# 42-The effects of language learning strategies instruction based on learning styles on reading comprehension[1]

**Nazan Müge UYSAL[2]**

**Kadir Vefa TEZEL[3]**

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## Abstract

This article aims to reveal the results of an experimental study aiming to identify the effects of language learning strategies instruction (LLSI henceforth) based on learning styles on reading comprehension of EFL learners at the preparatory school of a state university in Turkey. 52 preparatory school students were given strategy instruction based on learning styles throughout an entire learning level (5 weeks) to help improve their reading comprehension ability. For that purpose, two cognitive learning strategies, namely note-taking and summarizing, were taught to learners. At the beginning of the study, students' learning styles were identified using The Kolb Learning Style Inventory (Version 3.1, Kolb & Kolb, 2005b). The reading course that incorporated strategy instruction included teaching and practicing note-taking and summarizing strategies which match with identified learning styles. To help maximize the benefit of strategy instruction based on learning styles, the 4MAT Model (McCarthy, 1990) which includes four basic quadrants, each representing a learning style, was used for planning classes and learning activities. The effects of LLSI based on learning styles were analyzed through a pretest- posttest design. In order to assess to what extent reading strategies instruction based on learning styles increased students' comprehension of reading texts in the experiment group, paired sample t-test was used. On the other hand, the differences between the experiment and the control group were examined using independent sample t-test. The results showed that there was statistically significant difference between the post test results of the experiment and the control groups and LLSI was effective in terms of improving students' reading ability and increasing their comprehension of reading texts.

**Keywords:** Language learning strategies, reading comprehension, the 4Mat Model, learning styles

# Öğrenme stillerine dayalı dil öğrenme stratejileri eğitiminin okuduğunu anlama becerisine etkisi

Bu çalışmada, Türkiye'de bir devlet üniversitesinde İngilizce hazırlık eğitimi alan öğrencilerle gerçekleştirilmiş olan öğrenme stillerine dayalı dil öğrenme stratejisi eğitiminin öğrencilerin okuduğunu anlama becerisine etkisinin araştırıldığı bir deneysel çalışmanın sonuçları aktarılmıştır. Okuduğunu anlama becerisinin geliştirilmesi amacıyla çalışmada yer alan 52 hazırlık sınıfı

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[2] Dr. Öğr. Üyesi, Bolu İzzet Baysal Üniversitesi, Yabancı Diller Yüksekokulu, Mütercim Tercümanlık Bölümü (Bolu, Türkiye), mugenazan@hotmail.com, ORCID ID: 0000 0001 8983 4367 [Araştırma makalesi, Makale kayıt tarihi: 05.09.2020-kabul tarihi: 20.11.2020; DOI: 10.29000/rumelide.839149]

[3] Dr. Öğr. Üyesi, Bolu İzzet Baysal Üniversitesi, Eğitim Fakültesi, Yabancı Diller Eğitimi Bölümü (Bolu, Türkiye), vefa2000@gmail.com, ORCID ID: 0000 0002 2636 1221

öğrencisine 5 haftalık bir süre boyunca (bir kur) iki adet bilişsel öğrenme stratejisini (not alma ve özetleme stratejileri) içeren bir strateji eğitimi verilmiştir. Çalışmanın başlangıcında, öğrencilerin öğrenme stillerinin belirlenmesi için Kolb Öğrenme Stili Envanteri (3.1 Versiyonu, Kolb & Kolb, 2005b) kullanılmıştır. Stillere dayalı strateji eğitimini oluşturan derslerde okuduğunu anlama becerisinin geliştirilmesi için not alma ve özetleme stratejileri öğretilmiş ve bu stratejilerin kullanılmasına yönelik uygulamalar yapılmıştır. Okuma derslerinin farklı öğrenme stillerine sahip öğrencilere hitap edebilmesi ve öğrencilerin strateji eğitiminden mümkün olduğunca fazla fayda sağlayabilmeleri için dersler 4 MAT modeline (McCarthy, 1990) uygun olarak tasarlanmıştır. Bu eğitim modelinde dört temel koordinat ekseni yer almaktadır ve bu eksenlerin her biri bir öğrenme stilini temsil eder. Öğrenme stillerine dayalı öğrenme stratejisi eğitiminin okuduğunu anlama becerisine etkisini analiz etmek amacıyla ön test son test kontrol gruplu araştırma deseni kullanılmıştır. Stillere dayalı strateji eğitiminin, deney grubunda yer alan öğrencilerin okuduğunu anlama becerisine etkisini ölçmek için de ikili örneklem t testi kullanılmıştır. Deney grubu ve kontrol grubu arasındaki farkın değerlendirilmesi bağımsız örneklem t testi ile yapılmıştır. Araştırmanın sonuçları, deney grubu ve kontrol grubu arasında anlamlı derecede fark olduğunu ve stillere dayalı strateji eğitiminin öğrencilerin okuma becerilerinin geliştirilmesinde ve okuma metinlerini kavramalarının ilerletilmesinde etkili olduğunu göstermiştir.

**Anahtar kelimeler:** Dil öğrenme stratejileri, okuduğunu anlama becerisi, 4Mat Modeli, öğrenme stilleri

## 1. Introduction

The current age, which is also interchangeably referred to as the *computer age* or *information era*, is characterized by the ease that individuals have to instantly access knowledge that used to be more difficult to reach. In this information age, access to sources of knowledge has become easier than ever. The ease of access to the vast amount of sources has endorsed once again the importance of reading. In this rapidly changing world, reading is a must to access knowledge more than it has always been.

In countries where English is taught as a foreign language, reading plays an important role in learning because of certain reasons. First of all, many language learners consider reading as a significant goal when learning a foreign language because they want to be able to read for information or pleasure in the target language or they need to read fluently for study purposes or for their careers. Second, exposure to written texts helps learners in their language learning experiences in general. Good readers are potentially good writers and being exposed to written texts in the target language means being familiar with different genres, ways of organizing content, vocabulary, idioms, syntactic structures, and the like (Blanton, Moorman & Wood, 1990; Grabe, 1991, 2002, 2004). Therefore, reading increases competence in the target language. Third, comprehending written texts is a significant way of doing research for students in academic contexts. In order to fulfill certain assignments or tasks like holding a discussion, preparing a project or research paper or writing a report on a specific topic, the learner should be able to reach relevant sources and read in a fluent way to comprehend the messages within these sources of information.

Although it is admitted that reading is a vital skill for learning a foreign language, most of the students generally have difficulty in comprehending reading texts. In most EFL contexts, the difficulty of comprehension is underestimated and reading is taught in a limited amount of time without the integration of various ranges of texts. Mainly intensive reading is done through texts that exist in the

course book selected and used by the instructor/ school, and an insignificant number of texts from outside. All these may lead to comprehension problems for learners.

Our understanding of the nature of reading both in terms of theory and practice has changed significantly as we have realized the complexities involved in it. In the mid- to late 1960s reading was seen as a reinforcement for improving learners' verbal skills. During the popularity of the audio-lingual method, the struggle to teach reading was mainly based on using reading to analyze grammar and vocabulary, or to practice communication. This view, later, changed due to two major concerns-changing ESL/EFL institutional needs and changing views of reading theory. In the late 1960s, there appeared a fresh need for improving reading ability of learners: ESL students were in need of being a fluent ESL reader for higher education academic skills. However, reading was generally neglected in the language teaching approaches of the time- taking the audio-lingual method as an example; the main emphasis was on developing oral skills. Through the 1970s, several researchers started to argue for the greater importance of reading. As a result of the research and persuasive arguments such as that of Goodman and Smith (1967), "a psycholinguistic model of reading" emerged, which claims that reading is not primarily a process of picking up information from the page word-by-word or letter-by-letter. Rather it was considered as an active process of comprehending in which readers do not focus on every word but read in a rapid manner but at the same time employ certain strategies such as using prior knowledge, making predictions about the upcoming information and confirm predictions, and so on. Whereas 1970's was a time of transition from one dominant view to another, 1980's was a decade of extension in terms of reading theory and practice (Grabe, 1991). With the emergence of the interactive models of reading known as bottom-up and top-down processing, our understanding concerning the mental activities taking place in readers' minds shifted. Researchers recognized that these two perspectives are complementary to each other; one is not over the other.

Kaplan (2002) suggests that since comprehension is one of the most significant factors in the reading process, it deserves the due attention. It has been noted that comprehension is vital for general understanding, one of the basic reading purposes. In most L2 reading instruction, reading for general understanding, the main purpose of which is to understand main ideas and a subset of supporting ideas and information, is the primary goal for reading. Although it is often noted as *general*, reading for general understanding is not as easy to carry out fluently as it seems. "Under normal processing rates, it requires a very large recognition of words, a high level of automaticity, a rapid reading speed for text-information integration and the ability to comprehend the overall text in a limited amount of time" (Kaplan, 2002, p. 50). The fact that most foreign language learners generally experience difficulty in reading comprehension should not be a surprise then. Eskey (2005) points out that problem and states that the main difficulty in reading lies somewhere in between decoding and comprehension processes. In decoding, which is the bottom-up process, "the reader is assumed to decode precisely (in the case of English) from left to right, from letters into words, and from words into larger grammatical units in retrieving the writer's meaning, step by step from the text" whereas in comprehending, which is the top-down process, the reader plays a "psycholinguistic guessing game and do not decode in a precise manner but attack the text with expectations of meaning developed before and during the process, take in whole chunks of text" to interpret the meaning or confirm expectations (Eskey, 2005, p. 566). The process from text to brain (decoding) should be accompanied by from brain to text process (comprehension).

Research has shown that one of the most effective ways to increase comprehension rate and go beyond decoding process is giving strategy instruction to learners (Eskey, 2005; Grabe, 1991, 2002, 2004;

Shih, 1992) because one of the critical components for reading comprehension is the ability to use proper reading strategies. Moreover, learners need certain amount of time to be fluent and proficient in the foreign language reading process. Providing learners with strategy instruction is a way to lessen this long development period as learning strategies can help learners become more independent, autonomous, and strategic (Allwright, 1990; Oxford, 1986, 1990, 2003; Oxford & Crookall, 1989). In foreign language classrooms, one of the most popular suggestions given by teachers to learners is to read more and more to be good at reading but this generally brings the fact that learners get more and more discouraged as they feel they cannot comprehend the texts even if they read a lot. That's mainly because learners do not approach reading in a strategic manner. Reading is not a matter of following the lines by eyes only. Without comprehension, gazing at a text can never serve a purpose. Certain strategies can help learners to become better readers. To that end, *LLSI* seems to be a promising tool to help teachers increase their learners' comprehension of reading texts. Therefore, providing strategy instruction should be an essential part of foreign language reading classrooms. Moreover, most language educators and researchers supported the idea that LLSs need to be dealt with from the perspective of learning styles so as to increase the effectiveness of LLSI (Cohen& Weaver, 2005; Oxford, 1990). In parallel with this view, the present study aims to focus on the effects of LLSI based on learning styles on reading comprehension of learners. The second section of the study deals with the theoretical background of LLSs; the relationship between LLSs and learning styles and the 4MAT model which is a system for designing instruction procedures in a way that appeals to all types of learners as it integrates the ideas of learning tendencies- styles- and brain hemispheric preferences, and experiential learning theory. In the third section, the methodology of the study (information on participants, data collection instruments, learning strategy instruction procedure, and data analysis) is presented. In the fourth section, the analysis of the results is revealed, which is followed by the conclusion and discussion part.

## 2. Theoretical background of LLSs

The recognition of the importance of the learner as an active agent in the language learning context is the starting point of the emergence of the LLSs. The emerging importance of LLSs is a result of the disillusionment with utilizing solely language teaching methods in language teaching. In the methods era, the focus was to find a method that would teach English effectively to all students. But, this tendency had a serious flaw: it did not recognize individual learning differences. As the idea that the learner has an active role in the learning process as an agent becomes more prevalent, the roles of different stakeholders in the learning process such as the learner, the teacher, the teaching techniques and principles used have all been taken into consideration and the effort to devise the best method which can work for all learners and learning contexts have been questioned. Although this effort has not come to an end, the introduction of learner-centered innovations into the foreign language education discourse directed the main focus to the fact that learners and learner acts are also significant in the learning process.

LLSs are one of the learner-centered innovations that have shaped research and practice in the field of learner development starting from the 1970s. LLSs improve learning in order to complete pedagogical tasks by fostering learner's capacity to assume a more active, reflective, and self-directed role, which makes it process-oriented as well. Except for learning strategies, all the individual factors like aptitude, motivation, intelligence or styles have been accepted as influential on the learning process, but they all operate below consciousness level and are more difficult to change. Yet, with the acceptance of LLSs as a research field and as one of the factors affecting success or failure, a new sort of learner difference

which, instructors have the opportunity of reaching and changing, has been discovered (Wenden, 2002).

As learners are considered making conscious attempts to influence their own learning, from the perspective of LLS theory, language learning becomes a cognitive process resembling other kinds of learning (Griffiths, 2004). In the 1990s, based on cognitive theory, O' Malley and Chamot (1990) proposed an information processing theory of memory that explains the way second languages are learnt and the contribution of strategies to this process. In this model, language learning is likened to the learning of procedural knowledge or other complex cognitive skills (as cited in Wenden, 2002, p. 43). In this complex system, the mental operations that are responsible for encoding incoming information are referred to as processes whereas the changes that form as a result of these processes are called organizations of knowledge. LLSs help the organization of information by performing the function of facilitating the acquisition, storage, elaboration, retrieval or use of information (O'Malley& Chamot, 1990, p. 18; Wenden& Rubin, 1987). Thus, LLSs are theoretically based on cognitive science, which accepts human cognition as the key to active processing of information.

Besides cognitive theory, research related to the features of good or successful language learners also contributed to the development of LLSs. Earlier studies regarding learners tend to investigate *interlanguage* concept (Corder, 1967; Selinker, 1972). Corder argued that learner errors actually signal the attempts to develop a language system; therefore, errors should be seen as indicators of improvement. Selinker, in the 1970s, called this intermediate system interlanguage and again errors of learners were regarded as evidence of efforts on the way of learning a new language. These views were significant in the sense that they reflect the attention from the search of a *one-fits-all method* to the learner and his/her attempts to learn a language. These led to a research thrust in the 1970's at discovering what type of deliberate actions (later called strategies) learners employ while learning a new language and how they employ these actions. Then, researchers like Rubin (1975), Stern (1975), Naiman, Froanhlich, Stern & Toedesco (1978) started to conduct studies on good, or successful, language learner, that is, in Wenden's (2002, p. 36) terms, "a learner who could approach the task of language learning competently and effectively". Therefore, it is clear that the primary educational goal of the early studies on learner strategies was the successful language learner and what these learners can teach us (Cohen, 2005). All these studies have helped researchers see the significance of shifting the attention to the learner in assisting him/her to learn on his own and LLSs has gained popularity in foreign/second language learning.

The most prevalent LLS taxonomies existing in the language learning literature have come from Rubin (1981), O'Malley & Chamot (1990), and Oxford (1990). Of all these classifications, Oxford (1990) provides the most comprehensive framework of LLSs. Oxford's taxonomy consists of two major LLS categories, Direct and Indirect Strategies. Direct strategies are those behaviors that directly involve the use of the target language and facilitate language learning. On the other hand, indirect strategies are those which enhance general management of learning. Cognitive strategies come under the category of direct strategies in this taxonomy. This group of strategies can be defined as the cognitive tools used for manipulation or transformation of the target language by the learner. They help learners comprehend the new material allowing them to formulate a mental processing/structure of language input and analyze language messages, and produce relevant outputs. Note-taking and summarizing strategies included in this study are examples of cognitive strategies.

Although LLSs have proved to be an effective way of improving foreign language learning, some factors such as the duration of the strategy instruction procedure, raising strategy awareness of learners, strategy practice, and learning style preferences of learners influence the extent to which learners take advantage of these strategies in the classroom. Among these factors, one of the most important has been reported as matching strategy instruction with learners' learning style preferences (Cohen & Weaver, 2005; Green & Oxford, 1995; Griffith, 2004; Oxford, 1990). In order for learners to be aware of the usefulness of LLSs and make the most of them, learners should be instructed regarding strategy use. If strategy instruction is provided with activities addressing different learning styles, it will make instruction more effective and meaningful for each and every learner (Cohen& Weaver, 2005; Ehrman, Leaver& Oxford 2003; Oxford, 1990).

### 2.1. LLSs and learning styles

Starting from the 1980s, the investigation concerning LLSs issue has multiplied. In the 1980s, researchers tried to define and classify the terminology. In the 1990s, there was a shift from simply categorizing LLSs to experimenting with them in the classroom. Meanwhile, most of the studies conducted in the area of LLSs and learning styles generally included the ones that investigated either the relationship between these two terms or the relationship between LLSs and some other individual differences such as motivation and gender, or learner preferences of styles and strategies.

The 2000s became the decade when styles and strategies were combined and started to be thought as one entity as styles and strategies-based instruction. That's why, most language educators and researchers supported the idea that learning styles should be taken into consideration when discussing LLSs. In other words, the *one-size-fits-all approach* started to become out of fashion regarding LLSI (Cohen& Weaver, 2005; Oxford, 1990).

Griffiths (2007) conducted a study to investigate to what extent teachers' and learners' perceptions regarding LLSs intersect. The results of her study showed that there was a high level of accord (71 percent) between the strategies frequently used by the learners and those teachers regard as highly important. Another study, conducted by Cabi (2012), investigating the effect of learning strategies and gender on learning styles of participants demonstrated that gender has no significant effect on learning styles and there is no significant effect of learning strategies on learning styles of participants. Morris (2006) analyzed the effect of strategy teaching in schools and mentioned that the traditional school system favors left-brained learners more as the majority of the teachers that take part in this study were left-brained themselves. Right-brained learners cannot make the most of strategy instruction (as cited in Oflaz 2011).

Learning style was first introduced as a term by Herbert Thelen while he was discussing group dynamics in the 1950s. It will not be wrong to say that the idea of individualized learning styles reemerged and started to become popular in the 1970s. Since then, different learning style dimensions have been identified. Table 1 below provides a summary of the most recognized learning style classifications in the field of language teaching with their brief definitions.

Among all these dimensions which define what the term learning style is and how it can be classified, one classification stands out with one of the best known educational theories in higher education- *experiential learning theory* (Kolb & Kolb,2005a) which incorporates the practical, educational and

theoretical base regarding learning styles. In this study, Kolb's classification of learning styles was used in order to assess individualized learning styles of the learners.

Though strategy instruction is documented to be more effective when adjusted for students' learning styles, experimental studies aiming to give strategies based instruction are very limited in number, and LLSI has had mixed results, as noted by Dörnyei (1995) and Oxford (1990). One main reason for this might be that learners' diversity of learning styles and needs were not systematically taken into consideration while strategy instruction was given. In this sense, it is significant to identify learners' preferred learning styles and design LLSI accordingly.

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|---|---|
| The Seven Multiple Intelligences (Gardner) | |
| Verbal/Linguistic | ability with and sensitivity to oral and written words |
| Musical | sensitivity to rhythm, pitch, and melody |
| Logical/Mathematical | ability to use numbers effectively and to reason well |
| Spatial/Visual | sensitivity to form, space, color, line, and shape |
| Bodily/Kinesthetic | ability to use the body to express ideas and feelings |
| Interpersonal | ability to understand another person's moods and intentions |
| Intrapersonal | ability to understand oneself: strengths weaknesses |
| Field Independent and Field Dependent Learning Styles (Witkin & Goodenough) | |
| Field Independent | learns more effectively sequentially, analyzing facts |
| Field Dependent | learns more effectively in context (holistically) and is sensitive to human relations |
| Analytic and Global Learning Styles (Kirby & Scmeck) | |
| Analytic | learns more effectively individually, sequentially, linearly |
| Global | learns more effectively through concrete experience and interaction with other people |
| Reflective and Impulsive Learning Styles (Kagan) | |
| Reflective | learns more effectively when given time to consider options |
| Impulsive | learns more effectively when able to respond immediately |
| Kolb Experiential Learning Model (Kolb) | learns more effectively when able to: |
| Converger | perceive abstractly and process actively |
| Diverger | perceive concretely and process reflectively |
| Assimilator | perceive abstractly and process reflectively |
| Accomodator | perceive concretely and process actively |
| Myers-Briggs Type Indicator (Myers & Briggs) | learns more effectively: |
| *Extraversion-Introversion* | |
| Extraverted | through concrete experience, contacts with others |

| | |
|---|---|
| Introverted | in individual, independent learning situations |
| *Sensing-Perception* | |
| Sensing | from reports of observable facts |
| Intuition | from meaningful experiences |
| *Thinking-Feeling* | |
| Thinking | from impersonal and logical circumstances |
| Feeling | from personalized circumstances |
| *Judging-Perceiving* | |
| Judging | by reflection, deduction, analysis, and processes that involve closure |
| Perceiving | through negotiation, feeling, and inductive processes that postpone closure |
| Right-and Left- Brained Learning Styles | learns more effectively through: |
| Right-Brained | visual, analytic, reflective, self-reliant learning |
| Left-Brained | auditory, global, impulsive, interactive learning |

**Table 1:** A Brief Overview of Some Learning Styles (Reid, 1998, p. xi)

### 2.2. The 4MAT model

Taking Kolb's experiential learning theory and the concept of learning styles as a theoretical base, Bernice McCarthy developed a system which consists of a circle divided into four quadrants, each representing a learning style: Diverger (Innovative), Assimilator (Analytic), Converger (Common Sense) and Accommodator (Dynamic learners). This system is called the 4MAT. 4MAT is a process for designing instruction procedures in a way that appeals to all types of learners and gives instructors the opportunity of engaging learners in learning while informing them as it allows for practice and creative use of material learned within each lesson. The movement around the cycle [Diverger (Innovative), Assimilator (Analytic), Converger (Common Sense) and Accommodator (Dynamic learners)] suggests all learners learn in their natural preferences, but at the same time the 4Mat model encourages learners to develop skills in other three styles. That's why, McCarthy states that "4MAT offers a way to accommodate, as well as challenge, all types of learners, by appealing to their accustomed learning styles while stretching them to function in less comfortable modes" (McCarthy, 1990, p. 31; McCarthy, Germain & Lippitt, 2002). The cycle is the same as the Kolb's experiential learning model but gives more insights concerning its application in the classroom.

To make an overview of the model, McCarthy reminds that actually as human beings, we all feel, reflect, think, and do while learning, but on the way of learning, every individual tend to acquire and process stimuli or information in a different way with a different pace. This uniqueness of us affects the way we perceive new information while learning. These differences make up learning styles. While exploring learning style connections, McCarthy also became interested in the research on right brain / left brain dominance and human behavior, which influenced her ideas about the system (Berman, 1992). The two hemispheres are known to differ in their functions of processing information. The right

brain is known to gather information in a holistic manner catching nonverbal clues better whereas the left brain follows a linear, sequential and logical manner (Wilkerson & White, 1988, p. 357-358). Although left and right parts of the brain possess certain special functions, recent studies reveal that they work in harmony all the time. Therefore the idea of categorizing people rigidly as right-brained or left-brained has been questioned as neuroscience studies reveal new findings (Wolfe, 2001). Still, the fact that brain hemispheres are lateralized for different functions is critical when it comes to designing learning materials and facilities in order to create an optimal learning environment.

As stated earlier, the model consists of four quadrants; each part represents one of the four major learning styles. In addition to this dimension, information concerning right and left hemispheric functions of the brain is integrated into the model, making up an eight-step circle (McCarthy et.al., 2002). Figure 1 shows the eight-step learning cycle of the model. If the learning context is designed in accordance with the circle suggested by McCarthy, the learning style preference of each and every individual will be addressed at least one-fourth of the teaching period and both hemispheres of the brain will be integrated into teaching making the learning atmosphere more brain-compatible. When the remaining parts of the cycle is applied and practiced by the instructor, the learner needs to stretch herself/himself to learn and deal with tasks in other ways, thereby developing a broader range of learning skills (Wilkerson & White, 1988). In other words, this full circle instruction will give learners the opportunity to shine 25% of the time and be challenged in the other 75%, and this is how an optimal learning atmosphere functions.

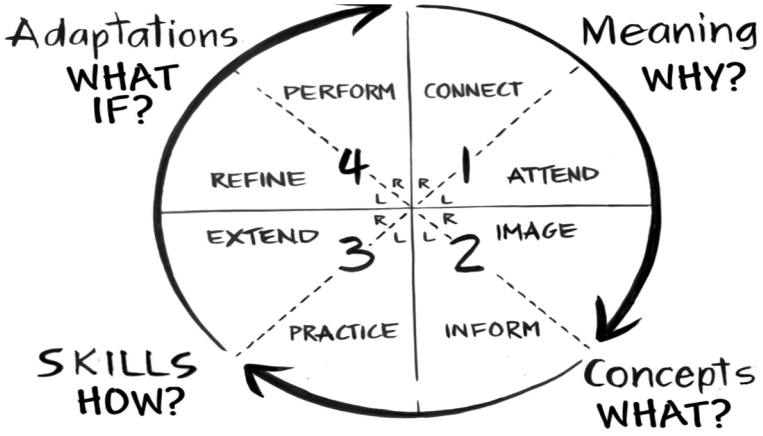


**Figure 1:** The eight-step learning cycle of the 4MAT Model (About Learning, 2018)

## 3. Methodology of the present study

Realizing the importance of the gap in the field and intending to improve learner's reading comprehension ability, this experimental study was designed to devise effective instructional techniques to increase the reading comprehension rates of students at the preparatory school of a state university and to investigate the effect of LLSI based on students' identified learning styles on participants' reading comprehension.

The study aimed to seek answers to the following questions:

1. Does LLSI based on learning styles increase students' comprehension of reading texts?

2. To what extent are differences seen between students who receive LLSI based on learning styles and students who are taught reading without the inclusion of LLSI?

### 3.1. Participants

The participants involved in this study were B1 Level (based on Common European Framework) students studying at the preparatory school of a state university in Turkey. Out of 15 B1-Level sections at the school, two sections were chosen randomly as experiment and control groups. The experiment group was instructed by the researcher and the control group was chosen randomly out of the remaining groups. In each section, there were 26 students. In the experiment group, the number of female students was 18 and that of males was 8. The control group had 16 female students and 10 male students. Each level at the school lasted for 5 weeks with a total of 150 hours of intensive English teaching. Thus, the participants in this study had been studying English for 10 weeks (B1 Level) and the duration of the reading strategy instruction was five weeks.

### 3.2. Data collection

#### 3.2.1. Identification of student's learning styles

In order to assess the participants' learning styles, *The Kolb Learning Style Inventory* (Version 3.1, Kolb& Kolb, 2005b), which is a comprehensive model was used because Kolb's Learning Style Dimension is based on one of the best known educational theories in higher education- *experiential learning theory* (Kolb& Kolb, 2005a). The permission to utilize the inventory was obtained from Professor David Kolb.

#### 3.2.2. Selecting a taxonomy of LLSs

Among all the existing LLS taxonomies, Oxford (1990) provides the most comprehensive classification of LLSs developed so far. Therefore, regarding reading strategy instruction, *Oxford's LLS taxonomy* (Oxford, 1990) was taken as reference and *note-taking strategy* and *summarizing strategy* that belong to the cognitive strategies category in Oxford's LLS taxonomy were chosen and included in the strategy instruction.

#### 3.2.3. Selecting a teaching model compatible with students' learning styles

For the design of the lessons in the light of learning styles, the *4MAT Model* (McCarthy, 1990) was used because the 4MAT Model is based on Kolb's experiential learning theory, learning styles, and the hemispheric speacialization of the brain.

### 3.3. Reading strategy ınstruction procedure

The five-week strategy instruction included the presentation and practice of two cognitive strategies: note-taking and summarizing. The first three weeks were allocated for note-taking strategy instruction and the remaining two weeks were allotted for summary strategy instruction The courses for reading strategy instruction was designed according to the phases of the 4MAT Model: *Integrating experience with the "self"*; *Concept Formulation*; *Practice and Personalization;* and *Integrating Application and Experience* (McCarthy, 1990). Each LLS was taught using powerpoint presentations that covered information on how these strategies relate to the participants' daily lives, academic lives, and what the

basics of these strategies are. In this way, it was aimed to help learners *integrate the new experience with themselves*. Following this session, the focus of the class is formulated using presentations in order to make *concept formulation*. In this part, more specific information about how to use these strategies was taught through explanations and demonstrations. For the *practice and personalization* part, participants were asked to practice the new experience through individual/pair, or group work activities. To that end, various exercises were given to the participants. Finally, regarding *the integration of experience and application*, participants were expected to perform different tasks such as preparing written or oral homework or projects to be presented in the class.

### 3.4. Data analysis

To evaluate the effect of reading strategy instruction based on identified learning styles, this study included one experiment and one control group, and it was thus designed as an experimental research study. The effects of reading strategy instruction were analyzed through *a pretest-posttest design*. Two pre-tests were used in this study in order to indicate learners' knowledge level of the note-taking strategy and summarizing strategy before the instruction was given. These pre-tests were also used as post-tests after the instruction was completed. Before strategy instruction is given on each strategy, a pre-test was given to test the participants' knowledge on the LLS to be taught and comprehension of the reading text(s), note-taking, and summarizing strategies respectively. Following strategy instruction, the same test was given again, this time as a post-test to see the difference.

In order to assess to what extent LLSI based on learning styles increased students' comprehension of reading texts in the experiment group, a *paired sample t-test* was used as it clearly shows the differences within a group before and after the instruction period. The differences between the experiment and the control group were examined using *independent sample t-test* as it helps to make a comparison between two different groups to see the results before and after the instruction.

## 4. Results

### 4.1. The analysis of the pre-test and post-test results

Before teaching note-taking and summarizing strategies based on students' learning styles, two pre-tests were conducted, one of the tests included tasks related with the note-taking strategy use for the comprehension of a reading text and the other for summarizing strategy use to comprehend the reading material. The results of the pre-tests indicated that the participants in both groups had the same level of proficiency in reading comprehension. To see the differences after the instruction procedure, the same tests were administered as post-tests.

The first research question was as follows:

"Does LLSI based on learning styles increase students' comprehension of reading texts?"

In order to assess whether reading strategies instruction based on students' identified learning styles increased participants' comprehension of reading texts, paired sample t-test technique was used. In the experiment group, there were 26 students in the note-taking strategy test. According to the results of the analysis, it was found that there was a statistically significant difference between the pre-test and the post-test means [$t(25) = -13.719$, $p < 0.05$]. For the note-taking strategy test, the mean of the participants' pre-test results was 37.53 and the mean of the post-test results was 66.92, so it can be

concluded that note-taking strategy instruction proved to be effective in increasing participants' comprehension of reading texts (Table 2).

On the other hand, the number of students in the experiment group who took the test assessing summarizing strategy was 24. The analysis results indicated that there was a statistically significant difference between the pre-test and post-test means [t (23) = -12.362, p < 0.05]. As can be seen in Table 3, concerning the summarizing strategy test, the mean of the participants' pre-test results was 2.79 and that of the post-test was 7.54, which shows that summarizing strategy instruction increased participants' comprehension of reading texts.

**Table 2**: Paired Samples t-test for Note-taking Strategy Test of the Experiment Group

| | | N | $\overline{X}$ | S | df | t | p |
|---|---|---|---|---|---|---|---|
| Note-taking strategy results *Experiment group* | Pretest | 26 | 37.53 | 11.37 | 25 | -13.719 | .000 |
| | Posttest | 26 | 66.92 | 16.21 | | | |

(p < 0.5)

**Table 3:** Paired Samples t-test for Summarizing Strategy Test of the Experiment Group

| | | N | $\overline{X}$ | S | df | t | p |
|---|---|---|---|---|---|---|---|
| Summarizing strategy results *Experiment group* | Pretest | 24 | 2.79 | 1.76 | 23 | -12.362 | .000 |
| | Posttest | 24 | 7.54 | 2.08 | | | |

(p < 0.5)

Table 4 shows the results of the note-taking strategy test. 26 students took the test in the control group. The analysis results for the note-taking strategy test of the control group indicated that there was no statistically significant difference between the pre-test and post-test means of the participants in the control group [t (25) = - 1.617, p > 0.05]. In the control group, the mean value was 40.07 for the pre-test and the post-test mean was 42.73.

The number of students in the summarizing strategy test in the control group was 24. The analysis results for the summarizing strategy test of the control group revealed that there was no statistically significant difference between the pre-test and post-test means of the participants in the control group [t (23) = - 1.436, p > 0.05]. In the control group, the mean value was 3.27 for the pre-test and the post-test mean was 3.45. Table 5 shows these results.

**Table 4:** Paired Samples t-test for Note-taking Strategy Test of the Control Group

| | | N | $\overline{X}$ | S | df | t | p |
|---|---|---|---|---|---|---|---|
| Note-taking strategy results *Control group* | Pretest | 26 | 40.07 | 13.35 | 25 | -1.617 | .118 |
| | posttest | 26 | 42.73 | 11.22 | | | |

(p < 0.5)

**Table 5:** Paired Samples t-test for Summarizing Strategy Test of the Control Group

| | | N | $\overline{X}$ | S | df | t | p |
|---|---|---|---|---|---|---|---|
| Summarizing strategy results *Control group* | Pretest | 24 | 3.27 | 2.15 | 23 | -1.436 | .164 |
| | posttest | 24 | 3.45 | 2.15 | | | |

(p < 0.5)

The second research question was as follows:

"To what extent are differences seen between students who receive LLSI based on learning styles and students who are taught reading without the inclusion of LLSI?"

Independent sample t- test was conducted to analyze the pretest results of participants both for control group and experiment group. For note taking strategy, t value was found .738, and for summarizing strategy it was .843 at p< 0,05 . As can be seen in Table 6 and 7, according to analyses, there was no statistically significant difference between the participants in the control group and experiment group before reading strategy instruction was given.

**Table 6:** Independent Samples t-test for Note-taking Strategy Pre-test of the Experiment and Control Group

| | | N | $\overline{X}$ | S | df | t | p |
|---|---|---|---|---|---|---|---|
| Note-taking Strategy *Pretest* results | Control | 26 | 40.07 | 13.35 | 50 | .738 | .464 |
| | Experiment | 26 | 37.53 | 11.37 | | | |

(p < 0.5)

**Table 7:** Independent Samples t-test for Summarizing Strategy Pre-test of the Experiment and Control Group

| | | N | $\overline{X}$ | S | df | t | P |
|---|---|---|---|---|---|---|---|
| Summarizing strategy *Pretest* results | Control | 24 | 3.27 | 2.15 | 46 | .843 | .404 |
| | Experiment | 24 | 2.79 | 1.76 | | | |

($p < 0.5$)

To analyze to what extent differences are seen between students who receive reading strategy instruction based on their identified learning styles and students who are taught reading without the inclusion of reading strategy instruction on the basis of the identification of learning styles, an independent samples t-test was conducted. Only participants in the experiment group took reading strategy instruction in between the pre-test and post-test. Table 8 indicates the results of the statistical analysis conducted to identify the differences between the experiment and the control group. According to the analysis results, there was statistically significant difference between the reading comprehension level of two groups in the note-taking strategy test [$t (50) = -6.256$, $p < 0.05$]. For the note-taking strategy, the post-test mean for the control group was 42.73 while it was 66.62 for the experiment group.

For the summarizing strategy test, the number of participants in both groups was 24. The analysis of the summarizing strategy test results also showed a statistically significant difference between the experiment and the control group [ $t (46) = -6.677$, $p < 0.05$]. For the summarizing strategy, the post-test mean was 3.45 for the control group and 7.54 for the experiment group (Table 9).

**Table 8:** Independent Samples t-test for Note-taking Strategy Post-test of the Experiment and Control Group

| | | N | $\overline{X}$ | S | df | t | P |
|---|---|---|---|---|---|---|---|
| Note-taking strategy *Post-test* results | Control | 26 | 42.73 | 11.22 | 50 | -6.256 | .000 |
| | Experiment | 26 | 66.92 | 16.21 | | | |

($p < 0.5$)

**Table 9:** Independent Samples t-test for Summarizing Strategy Post-test of the Experiment and Control Group

| | | N | $\overline{X}$ | S | df | t | p |
|---|---|---|---|---|---|---|---|
| Summarizing strategy *Post-test* results | Control | 24 | 3.45 | 2.15 | 46 | -6.677 | .000 |
| | Experiment | 24 | 7.54 | 2.08 | | | |

($p < 0.5$)

## 5. Conclusion and discussion

As the most important component of a teaching context is the learner, it is vital that the learner be the main focus in teaching, and reaching the learner is the main issue for learning to occur. This brings us to the point that factors like gender, age, social status, motivation, attitude, aptitude, learning preferences, culture, and so on lead to differences in learners concerning language learning. This brings us to the point that what works for one learner might not work for another or a method or technique that proves to be effective in one context may not work well in another (Kumaravadivelu, 1994). As the most important component of a teaching context is the learner, it is preferable to diagnose the specific teaching context well and increase the opportunities which help all kinds of learners creating an all-embracing learning atmosphere. Taking LLSs, learning styles, and brain research into consideration while designing teaching is a way to create such a learner-centered context. The 4MAT Model serves as an effective guide to achieve this goal.

The main purpose of this study was to identify the effects of LLSI based on the learning styles on reading comprehension of participants. The results of the study indicated that LLSI based on learning styles is effective and it increases the reading comprehension of learners, thereby increasing their success at tests. In this study, learning styles of learners were identified through The Kolb Learning Style Inventory (Version 3, Kolb& Kolb, 2005b). LLSI included two cognitive LLSs, namely note-taking and summarizing. The 4 MAT Model was used as a guide for the design of the classes to address different learning styles while teaching LLSs. The effects of reading strategy instruction were analyzed through a pretest-posttest design. For the analysis of the data, paired sample t-test, and independent sample t-test techniques were used.

When the pre-test results of the experiment and the control group were analyzed, a statistically significant difference was not seen as expected and found whereas the post-test results of the two groups indicated that there was a statistically significant difference. This means that before the strategy instruction was given, the groups were almost at the same level. Yet, following the instruction period, the experiment group outperformed the control group.

This finding may, first of all, suggest that teachers can spend time and effort to be equipped with information concerning LLSs and learning styles, and they can design courses addressing different learning styles to teach and practice these strategies. In this sense, educating teachers in strategies, identifying strategies that certain groups of students' need and preparing a plan to incorporate these strategies as part of teaching, and making strategy instruction as part of foreign language teaching is essential. The findings of this study showed that reading strategies instruction based on learning styles is effective in increasing the reading comprehension of learners. This conclusion may have some implications for teachers and administrators.

First of all, besides being a teacher in the classroom, teachers can take the responsibility of being a researcher to be aware of their students' learning styles and meet their needs as much as possible. It is important that every learner has the chance to be taught in accordance with his/her learning style. However, learners should also be given the opportunity to stretch their learning preferences and improve themselves to learn in other ways as well. This is only possible in the classroom where teachers design their courses by addressing various learning styles.

Secondly, it is also important that every teacher has a teaching style just like every learner has a learning style but the important thing is that teachers can adopt their teaching styles so as to address all learners with different learning styles in a classroom. In this sense, teachers should be aware of their own teaching styles first so that they can make objective reflections in terms of their teaching practices. What is more, maximizing student learning requires being sensitive to different learning preferences, addressing both the left and the right hemispheres of the brain and accordingly integrating a variety of instructional methods and materials in a learning context.

Another significant implication is that it is better if teachers spend time and effort to be equipped with information concerning LLSs and design courses to teach and practice these strategies since LLSs are an important component for training effective and independent learners. O'Malley& Chamot (1990) report that the literature on LLS in second language acquisition depends on studies aiming to identify the features of effective learners. The results of the studies on the *good language learner* showed that certain strategies do contribute to language learning. When learners are equipped with different LLSs, they not only learn special thoughts or behaviors that can help them comprehend, learn, and retain new information but they are also given the chance to deal with difficult academic tasks themselves in a strategic manner.

Moreover, the administrators can also take the responsibility of helping teachers to apply this research in their classrooms. They can help teachers design courses in the light of learning styles and incorporate strategies instruction into their curriculum. In order for this research to be used in classrooms, certain adaptations can be made in an attempt to develop lesson plans and syllabi including LLSI and learning styles in different learning contexts.

The current study showed that LLSI based on learning styles is an effective way of improving learners' reading comprehension skills. Future studies aiming to explore the effects of LLSI based on learning styles might be longer in terms of the training procedure. In this study, the instruction procedure lasted five weeks. If this period had been longer, strategy instruction could have been more effective. Also, similar studies can be conducted with a larger number of participants. The number of participants in this study was 52. Finally, the participants in this study were preparatory school students studying at a university. The same study can be conducted with different levels of learners in other types of learning environments.

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