MANOVA was conducted to determine whether there was a significant difference between gender and learning styles. According to MANOVA results, significant differences were found between students' gender and learning styles ($F= 12.825$, $\lambda= .000$, $\eta^2= .111$).

Then the mean scores and standard deviations of students of different gender were calculated. The results are given in Table 4.2.

Table 4.2

Means and Standard Deviations of the Students' Scores Depending on Their Gender

	Gender	**N**	**M**	**SD**
Competitive	Female	330	3.3	.04
	Male	299	3.1	.05
Collaborative	Female	330	3.6	.04
	Male	299	3.4	.04
Avoidant	Female	330	2.6	.04
	Male	299	2.9	.04
Participant	Female	330	3.6	.04
	Male	299	3.2	.04
Dependent	Female	330	4.0	.04
	Male	299	3.7	.04
Independent	Female	330	3.0	.03
	Male	299	3.1	.03

As shown in Table 4.2 students with different gender have different mean scores. It was seen that for each learning style, female and male students' mean scores are close to each other. Avoidant female students' mean score is 2.6, and avoidant male students' mean score is 2.9. Participant female students' mean score is 3.6 and participant male students' mean score is 3.2. Competitive female students' mean score is 3.3 and competitive male students' mean score is 3.1. Collaborative female students' mean score is 3.6, and collaborative male students' mean score is 3.4. Dependent female students' mean score is 4.0 and dependent male students' mean score is 3.7.Independent female students' mean score is 3.0, and independent male students' mean score is 3.1.

Since all learning style mean scores of students are different, ANOVA on each learning style was conducted as a follow-up test to MANOVA in order to determine

which learning styles of students with different gender has a significant difference. The results are given in Table 4.3.

Table 4.3

ANOVA Results for Difference in Students' Learning Styles Depending on Their Gender

Learning Styles		**SS**	***df***	**MS**	**F**	***p***	η^2
Competitive	Between Groups	6.833	1	6.833	10.971	.001*	.017
	Within Groups	387.406	622	.623			
	Total	394.239	623				
Collaborative	Between Groups	5.96	1	5.968	14.264	.000*	.022
	Within Groups	260.255	622	.418			
	Total	266.223	623				
Avoidant	Between Groups	9.025	1	9.025	16.646	.000*	.026
	Within Groups	337.258	622	.542			
	Total	346.283	623				
Participant	Between Groups	24.355	1	24.355	56.612	.000*	.083
	Within Groups	267.595	622	.430			
	Total	291.950	623				
Dependent	Between Groups	14.926	1	14.926	32.767	.000*	.050
	Within Groups	283.334	622	.456			
	Total	631.926	623				
Independent	Between Groups	.534	1	.534	1.773	.183	.003
	Within Groups	187.168	622	.301			
	Total	187.702	623				

* The mean difference is significant at the .01 level.

As shown in Table 4.3, ANOVA test result is significant for competitive ($F(1,622)= 0.97$, $p = .001 < .01$), collaborative ($F(1,622)=14.26$, $p = .000 < .01$), avoidant

(F(1,622)=16.65, p = .000< .01), participant (F(1,622)=56.61, p = .000< .01) and dependent (F(1,622)=32.77, p = .000< .01) learning styles. Only for independent learning style no significant difference is found (F(1,622)= 1.773, p= .183 > .01).

As post hoc analyses to the univariate ANOVA, Least Significant Difference test (LSD) was conducted to find which gender type affects learning styles the most. For this purpose, each pairwise comparison was tested. The results are given in Table 4.4.

Table 4.4

Least Significant Difference Test Results With Respect to the Students' Learning Styles Depending on Their Gender

	Gender	**Gender**	**MD**	**Std. Error**	***p***
Competitive	Female	Male	.222	.067	.001*
Collaborative	Female	Male	.208	.055	.000*
Avoidant	Female	Male	-.256	.063	.000*
Participant	Female	Male	.420	.056	.000*
Dependent	Female	Male	.329	.057	.000*

* The mean difference is significant at the .01 level.

As seen in Table 4.4, Least Significant Difference Test results indicate that there is a significant difference at .01 level between female and male students in competitive (MD= .222,p=.001), collaborative (MD= .208,p=.000), avoidant(MD= -.256,p=.000), participant (MD= .420,p=.000), and dependent (MD= .329,p=.000) learning styles. In competitive, collaborative, participant and dependent learning styles, female students have significantly higher scores than male students whereas in avoidant learning style male students have significantly higher scores than female students.

It can be concluded that female students have significantly higher scores than male students in competitive, collaborative, participant and dependent learning styles while male students have significantly higher scores than female students in avoidant learning style. Accordingly, it can be said that female students are more competitive, collaborative, participant and dependent than male students. Also, male students are more avoidant than female students.

The results of this study support the findings in the literature. Sidek, Noor and Jusoff (2009) also found that female students had significantly higher scores than male students in competitive, collaborative, participant and dependent learning styles.

4.2.2 High School Students' Grade Levels and Learning Styles

In the second research question, secondly the researcher tried to find out whether the high school students' learning styles vary depending on their grade levels.

For this purpose, firstly MANOVA was conducted to determine whether there is a significant difference between grade levels and learning styles. According to MANOVA results, significant differences were found between students' grade levels and learning styles ($F= 1.787$, $\lambda= .022$, $\eta^2= .017$).

Then the mean scores and standard deviations of students of different grade levels were calculated. The results are given in Table 4.5.

Table 4.5

Means and Standard Deviations of the Students' Scores Depending on Their Grade Levels

	Grade Level	**N**	**M**	**SD**
Competitive	Grade 9	199	3.1	.056
	Grade 10	181	3.9	.059
	Grade 11	131	3.3	.070
	Grade 12	118	3.2	.073
Collaborative	Grade 9	199	3.5	.046
	Grade 10	181	3.5	.048
	Grade 11	131	3.5	.057
	Grade 12	118	3.5	.060
Avoidant	Grade 9	199	2.7	.052
	Grade 10	181	2.8	.055
	Grade 11	131	2.7	.065
	Grade 12	118	2.8	.068
Participant	Grade 9	199	3.4	.047
	Grade 10	181	3.3	.049
	Grade 11	131	3.5	.058
	Grade 12	118	3.4	.061
Dependent	Grade 9	199	3.8	.048
	Grade 10	181	3.8	.050
	Grade 11	131	3.9	.060
	Grade 12	118	3.8	.062
Independent	Grade 9	199	2.9	.039
	Grade 10	181	3.0	.041
	Grade 11	131	3.0	.048
	Grade 12	118	3.2	.051

As seen in Table 4.5, students at different grade levels have different mean scores of learning styles. Competitive students' mean scores are different but very close to each other except 10th grade students. According to their grade level order, from grade 9th to 12th, the competitive students' mean scores are 3.1, 3.9, 3.3 and 3.2.

Collaborative students' mean scores are 3.5 in all grades. Also, avoidant students' mean scores are close to each other. The 9th grade and 11th grade avoidant students' mean scores are 2.7. The 10th grade and 12th grade avoidant students' mean scores are 2.8. Participant students' mean scores are also close to each other. The 9th grade and 12th grade participant students' mean scores are 3.4, the 10th grade participant students' mean score is 3.3, and the 11th grade participant students' mean score is 3.5. Moreover, the 9th, 10th and 12th grades dependent students' mean scores are 3.8 and the 11th grade dependent students' mean score is 3.9. Independent students' mean scores are very close to each other. The 9th grade independent students' mean score is 2.9, the 10th grade and 11th grade independent students' mean scores are 3.0 and the 12th grade independent students' mean score is 3.2.

Since students' mean scores of their learning styles are different, ANOVA was conducted on each learning style as a follow-up test to MANOVA in order to determine which learning styles of the students with different grade level has a significant difference. The results are given in Table 4.6.

Table 4.6

ANOVA Results for Difference in Students' Learning Styles Depending on Their Grade Levels

Learning Styles		**SS**	***df***	**MS**	**F**	***p***	η^2
Competitive	Between Groups	1.810	3	.603	.969	.407	.017
	Within Groups	387.406	622	.623			
	Total	389.216	625				
Collaborative	Between Groups	.595	3	.198	.474	.701	.022
	Within Groups	260.255	622	.418			
	Total	260.850	625				
Avoidant	Between Groups	3.012	3	1.004	1.852	.137	.026
	Within Groups	337.258	622	.542			
	Total	340.270	625				
Participant	Between Groups	1.653	3	.551	1.281	.280	.083
	Within Groups	267.595	622	.430			
	Total	269.248	625				
Dependent	Between Groups	.289	3	.096	.212	.888	.050
	Within Groups	283.334	622	.456			
	Total	283.623	625				
Independent	Between Groups	6.328	3	2.109	7.01	.000*	.003
	Within Groups	187.168	622	.301			
	Total	193.496	625				

* The mean difference is significant at the .01 level.

As shown in Table 4.6, ANOVA test result is significant for only independent learning style ($F(3,622)=7.010$, $p=.000<.01$). No significant difference is found between students' grade levels and competitive ($F(3,622)=.969$, $p = .407>.01$), collaborative ($F(3,622)=.474$, $p = .701>.01$), avoidant ($F(3,622)=1.852$, $p = .137>.01$), participant ($F(3,622)=1.2581$, $p = .280>.01$) and dependent

(F(3,622)=.212, *p*=.888) learning styles.

As post hoc analyses to the univariate ANOVA, Least Significant Difference test (LSD) was conducted to find which grade level affects independent learning style the most. For this purpose, each pairwise comparison was tested. The results are given in Table 4.7.

Table 4.7

Least Significant Difference Test Results with Respect to the Students' Learning Styles Depending on Their Grade Levels

	Grade Level	**Grade Level**	**MD**	**St. Error**	***p***
Independent	Grade 9	Grade 10	-.065	.057	.254
	Grade 9	Grade 11	-.106	.062	.088
	Grade 9	Grade 12	-.287	.064	.000*
	Grade 10	Grade 11	-.041	.064	.515
	Grade 10	Grade 12	-.223	.065	.001*
	Grade 11	Grade 12	-.181	.070	.010*

* The mean difference is significant at the .01 level.

As seen in Table 4.7, Least Significant Difference Test results indicate that there is a significant difference at .01 level between grade 9 and grade 12 (MD= -.287,*p*=.000), grade 10 and grade 12 (MD= -.223,*p*=.001), and grade 11 and grade 12 (MD=-.181,*p*=.010) in independent learning style. Also, no significant difference is found between grade 9 and grade 10 (MD= -.065,*p*=.254), grade 9 and grade 11 (MD= -.106, *p*=.088) and grade 10 and grade 11 (MD= -.041,*p*=.515) in independent learning style.

It can be concluded that students at grade 12 have significantly higher scores than

students at grade 9, 10 and 11 in independent learning style. Therefore, grade 12 students are more independent than the students at other three grade levels.

The literature also supports the findings of this study. Sidek, Noor and Jusoff (2009) found that college students whose ages were between 18-20 had higher scores in independent learning styles than other students.

4.2.3 High School Students' School Type and Learning Styles

In the second research question, lastly the researcher tried to find out whether high school students' learning styles vary depending on their school type.

For this purpose, firstly MANOVA was conducted to determine whether there was a significant difference between school types and learning styles. According to MANOVA results, significant difference was found between students' school types and their learning styles ($F= 7.361$, $\lambda= .000$, $\eta^2= .067$).

Then the mean scores and standard deviations of students of different school types were calculated. The results are given in Table 4.8.

Table 4.8

Means and Standard Deviations of the Students' Scores Depending on Their School Type

	School Type	N	M	SD
Competitive	General	217	3.3	.055
	Science and English-medium	197	3.1	.058
	Vocational	215	3.2	.056
Collaborative	General	217	3.6	.045
	Science and English-medium	197	3.6	.048
	Vocational	215	3.3	.046
Avoidant	General	217	2.7	.051
	Science and English-medium	197	2.6	.054
	Vocational	215	3.0	.052
Participant	General	217	3.5	.045
	Science and English-medium	197	3.3	.049
	Vocational	215	3.4	.047
Dependent	General	217	3.9	.047
	Science and English-medium	197	3.9	.050
	Vocational	215	3.7	.048
Independent	General	217	3.0	.038
	Science and English-medium	197	3.1	.041
	Vocational	215	3.0	.039

As seen in Table 4.8, the students enrolled at different school types have very close but different mean scores for their learning styles. General high school competitive students' mean score is 3.3, science and English-medium high school competitive students' mean score is 3.1 and vocational high school competitive students' mean score is 3.2. Also, general high school and science and English-medium high school collaborative students' mean scores are 3.6 while vocational high school collaborative students' mean score is 3.3. General high school and science and English-medium high school avoidant students' mean scores are 2.7 and 2.6 whereas, vocational high school avoidant students' mean score is 3.0. General high school

participant students' mean score is 3.5, science and English-medium high school participant students' mean score is 3.3 and vocational high school participant students' mean score is 3.4. Also, general high school and science and English-medium high school dependent students' mean scores are 3.9 and vocational high school dependent students' mean score is 3.7. Also, general high school and vocational high school independent students' mean scores are 3.0 and science and English-medium high school independent students' mean score is 3.1.

ANOVA was conducted on each learning style as a follow-up test to MANOVA in order to determine which learning styles of the students with different school type has a significant difference. The results are given in Table 4.9.

Table 4.9

ANOVA Results for Difference in Students' Learning Styles Depending on Their School Type

Learning Styles		**SS**	***df***	**MS**	**F**	***p***	**η^2**
Competitive	Between Groups	3.280	2	1.640	2.633	.073	.008
	Within Groups	387.406	622	.623			
	Total	390.686	624				
Collaborative	Between Groups	15.003	2	7.501	17.928	.000**	.055
	Within Groups	260.255	622	.418			
	Total	275.258	624				
Avoidant	Between Groups	13.384	2	6.692	12.342	.000**	.038
	Within Groups	337.258	622	.542			
	Total	350.642	624				
Participant	Between Groups	2.379	2	1.189	2.765	.064	.009
	Within Groups	267.595	622	.430			
	Total	269.974	624				
Dependent	Between Groups	2.976	2	1.488	3.266	.039*	.010
	Within Groups	283.334	622	.456			
	Total	286.310	624				
Independent	Between Groups	.435	2	.218	.723	.486	.002
	Within Groups	187.168	622	.301			
	Total	187.603	624				

* The mean difference is significant at the .05 level.

** The mean difference is significant at the .01 level.

As shown in Table 4.9, ANOVA test result is significant for collaborative ($F(2,622)= 17.928$, $p = .000<.01$), avoidant ($F(2,622)= 12.342$, $p = .000<.01$) and dependent ($F(2,622)= 3.266$, $p = .039<.05$) learning styles. Also, no significant difference was found between students' school type and competitive ($F(2,622)= 2.633$, $p =$

.073>.01), participant (F(2,622)= 2.765, p = .064>.01) and independent (F(2,622)= .723, p = .486>.01)learning styles.

As post hoc analyses to the univariate ANOVA, Least Significant Difference test (LSD) was conducted to find which school type affects learning styles the most. For this purpose, each pairwise comparison was tested. The results are given in Table 4.10.

Table 4.10

Least Significant Difference Test Results with Respect to the Students' Learning Styles Depending on Their School Type

	School Type	**School Type**	**MD**	***p***
Collaborative	General	Science and English-medium	.097	.129
	General	Vocational	.381	.000*
	Science and English-medium	Vocational	.284	.000*
Avoidant	General	Science and English-medium	.106	.148
	General	Vocational	-.264	.000*
	Science and English-medium	Vocational	-.370	.000*
Dependent	General	Science and English-medium	.021	.758
	General	Vocational	.163	.017**
	Science and English-medium	Vocational	.142	.043**

* The mean difference is significant at the .01 level.

** The mean difference is significant at the .05 level.

As seen in Table 4.10, Least Significant Difference Test results indicate that there is a significant difference between general and vocational high school students (MD=.381, *p*=. 000< 0.1) and science and English medium and vocational high school students(MD=.284, *p*=. 000< 0.1) in collaborative learning style. Also, a significant difference is found between general and vocational high school students (MD= -.264, *p*=. 000< 0.1) and science and English medium and vocational high school students (MD= -.370, *p*=. 000< 0.1) in avoidant learning style. Moreover, there is a significant difference between general and vocational high school students (MD=.163, *p*=. 017< 0.5) and science and English medium and vocational high school students (MD=.142, *p*=. 043< 0.5) in dependent learning style. Furthermore, no significant difference was found between general and science and English-medium high school students in collaborative (MD=.097, *p*=.129> .01), avoidant (MD=.106, *p*=.148> .01) and dependent (MD=.021, *p*=.758> .01) learning styles.

It can be concluded that general and science and English-medium high school students are more collaborative than vocational high school students. Besides, vocational high school students are more avoidant than general and science and English-medium high school students. Moreover, general and science and English-medium high school students are more dependent than vocational high school students.

4.3 High School Students' Awareness of their Learning Styles

In the third research question, the researcher investigated how much students are aware of their learning styles. For this purpose the data were gathered via interviews. The thematic analysis of all interview documents yielded one main category as

shown in Figure 4.1.

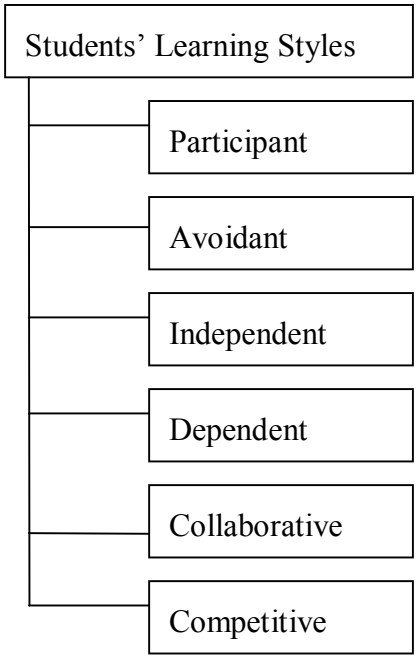

Figure 4.1. Thematic category of students' learning style awareness

Under the "students' learning styles" category, the sub-themes "participant", "avoidant", "independent", "dependent", "collaborative" and "competitive" are emerged.

The analysis of the interview documents in all sub-themes exhibited the students' awareness of their learning styles.

4.3.1 Participant Learning Style

With regard to students' awareness of their learning styles, related to participant learning style, the majority of students (Students B, C, D, F, G , H, I, J, K, L, M, N, O and P) highlighted their participation in learning activities. Students B, C, D, F, G, H, I, J, K, L, M, N, O and P emphasized that they prefer to attend learning activities in the classroom. Students D and O asserted that learning activities are interesting to

participate. Also, students B, F, H, J and L remarked that participating to learning activities in the classroom is enjoyable while other students (Student D, F, I, K, L, M, N) reported that taking part in activities have impact on their learning. They mentioned, while they are participating in the classroom activities they learn better and easily. Student L remarked, "I always participate to learning activities actively in the classroom. I enjoy taking part in activities. They are interesting for me. I also learn in an easy way through participating in learning activities".

4.3.2Avoidant Learning Style

With regard to students' awareness of their learning styles, related to avoidant learning style, only two students (Students A and E) identified themselves as avoidant. Students (Students A and E) reported that they do not prefer to attend learning activities in the classroom. Students A and E remarked that the classroom learning activities not interesting. In addition, student A reported, "I am not a successful student in the class. I do not prefer to attend learning activities in the classroom. The learning activities are boring. Also they are not interesting for me".

4.3.3 Dependent Learning Style

With regard to students' awareness of their learning styles, related to dependent learning style, half of the students preferred to be dependent on their teachers while studying and learning. Most of the students (Students D, E, G, I, K, L and P) remarked that it is important to have clear and detailed instructions from teachers while doing homework. Furthermore, student B highlighted that "While learning and studying what teacher says are important". Also student D stressed, "I always need teachers' detailed instructions while learning and studying".

4.3.4 Independent Learning Style

With regard to students' awareness of their learning styles, related to independent learning style, majority of the students identified themselves as independent learners. Most of them (Students A, B, D, E, F, H, I, K, M, N, O and P) remarked that while learning and studying they prefer to follow their own learning ways. Student C stated, "While learning and studying, I always search other sources and different books to extent my knowledge. It is an advantage for me. So, I always put into practice my own decisions while learning". Student K mentioned, "I always learn and study in a different way than the teacher teaches us". Also student M stressed, "I believe my own learning ability while learning and studying".

4.3.5 Collaborative Learning Style

With regard to students' awareness of their learning styles, related to collaborative learning style, some students recognized themselves as collaborative learners. A few of the students (Students C, D, K and O) remarked that they prefer to collaborate with their classmates while doing homework and studying. Student A stressed, "It is enjoyable to collaborate with my friends". Also students A, I and J reported that collaboration with friends makes them learn better and increases the retention of knowledge.

4.3.6 Competitive Learning Style

With regard to students' awareness of their learning styles, related to competitive learning style, many students recognized themselves as competitive learners. Some students (Students B, D, F, L and P) remarked that it is important to be more successful than their classmates. Also, students B, F, G, H and O stressed that as a

result of homework or examination they have to obtain the first rank. Furthermore, student H stated, “I am mostly successful. So, it is important for me to take proud of my teachers and be more successful than my classmates”. Two students (Students H and M) remarked that they enjoy taking proud of their teachers because of their success. Also, they like to be more successful than their classmates.

4.3.7 Interpretation

Each learning style has particular characteristics. Most of the students talked about some characteristics of learning styles that they have. They explained these characteristics and the benefits of these learning style characteristics on their learning. However, students mostly mentioned about only one or two characteristics of their learning styles. Thus, it can be concluded that students may not have deep understanding and awareness of how they learn the best and they are not aware of their learning styles very much.

4.4 Teachers’ Awareness of Their Students’ Learning Styles

In the fourth research question, the researcher investigated how much the teachers are aware of their students’ learning styles. For this purpose, the data were gathered via interviews. The thematic analysis of all interview documents yielded one main category as shown in Figure 4.2.

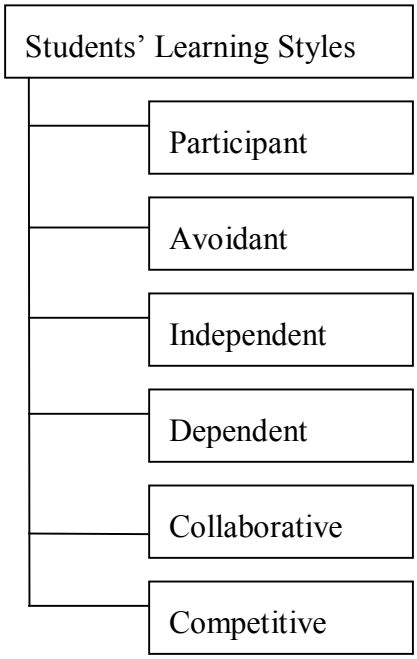

Figure 4.2. Thematic category of teachers' awareness of their students' learning styles

Under the "students' learning styles" category, the sub-themes "participant", "avoidant", "independent", "dependent", "collaborative" and "competitive" are emerged.

The analysis of interview documents in all sub-themes exhibited the teachers' awareness of their students' learning styles.

4.4.1 Participant Learning Style

With regard to teachers' awareness of their students' learning styles, related to participant learning style, the majority of teachers identified their students as participant learners. Teachers 1, 2, 4, 5, 6, 7 and 8 remarked that in class their students participate in the learning activities. Teacher 1 stated, "This semester the

number of the students who are willing to participate in class activities has increased. When students know the subject matter and they trust themselves, they participate in all classroom activities".

4.4.2 Avoidant Learning Style

With regard to teachers' awareness of their students' learning styles, related to avoidant learning style, most of the teachers identified their students as avoidant learners. Teachers 2, 3, 5, 6 and 8 remarked that they have students who prefer not to attend learning activities in class. Teacher 6 stated, "Some students never prefer to talk". Also, Teacher 3 reported, "The participation is insufficient. Students do not prefer to participate if the topic is abstract and visual materials are not supplied to them".

4.4.3 Dependent Learning Style

With regard to teachers' awareness of their students' learning styles, related to dependent learning style, all teachers, except Teacher 2, identified their students as dependent learners. Teachers 1, 3, 4, 5, 6, 7 and 8 remarked that students need their guidance, detailed and clear instruction while doing homework and studying. Teacher 1 stressed, "They need my guidance a lot. They follow the way I showed them while learning. Unfortunately, they do not have their own ideas to follow".

4.4.4 Independent Learning Style

With regard to teachers' awareness of their students' learning styles, related to independent learning style, half of the teachers recognized their students as independent learners. Teachers 1, 3, 5 and 6 remarked that especially students prefer

to study and do their homework on their own. Teacher 6 stated, “Students do not need any details or clear instructions while they are learning. Only the ninth grade students need my guidance because they have not recognized me yet”.

4.4.5 Collaborative Learning Style

With regard to teachers’ awareness of their students’ learning styles, related to collaborative learning style, majority of the teachers recognized their students as collaborative learners. Teachers 1, 2, 3, 5 and 8 reported that students collaborate by asking questions to teacher and their classmates. Two teachers (Teachers 4 and 7) remarked that students prefer group work while studying or doing homework. Teacher 1 stressed, “Our students’ collaborative aspect is highly developed”. Also Teacher 7 stated, “They prefer to learn from each other”.

4.4.6 Competitive Learning Style

With regard to teachers’ awareness of their students’ learning styles, related to competitive learning style, majority of the teachers identified their students as competitive learners. Two teachers (Teachers 2 and 4) remarked that some students always want to get the highest marks from exams and homework. Teachers 2, 5, 6 and 7 reported that their students are ambitious to be successful. Teacher 8 stated, “There are students who compete with each other. So, these students bet about who will get the highest mark”. Teacher 3 stressed, “Some students always aim to do excellent homework”.

4.4.7 Interpretation

A class consists of many different types of students. Each student is unique and may have a different learning style from other students. Therefore, variety of learning styles can be found in a class. In this research, all the teachers accepted that there are students with different learning styles in their classes. However, most of them mentioned only few characteristics about the learning styles that their students have. This shows that teachers don't have enough and detailed information about what learning styles are and what the characteristics of their students' learning styles are in their classes. Therefore, it seems doubtful that teachers are exactly aware of their students' learning styles.

4.5 Teachers' Consideration of Their Students' Learning Styles in Their Instruction

In the fifth and the last research question, the researcher investigated teachers' consideration of their students' learning styles in their instruction. For this purpose, the data were gathered via interviews. The thematic analysis of all interview documents yielded one main category as shown in Figure 4.3.

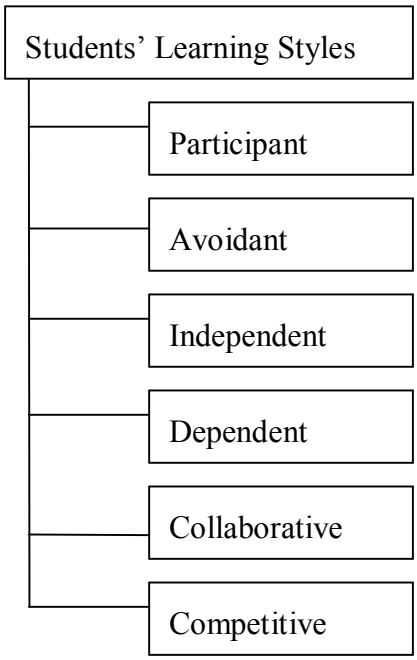

Figure 4.3. Thematic category of teachers' consideration of their students' learning styles in their instruction

Under the "students' learning styles" category, the sub-themes "participant", "avoidant", "independent", "dependent", "collaborative" and "competitive" are emerged.

The analysis of interview documents in all sub-themes exhibited the teachers' consideration of their students' learning styles in their instruction.

4.5.1 Participant Learning Style

With regard to teachers' consideration of their students' learning styles in their instruction, related to participant learning style, half of the teachers considered participant learning style in their instruction. Two teachers (Teachers 2 and 6) reported that they start to talk about daily news to create an active participation environment in class. Teacher 7 stated, "I try to supply many learning activities to

my students". Also, Teacher 8 mentioned, "In my courses I always use question-answer technique to increase student participation".

4.5.2 Avoidant Learning Style

With regard to teachers' consideration of their students' learning styles in their instruction, related to avoidant learning style, some of the teachers considered avoidant learning style in their instruction. Teacher 1 stressed, "I always motivate my students who are not willing to participate in learning activities". Teacher 2 stated, "Some students withdraw themselves from class interaction. I deal with these kinds of students by asking questions to them to increase their participation in learning". Teacher 6 remarked, "During instruction I always ask questions to quiet students in class".

4.5.3 Dependent Learning Style

With regard to teachers' consideration of their students' learning styles in their instruction, related to dependent learning style, most of the teachers considered dependent learning style in their instruction. Teachers 1, 2, 4, 5, 7 and 8 reported that they always provide clear instructions and detailed information to the students about homework or course topic. Teacher 3 remarked, "I always provide examples to the students about the course topic that I teach. I also provide them detailed information. Otherwise, I know that some students cannot do their homework in an effective way".

4.5.4 Independent Learning Style

With regard to teachers' consideration of their students' learning styles in their instruction, related to independent learning style, most of the teachers considered independent learning style in their instruction. Teachers 1, 2, 3, 4, 5, 7 and 8 remarked that they organize individual activities and homework for their students. Teacher 8 stated, "To learn students' own feelings and thoughts, I supply individual activities and homework to my students".

4.5.5 Collaborative Learning Style

With regard to teachers' consideration of their students' learning styles in their instruction, related to collaboration learning style, all teachers considered collaborative learning style in their instruction. Teachers 2, 4, 5, 6 and 7 reported that they organize group activities to create collaborative environment for their students. Two Teachers (Teachers 8 and 3) stated that they always encourage their students to ask questions to them and their classmates. Teacher 1 remarked, "Our students mostly like collaboration. So, I organize activities which require collaboration between students as often as possible".

4.5.6 Competitive Learning Style

With regard to teachers' consideration of their students' learning styles in their instruction related to competitive learning style, none of the teachers considered competitive learning style in their instruction, because none of them mentioned anything about competitive learning style characteristics of their students.

4.5.7 Interpretation

Teachers should consider their students' learning styles while organizing and implementing teaching and learning activities in their instruction to have them learn effectively. In this research, during the interviews, the teachers explained that they consider their students' learning styles in their instruction, but they gave only few activities for each learning style group of students to show how they did it. Besides, only few teachers mentioned that they have organized some activities for the participant and avoidant students. In other words, many teachers ignored some of their students' learning style preferences in instruction. On the other hand, although many of the teachers said that they have had some competitive students in their classes, none of them explained any suitable activities which they organized for them. As a result, it can be said that the teachers consider their students' learning styles at a certain extent, but not for all learning styles and not properly in their instruction.

Chapter 5

CONCLUSION

In this chapter, background of the problem, methodology and results of the present study are summarized. Also recommendations for education and for further research are provided.

5.1 Summary

Learning process is peculiar to the individual. Recently individual differences are regarded as one of the considerable features of learning. One of the most important areas of individual differences is learning styles. Learning styles show how an individual learn more effectively and efficiently. According to researches, effective learning is obtained by situations which are based on students' individual characteristics. Learning styles have a great impact on students' learning. Thus, teachers and students should gain awareness about learning styles. Besides, teachers should consider their students' different learning styles during their instruction.

Considering students' different learning styles by teachers in instruction in schools in North Cyprus is important for effective instruction. However, no research on student's learning styles has been done at any school level in North Cyprus. Also, no attempt has been done to investigate teachers' awareness about their students' learning styles and teachers' consideration of those styles in their instruction. As a result of this need, the present study was designed.

The purpose of this study was to identify high school students' learning styles, teachers' and students' awareness of students' learning styles and how much teachers take those styles into consideration in their instruction.

Mixed research design, which included both qualitative and quantitative methods, was used in this study. The qualitative data were collected through semi structured interviews and the quantitative data were collected through the survey method.

The population of the study is 9,500 students and 1,500 teachers in different high schools in North Cyprus. The sample included 629 students and 8 teachers from those high schools. The research was conducted in 2010-2011 academic year.

Three instruments, Grasha-Reichmann Learning Style Scale (GRSLSS), an inventory, and two semi structured interview forms for students and teachers, were used to collect data for the study. GRSLSS was used to identify students' learning styles. The two interview forms were used to identify students' and teachers' awareness of learning styles and teachers' consideration of their students' learning styles in their instruction. Grasha-Reichmann Learning Style Scale (GRSLSS) was translated into Turkish through back translation procedure and the Turkish version of the scale was designed accordingly. The results of the reliability analysis of the Turkish inventory revealed .85 Alpha coefficients for the whole scale. It included 44 items on a five point Likert scale. One of the two interview forms, the Students' Interview Form included 4 questions about their learning style awareness. The Teachers' Interview Form included 8 questions about their awareness of their students' learning styles and their consideration of those styles in their instruction.

All of the data were collected by the researcher at high schools.

In analyzing the data, to answer the first and second research questions, descriptive statistics were applied to find out the means and standard deviations of students' learning styles. Multivariate analysis of variance (MANOVA) was used to determine whether there are any differences between independent groups on learning styles. Then, analysis of variances (ANOVA) was used to compare more than two groups. In addition, to determine which groups differed from each other Least Significance Difference Test (LSD) was carried out. SPSS version 15.0 was used in all quantitative data analysis procedure. Besides, the thematic coding was implemented through content analysis to find the answers to the third, fourth and fifth research questions.

5.2 Results

The results of the present study can be summarized as follows:

- High school students mostly have competitive and collaborative learning styles. They also prefer participant, avoidant, dependent and independent learning styles moderately.
- High school students with different genders have different learning styles. Female students are more competitive, collaborative, participant and dependent than male students. On the other hand, male students are more avoidant than female students.
- High school students who are in different grade levels have different learning styles. Grade 12 students are more independent than the other three grade level students.

- High school students' learning styles differ with respect to their school type. General and science and English-medium high school students are more collaborative than vocational high school students. Also, vocational high school students are more avoidant than general and science and English-medium high school students. In addition, general and science and English-medium high school students are more dependent than vocational high school students.
- High school students do not have deep understanding and awareness about how they learn the best. Therefore, most of the students are aware of their learning styles at a certain extent.
- Teachers do not have enough and detailed information about learning styles and the characteristics of their students. Therefore, teachers are not exactly aware of their students' learning styles.
- Many teachers ignore some of their students' learning style preferences in instruction. Besides, they consider their students' learning styles at a certain extent, but not all the learning styles are properly considered in their instruction.

In the light of the research results, it can be stated that high school students mostly have competitive and collaborative learning styles in North Cyprus. Also, those students' learning styles differ with respect to their gender, grade level and school type. Furthermore, high school students and their teachers are partly aware of students' learning styles. Besides, teachers do not consider their students' all learning styles properly in their instruction.

5.3 Recommendations

In the light of the findings, the following recommendations are proposed for high schools about learning styles:

- While designing curricula, Ministry of National Education, Youth and Sports can integrate activities for all learning styles into the programs.
- It is the fact that students prefer to learn in different ways. Therefore, teachers should meet with the versatility of students' learning styles in their instruction. Therefore, they should be well-equipped with the necessary knowledge about learning styles.
- In-service teacher training programs can be organized to inform teachers about students' learning styles and teaching methods which are based on learning styles.
- Teachers can use learning style instruments to determine their students learning styles at the beginning of the academic year. Thus, they can organize their instruction according to different learning styles which their students have.

The following recommendations for future research are introduced below:

- For further studies, teachers' consideration of their students' learning styles in their instruction can be investigated by using observation technique.
- Further research could be conducted to find out if high school students' learning styles vary depending on culture.
- Further research could be conducted with primary school students to identify their learning styles and primary school teachers' consideration of their students' learning styles.

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APPENDICES

Appendix A: Varimax Rotated Component Matrix

	Component					
	1	2	3	4	5	6
q1s1	.678					
q2s2					.560	
q3s3		.474				
q4s4	.508					
q5s5				.659		
q6s6	.457		.343			
q7s1						.401
q8s2		-.400			.479	
q9s3		.528				
q10s4	.513					
q11s5				.677		
q12s6	.514	.366				
q13s1						.471
q14s2				.316		
q15s3		.599				
q16s4	.624					
q17s5				.718		
q18s6			.530			
q19s1						.346
q20s2					.603	
q21s3	.326	.404				
q22s4	.529					-.308
q23s5	.786					
q24s6	.682					
q25s1						.336
q26s2					.669	
q27s3		.557			.378	
q28s4					.390	
q29s5	.392		.462			
q30s6		.673				
q31s1	.559					
q32s2						.618
q33s3		.456				

q34s4	.468	.342				
q35s5				.483		
q36s6		.435	.486			
q37s1						.496
q38s2					.359	
q39s3						
q40s4	.528					
q41s5	.556					
q42s6	.340		.397			
q43s1	.762					
q44s2	.355					
q45s3	.609					
q46s4	.638					
q47s5			.552			
q48s6			.562			
q49s1	.456					
q50s2						
q51s3	.497					
q52s4	.731					
q53s5	.421					
q54s6			.582			
q55s1	.396					
q56s2						.462
q57s3		.550				
q58s4	.637					
q59s5	.551					
q60s6			.372			

Appendix B: Equamax Rotated Component Matrix

	Component					
	1	2	3	4	5	6
q52s4	.673					
q58s4	.544					
q16s4	.532					
q22s4	.522					
q45s3		.361				
q10s4	.491					
q46s4	.476					
q13s1					.357	
q59s5				.302		
q4s4	.413					
q40s4	.404					
q15s3		.625				
q57s3		.571				
q9s3		.549				
q27s3		.539				
q3s3		.505				
q21s3		.449				
q33s3		.448				
q34s4	.374					
q54s6			.599			
q48s6			.596			
q36s6			.514			
q18s6			.495			
q6s6			.423			
q60s6			.411			
q42s6			.404			
q17s5				.720		
q11s5				.699		
q5s5				.656		
q35s5				.497		
q53s5				.321		
q32s2					.515	
q37s1					.505	

q7s1					.449	
q56s2						.322
q55s1					.408	
q25s1					.398	
q19s1					.362	
q49s1					.335	
q26s2						.647
q20s2						.629
q2s2						.574
q8s2						.475
q38s2						.402

Appendix C: Student Questionnaire and

Grasha and Reichmann Learning Style Scale

GRASHA VE REICHMANN ÖĞRENME STİLLERİ ÖLÇEĞİ (Türkçe sürümü)

Sevgili Öğrenci,

Lise öğrencilerinin öğrenme stillerini saptamak amacıyla bir araştırma yapılmaktadır. Öğrenme stilleri, bireylerin öğrenmeye yönelik eğilimlerini ya da tercihlerini gösteren özelliklerdir. Elinizdeki envanter, bu araştırma için sizden gerekli olan bilgileri toplamak amacıyla hazırlanmıştır. Envanterde, her bir madde için öğrenmeye yönelik eğiliminizi ya da tercihinizi en iyi tanımlayan seçeneği (1, 2, 3, 4, 5) işaretleyiniz. Envanterdeki yanıt seçenekleri şunlardır:

1: Kesinlikle Katılmıyorum
2: Katılmıyorum
3: Kararsızım
4: Katılıyorum
5: Kesinlikle Katılıyorum

Araştırma sonuçlarının niteliği, sizin envanterdeki maddeleri gerçekçi ve içten biçimde yanıtlamanıza bağlıdır. Maddelerin doğru ya da yanlış yanıtları yoktur. Bu nedenle, envanterdeki maddeleri lütfen kendinize uyan bir biçimde yanıtlayınız ve yanıtsız madde bırakmayınız. Yanıtlarınız kesinlikle gizli tutulacak ve yalnız araştırma amaçlı kullanılacaktır.

Envanteri yanıtlamaya ayırdığınız zaman ve araştırmaya yaptığınız katkı için size çok teşekkür ederim.

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KİŞİSEL BİLGİLER

Cinsiyetiniz: Kız □ Erkek □

Sınıfınız: 9 □ 10 □ 11 □ 12 □

Okulunuz:

Genel Lise	□
Türk Maarif Koleji	□
Fen Lisesi	□
Meslek Lisesi	□
Anadolu Lisesi	□

Yönerge: Aşağıda verilmiş olan maddeleri okuyunuz. Her bir maddeyle ilgili katılma düzeyinizi (X) işareti ile belirtiniz.

	Kesinlikle Katılmıyorum	***Katılmıyorum***	***Kararsızım***	***Katılıyorum***	***Kesinlikle Katılıyorum***
	1	**2**	**3**	**4**	**5**
1. Derslerde sık sık hayal kurarım.					
2. Sınıf etkinliklerinde öteki öğrencilerle birlikte çalışmak sevdiğim bir şeydir.					
3. Öğretmenlerin öğrencilerden ne beklediklerini tam olarak açıklamalarını isterim.					
4. Öğretmenin ilgisini çekmede başarılı olmak için öteki öğrencilerle yarışmak gerekir.					
5. Derslerde konuları öğrenmek için benden ne istenirse yaparım.					
6. Ders konularıyla ilgili bilgileri çoğunlukla kitaptakiler kadar bilirim.					
7. Sınıf etkinlikleri genellikle sıkıcıdır.					
8. Ders konusundaki düşüncelerimi öteki öğrencilerle tartışmaktan zevk alırım.					
9. Öğretmenlerimin benim öğrenmem için neyin önemli olduğunu bana söylemelerine gereksinme duyarım.					

10. İyi bir not almak için öteki öğrencilerle yarışmak gerekir.	**1**	**2**	**3**	**4**	**5**
11. Her zaman öğretmenlerin önemli diye belirttiklerini değil, kendi önemli saydığım şeyleri çalışırım.					
12. Sınıfta ele alınan konularla ilgili öteki öğrencilerin düşüncelerini duymaktan hoşlanırım.					
13. Ödevlerin nasıl yapılacağı konusunda açık ve ayrıntılı bilgi edinmek isterim.					
14. Sınıfta, düşüncelerimi kabul ettirmek için öteki öğrencilerle yarışmak zorundayım.					
15. Derslere gitmeyi evde kalmaktan daha çok severim.					
16. Derslerimle ilgili birçok konuyu kendim öğrenirim.					
17. Derslerin çoğuna katılmak istemem.					
18. Öğrenciler, düşüncelerini birbirleriyle daha çok paylaşmaları için yüreklendirilmelidirler.					
19. Ödevlerimi, kesinlikle öğretmenlerimin bana söylediği yolu izleyerek yaparım.					
20. Kendi kendime öğrenebilme yeteneğime çok güvenirim.					
21. Derslerde dikkatimi toplamak benim için güçtür.					
22. Sınavlara öteki öğrencilerle birlikte çalışarak hazırlanmayı severim.					
23. Derslere katılmadan kendi kendime öğrenmeyi tercih ederim.					
24. Derslerde kendimi, herkesin birbirinin öğrenmesine yardım ettiği bir ekibin üyesi gibi hissederim.					
25. Öğretmenler öğrencilere ders projelerinde daha titiz danışmanlık yapmalıdırlar.					
26. Sınıfta başarılı olmak için öteki öğrencilerden daha üstün olmak gereklidir.					
27. Olabildiğince bir dersin bütün etkinliklerine katılmaya çalışırım.					
28. Derslerin nasıl yürütülmesi gerektiği konusunda kendi düşüncelerimi uygularım.					
29. Derslerimi yalnız geçebilecek kadar çalışırım.					
30. Ders notlarım, öğretmenin sınıfta söylediği hemen hemen herşeyi kapsar.					
31. Bütün ödevlerimi ilgi çekici olup olmadığını düşünmeden iyi yaparım.					
32. Bir konuyu öğrenmek, öğrencilerle öğretmenlerin işbirliği ile gerçekleşir.					
33. İyi planlanıp uygulanan dersleri tercih ederim.					

34. Ödevlerimi genellikle teslim günlerinden önce tamamlarım.	**1**	**2**	**3**	**4**	**5**
35. Derslerle ilgili projeleri ve ödevleri tek başıma yapmayı tercih ederim.					
36. Öğrencilere sınavların hangi konuları kapsayacağı tam olarak söylenmelidir.					
37. Öteki öğrencilerin sınavlarda ve ödevlerde ne kadar başarılı olduklarını bilmek isterim.					
38. Yapılması zorunlu ödevlerin yanı sıra isteğe bağlı ödevleri de yaparım.					
39. Bir şeyi anlamadığım zaman onun ne olduğunu ilk önce kendim bulmaya çalışırım.					
40. Derslerde yanımda oturan kişilerle konuşup eğlenmeye çalışırım.					
41. Derslerde küçük grup etkinliklerine katılmaktan hoşlanırım.					
42. Öğretmenlerden tahtaya konunun ana çizgilerini ya da konuyla ilgili notlar yazmalarını					
43. Öğretmenlerimin yaptığım iyi çalışmalar için bana daha iyi tepkiler vermelerini isterim.					
44. Derslerde çoğu zaman sınıfın ön sıralarında otururum.					

Appendix D: Student Interview Questions

Bu görüşme sizlerin nasıl öğrenmeyi tercih ettiğinizle ilgili görüşlerinizi ortaya çıkarmak amacındadır. Lütfen sorulara içtenlikle cevap veriniz. Verdiğiniz bilgiler yalnızca araştırma için kullanılacaktır. Katıldığınız için teşekkürler.

1. Ders çalışmada ve derslerle ilgili öğrenmeleri gerçekleştirmede ne tür yolları ve etkinlikleri tercih eden bir yapıya ya da özelliğe sahipsin?

2. Derslerde etkin olmaktan, çalışmalara katılmaktan hoşlanıyor musun, yoksa sınıfiçi etkinlikler ilgini çekmiyor ve sıkılıyor musun?

3. Ders çalışmada ve öğrenmede öğretmenin söylediklerine sıkı sıkıya bağlı mı hareket ediyorsun, yoksa kendi tercih ettiğin öğrenme yollarını mı izliyorsun?

4. Derslerde her zaman arkadaşlarından daha başarılı olmak, onların ve öğretmenlerinin övgüsünü almak senin için ne ölçüde önemli? Arkadaşlarınla işbirliği yaparak onlarla görüş alışverişinde bulunarak çalışmak ve öğrenmek, grup ödevi yapmak senin tercih ettiğin öğrenme yolları ve etkinlikleri midir?

Appendix E: Teacher Interview Questions

Bu görüşme sizlerin, öğrencilerinzin nasıl öğrenmeyi tercih ettikleriyle ilgili görüşlerinizi ortaya çıkarmak amacındadır. Lütfen sorulara içtenlikle cevap veriniz. Verdiğiniz bilgiler yalnızca araştırma için kullanılacaktır. Katıldığınız için teşekkürler.

1. Öğretmen olarak öğrencilerin ders çalışma ve öğrenmede tercih ettikleri yolları ve etkinlikleri bilmenin önemli olup olmadığı ile ilgili düşünceniz nedir? Sınıfınızda ders çalışma ve öğrenme bakımından hangi özelliklere sahip öğrencileriniz var?

2. Sizinle ve arkadaşlarıyla görüş alışverişinde bulunanlar var mı?

3. Sınıftaki etkinliklere ne ölçüde katılıyorlar?

4. Verdiğiniz ödevleri tek başlarına mı yoksa grup olarak mı yapmayı tercih ediyorlar?

5. Her zaman en iyi ödevi yapmak ya da en yüksek notu almak isteyen öğrencileriniz var mı?

6. Öğrencileriniz ne ölçüde sizin yönlendirmenize gereksinme duyarlar?

7. Öğrencileriniz ne ölçüde nasıl çalışacaklarına ve öğreneceklerine kendileri

karar veriyorlar?

8. Derslerinizde öğrencilerinizin ders çalışma ve öğrenme ile ilgili özelliklerini ne ölçüde göz önünde bulunduruyorsunuz? Buna dönük neler yapıyorsunuz? Bulunduramıyorsanız, nedenleri nedir?