

The Impact of Undergraduate Students' Learning Preferences (VARK Model) on Their Language Achievement

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Abstract—Different learning style models have been developed and used in EFL education. One of these models is VARK model. The VARK model was proposed by Fleming (2001). VARK is a questionnaire that provides users with a profile of their learning preferences. The ultimate goal of the study is to investigate the impact of undergraduate students learning preferences (VARK model) on the language achievement. At first, the participants were selected from all the humanities, basic sciences, engineering, and life sciences three fields of study were randomly selected. Then from each field of the study, 30 undergraduate students were selected through convenience sampling. The total number of the participants of the four sciences (life, humanities, basic science, and engineering) was 360. They were selected from undergraduate students at state university, Islamic Azad University, Farhangiyani University, Payamenoor University and Medical university of Sistan and Baluchestan province. After selecting participants, the researcher administered the two instruments (VARK questionnaire and standardized proficiency test). After analyzing these two tests scores, the results indicated that reading style is the dominant learning style among Iranian EFL learners and there is a significant relationship between learners' fields of study and their learning styles. Also, students with reading style have the highest language achievement and the students with visual personality type have the lowest performance.

Index Terms—learning styles, undergraduate students, VARK

I. INTRODUCTION

Educational research has identified many factors for some of the differences in how individuals learn (Reid, 1987). Learning styles, as one of these factors, are of widespread interest in the education area (Dunn & Griggs, 1998). The concept of individualized "learning styles" originated in the 1970s. It has recently gained popularity (Sprenger, 2003) and has been of much concern to a number of L2 studies (Peacock, 2001). There have been a number of definitions of learning style(s) have been defined in many different ways by different scholars. For example they were defined as general approaches used by students in order to learn a new subject or to cope with a new problem (Oxford, Ehrman, & Lavine, 1991).

Learning styles make the framework through which learners acquire knowledge and use their preferred approaches to process information in order to learn successfully. According to Larkin and Budny (2005: 1), "learning style is a biologically and developmentally imposed set of personal characteristics that make the same teaching and learning methods effective for some and ineffective for others". The review of literature shows that some certain people favor a singular (e.g., visual) mode of learning: whereas, others tend to favor integrated modes of learning (e.g., auditory plus visual) (Sarasin, 1998). Foley (1999) argued that the concept of learning style is very useful for identifying the internal and external variations in how individual learners learn and process information. He also believes that learning style helps individuals to improve their interaction within education environments. Learning styles have turned to have a real effect on the achievement of students (Cassidy, 2004 & Reese, 2002). The VARK model was proposed by Fleming (2001). Learning style was defined as "an individual's characteristics and preferred ways of gathering, organizing, and thinking about information. According to Fleming (2001) VARK is in the category of instructional preference because it deals with perceptual modes" (p.1). VARK stands for Visual (V), Aural (A), Read/Write (R) and Kinesthetic (K). According to Fleming (2001) Visual learners prefer maps, charts, graphs, diagrams, highlighters, different colors, pictures, word pictures, and different spatial arrangements. Aural learners like to explain new ideas to others, discuss topics with other students and their teachers, use a tape recorder, attend lectures, and discussion groups use jokes. Read/Write learners prefer lists, essays, reports, textbooks, definitions, printed handouts, readings, web-pages and taking notes. Kinesthetic learners like field trips, trial and error, doing things to understand them, laboratories, recipes and solutions to problems, hands-on approaches, using their senses and collections and samples. Although VARK is an important model to improve foreign language education, its effect on Iranian tertiary students (university undergraduates) attending general English was not properly investigated. Moreover, it is not known whether Iranian undergraduate students with different majors prefer the same learning strategy or not and if the

dominant learning style is not known. Furthermore, it is not known whether the students' learning preference affects their language achievement or not.

II. OBJECTIVES

This study had three main objectives: The first objective was to determine language style preferred by Iranian undergraduate learners. The second objective was to determine the dominant learning style among language learner with different majors. The third objective was to identify whether language learners' learning styles influence their general language achievement or not.

In line with the research objectives, the following research hypotheses were raised.

H: there is no significant correlation between the learners learning styles and their fields of the study?

H: as this question is exploratory, no hypothesis is stated.

H: Learning style has no impact on language achievement of undergraduate students

III. REVIEW OF LITERATURE

A. Definitions of Learning Styles

Felder and Silverman (1988) defined learning style as an individual's preferred way of acquiring, retaining and processing information. Foley (1999) defined learning styles as the unique behavior of learners adapting to their environment. These definitions differ slightly from Keefe and Ferrell (1990) who saw learning styles as "the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment" (p. 59). According to Curry (1981) learning styles relate to the differences in cognitive approaches and processes of individual students' learning. The Fleming (2006) VARK model of learning proposes that learning is composed of four major styles: visual (V), aural (A), read/write (R) and kinesthetic (K). Visual (V) learners learn by seeing and watching information. Materna (2007) suggested that visual learners learn best by viewing information presented in formats such as demonstrations, videos, and films. Mayzler and McGann(2010) explained that the visual learner is the person who learns best when she or he is seeing the information - the brain absorbs the information best when the information is delivered through the eyes. Stash (2007) defined visual learners as people who prefer pictorial information.

B. Learning Style Theories

Learning style theories refer to the diverse styles of learning people use for the purpose of gaining knowledge. Zepeda and Mayers (2004) reviewed learning style theories to those of Carl Jung in 1927. Learning style theories describe the extent of the learning approach used by individuals in learning different subjects or topics. Assumptions and foundations of learning style theories are different from each other. The basic tenets of each of the learning style theories are diverse and influence the learning attitude of students. This thesis, however, will specifically focus on the following learning styles: Kolb Experiential Learning Theory, Dunn and Dunn, VAK, Felder-Silverman Learning Style Model, the Gregorc Model and VARK model. These theories are considered as the most frequently used theories in educational research.

C. Kolb's Learning Style Theory

This learning style is based on Kolb's Experiential Learning Theory, which states that the learning process is composed of four stages, each having its own individual learning style preference (Sirin & Guzel, 2006). According to Kolb (1984) his perspective on learning is called experiential for two reasons; first, "to tie it clearly to its intellectual origins in the work of Dewey, Lewin, and Piaget," second "to emphasize the central role that experience plays in the learning process" (p, 20).

Kolb (1976, 1984) categorized the four stages of a learning cycle as: Concrete Experience (CE), Reflection Observation (RO); Abstract Conceptualization (AC) and Active Experimentation (AE), the model demonstrated in Figure 2. Concrete experience refers to the process of learning where an individual learns through actively experiencing an activity. Reflective observation, on the other hand, refers to the learning process where an individual learns through conscious reflection about the activity. Abstract conceptualization pertains to the learning process where an individual learns by being presented with a theory or model that has to be observed. Finally, active experimentation refers to the learning process where an individual learns through testing a theory or model. It is also implied that each individual has his own strengths within each of the four stages and this is the basis of his preferences for learning style (Bell & Griffin, 2007).

The Kolb learning style theory identifies four types of learners, labeled as diverger, assimilator, converger, and accommodator. Dornyei (2005) described the four types of learners as pure and extreme cases, as Individual learners may display some combination of the four types.

According to Kolb, Boyatzis and Mainemelis (2000) learners who are between concrete experience and reflective observation are designated as divergers or reflectors.

D. VAK Theory

VAK theory is considered to be one of the classical learning theories in the educational field, it is best known as VAKT, visual (V), auditory (A), kinaesthetic (K) and tactile (T) (Mackay, 2007). Dunegan (2008) noted that the first development of VAK was in 1920, by psychologists and teaching specialists such as Fernald, Keller, Orton, Gillingham, Stillman and Montessori. The Federal Aviation Administration (2009) outlined that a VAK learning style is based on the student receiving vision, hearing and touch. Miller (2001) described a VAK learning style as the perceptual, instructional preference model which classifies learners by sensory preferences. The Intel Corporation (2007) reported that this theory has proven to be a popular and simple way to identify different learning styles. Dreeben (2010) suggested that the practical mode of VAK assessment, which includes asking learners about the way they receive information, is a strong reason for using it in the educational field. Byrnes (2010) stated that “the VAK model can be utilized to assist in incorporating different learning techniques into classroom instruction and activities” (p. 4). Mackay (2007) proposed that according to the VAK learning style, most people have a leading learning style that may be aligned with other preferences. A study conducted by Willis and Hodson (1999) using the VAK theory determined that 29% of elementary and high school learners are visual learners, 34% are auditory, and the remaining 37% are kinesthetic learners. Similarly, a study by Lisle (2007) used a VAK learning model in determining the learning style preferences of adults who experience learning difficulties. The study showed that (34%) participants preferred a visual style, which was an equal proportion to those who prefer an auditory style (34 %). Of the remaining students, (23 %) were kinesthetic learners and (9 %) had multimodal learning style preferences.

E. Learning Style and Academic Achievement

In addition to gender, age and culture, academic achievement has also been investigated to determine if it has any influence and effect on learning style preference. Nolting (2002) emphasized that students’ academic achievement positively increases if they are aware of their learning style and how they learn best. The relationship between learning styles and academic achievement in different level of education was examined by researchers.

A study which evaluated the relationship between learning style and students’ academic achievement was conducted by Wallace (1992) at four elementary schools in suburban Syracuse, New York. The study aimed to evaluate the achievement of elementary school students who preferred learning alone or with peers. A sample of 114 students was selected from grades three, four and five to respond to the Dunn, Dunn and Price learning styles inventory in the first phase of the study. Then, 17 students who strongly preferred learning alone and 17 who strongly preferred learning with peers were selected for the next stage of the study. The student participants were introduced to a small group learning method and were given five lessons with the option of working alone or with peers each time. An ANCOVA was employed to evaluate the result which showed statistically significant differences between the two groups. Students who preferred to learn alone achieved significantly higher mean scores than students who preferred to study with peers. Students who strongly preferred to learn alone did not achieve significantly higher scores when they opted to learn alone, also students who strongly preferred to study with peers did not achieve significantly higher scores when they opted to learn with peers.

Also Collinson (2000) conducted a study among elementary students to investigate the influence of learning style on academic achievement. The sample of 110 students was selected randomly from grade three, four and five public school students. The researcher used a learning style inventory developed by Dunn and Dunn to assess students’ learning styles. Academic achievement of students was based on Stanford Achievement Test (SAT) composite scores obtained from student cumulative folders. A one way ANOVA was used to measure the relationship between learning style and academic achievement. The results showed significant differences between academic achievements with three out of twenty two learning style elements. The study concluded that low achievers prefer to learn in a formal classroom with peers during the afternoon, whereas high achievers preferred studying along with self-directed objectives.

IV. METHODOLOGY

A. Research Design

Research design depends on the nature of research questions. Due to the nature of the present study research question a post facto survey study was used. The research dependent variable was the first question of the study was learners’ learning styles and the independent variable was learners’ majors. The dependent variable of the third research question was learners’ language achievement and the independent variable was learners’ personality type with four levels.

B. Participants

The participants of the present study were selected through multistage sampling procedure. At first from all the humanities, basic sciences, engineering, and life sciences three fields of study were randomly selected. Then from each field of the study, 30 undergraduate students were selected through convenience sampling. The total number of the participants of the four sciences (life, humanities, basic science, and engineering) was 360. They were selected from undergraduate students at state university, Islamic Azad University, Farhangyan University, Payamenoor University and Medical university of Sistan and Baluchestan province. All the received the VARK questionnaire. However, 300 (80 from engineering, 70 from humanities, 80 from life students, and 70 from basic sciences) returned the completely

filled in instrument. The student’s age range was between 19 -25. They all studied in Iran and none of them studies in the foreign countries.

C. Instruments

To achieve the aims of the study, the following scales were used.

VARK questionnaire: it is used for determining the preferred learning style by students. It consists of 16 multiple choice items and provides information about the ways that student’s take-in and give-out information, and creates a profile of their learning preferences.

The VARK stands for Visual, Aural, Read/write, and Kinesthetic modalities that are used for learning information. Visual (V) preference includes the depiction of information on charts, graphs, flow charts, and all the symbolic arrows, circles, hierarchies and other devices that instructors use to represent what could have been presented in words. Students who have this preference usually like to learn from pictures and power points and like to use colored markers to mark texts and notes.

Aural (A): mode describes a preference for information that is "heard." Students with this learning style report that they learn best from lectures, tutorials, and tapes and from talking to other students.

Read/Write (R): preference is for information displayed as words. Not surprisingly, many academics have a strong preference for this learning style.

Kinesthetic (K) learning style refers to the "perceptual preference related to the use of experience and practice (simulated or real)." Although such an experience may invoke other learning styles, the key is that the student is connected to reality, "either through experience, practice or simulation." This instrument suggest students to make a selection (a, b, c or d) for each question, but allow them to delete a question or choose more than one option if they want to. In order to avoid being biased to any particular answer, additional information about specific questions was avoided. Students were encouraged to choose more than one response if they think the context is not clear.

Standardized proficiency test: this test was adapted from Oxford Solution test. It consists of three parts: grammar, vocabulary and reading comprehension. The original test consists of 70 multiple choice items but it was reduced to 60 items. The reliability of this instrument was estimated through KR-21. The reliability index was 0.81 which was acceptable.

3.5 procedures:

D. Data Collection Procedures

This study was carried out in different phases. First, the fields of the study were selected. Then, the participants for each field of the study were selected. The research set an appointment with them in one of their classes. After explaining the purpose of the study to the administrators and teachers, the research administered the two instruments. Each student was asked to fill in the two instruments within 90 minutes. Next, the instruments filled out by each student were coded. One numerical code was assigned to each participant. Later, the personality type of each participant was identified and his/her score on language achievement was reported. The data were entered into SPSS (version 16) and in line with research questions, appropriate statistical procedures were applied.

E. Data Analyses

The data of this study were through different statistical procedure including descriptive statistics (frequency, percentage, mean) and inferential statistics (one way Anova, Chi-square). The data needed for their first question (VARK questionnaire) were analyzed through chi-squire. The data needed for their second question (proficiency test) were analyzed through one way ANOVA. The data needed for the second questions were analyzed through descriptive statistics and Chi-square.

V. RESULTS AND DISCUSSIONS

1. The First Research Question

As stated earlier, the first research question of the study was stated as follows:

To test the hypothesis, the descriptive statistics (percentage of each personality type) for each field of study are shown in the following tables.

TABLE 4.1
DESCRIPTIVE STATISTICS OF PERSONALITY TYPES ACROSS FIELDS OF STUDIES

		style				Total
		reading	visual	audio	Kinesthetic	
Majors	Humanities	60 (79%)	5 (6.6%)	6 (7.8 %)	5 (6.6%)	76
	Engineering	22 (36.6%)	12(20%)	16 (26.6%)	11 (18.3)	61
	Basic science	20 (33.3%)	13(21.6%)	12 (20%)	15 (25%)	60
Total		102 (58 %)	30 (15%)	34 (17%)	31(16%)	197

As the results in the above show, 197 participants attempted the VARK questionnaire. 60 (30 %) of the participants were studying basic science majors. 61 out of 197 (31%) were engineering students, and 39 % of the participants were studying humanities subfields. Generally speaking, 51.7 % of the participants preferred reading style, 15% preferred visual style, 17 % preferred audio style and 16% preferred kinesthetic style.

Therefore, it could be strongly argued that reading style is the dominant learning style among Iranian EFL learners. The results also show that 79% of the students of humanities preferred reading style, 6.6% preferred visual style, 7.8 % preferred audio style, and 6.6 % preferred kinesthetic style.

Moreover, the results show that that 36.6% of the students of engineering preferred reading style, 20% preferred visual style, 26.6 % preferred audio style, and 18.3 % preferred kinetic style.

Finally, the results show that 33.3 % of the students of basic sciences preferred reading style, 21.6% preferred visual style, 20 % preferred audio style, and 25 % preferred kinesthetic style.

2. Research Question Two

The second question of the study addressed the relationship between learners' fields of study and learning style. The null hypothesis was: **there is no significant relationship between learners' fields of study and learning styles.**

The results of Chi square test are shown in the following table.

TABLE 4.2
RELATIONSHIP BETWEEN LEARNERS' FIELDS OF STUDY AND LEARNING STYLES

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.337 ^a	6	.001
Likelihood Ratio	39.725	6	.001
Linear-by-Linear Association	24.036	1	.001
N of Valid Cases	197		

According to the above table, there is a significant relationship between learners' fields of study and their learning styles ($X^2= 38.377$, $df= 6$, $p= 0.001 < 0.05$). Therefore, the null hypothesis is strongly rejected at $p=0.05$.

3. Research Question Three

This question addressed the impact of learners learning style on their language achievement. The hypothesis was: **learners' learning style does not have impact on their language achievement.** To test the hypothesis, the mean scores of the four groups were analyzed through one way analysis of variances. Results including descriptive statistics and one way Anova are shown in the following tables.

TABLE 4.3
DESCRIPTIVE STATISTICS OF THE GROUPS' LANGUAGE ACHIEVEMENT

	N	Mean	Std. Deviation	Std. Error
reading	102	48.04	7.7	.769
Audio	34	25.23	7.2	1.2
Visual	30	21.79	6.6	1.01
Kinesthetic	31	24.19	9.1	1.9
Total	197	36.02	14.47	1.02

According to the above table, the mean of students with reading style is 48.04, the mean of the students with audio style is 25.23, the mean of the students with visual is 21.79, and the students with kinesthetic style is 24.19. That is, students with reading style have the highest language achievement and the students with visual personality type have the lowest performance.

TABLE 4.4
ONE ANOVA FOR LEARNERS' LANGUAGE ACHIEVEMENT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30358.693	3	10119.56	174.856	.000
Within Groups	11343.227	196	57.874		
Total	41701.920	199			

The results in the above table show that there is a significant difference between the students with different learning styles and their means on language achievement ($F= 174.856$, $df=3$, $p= 0.001 < 0.05$). Therefore, the null hypothesis was strongly rejected and it could be said that learners' learning style significantly affect their language achievement.

In order to locate the source of differences, a post hoc test (Tuckey) test was run. The results are shown in the following table.

TABLE 4.5:
RESULTS OF POST HOC TEST (TUKEY)

(I) groups	(J) groups	Mean Difference (I-J)	Std. Error	Sig.
Reading	Audio	22.8 [*]	1.50	.001
	Visual	26.25	1.38	.001
	Kinesthetic	23.85	1.82	.001
visual	Kinesthetic	1.044	2.11	.960
	Audio	-3.44	1.74	.202
Audio	Kinesthetic	-1.04482	2.111	.960

The results in table 4.5 show that the difference between the mean of the students with reading style is statistically different from the mean scores of the students with the other learning styles ($p = 0.001 < 0.05$). However, there is no significant difference between the mean scores of the other groups ($p > 0.05$).

VI. DISCUSSION

In the first phase of the study, the participants dominant learning style in general and learning styles of students with different majors of study were identified. Then, the relationship between learners' majors and the learning styles which they prefer was identified. After that, the impact of learners' learning styles on their language achievement was estimated. Data were collected and analyzed using descriptive statistics and inferential statistics. The learning style preferences of students were determined according to their responses to the VARK. The data were subjected to quantitative analysis to evaluate differences in learning style preferences between students classified as humanities, engineering, and basic sciences. The key findings are discussed under the following themes which represent the research questions:

1. Dominant learning styles preferences,
2. Relationship between learners' majors and learning style preferences,
3. Learning styles and language achievement

Predominant learning styles preferences

Descriptive statistics, including frequencies, percentages and chi square students with different majors determined to address research question one. The single VARK group comparison showed that the reading style was preferred by all groups of the participants. That is, in general Iranian university students demonstrate a preference to use reading style while learning English as foreign language. The results also showed that that learning style preference varies among the students with different majors. About 80 percent of students with humanities majors preferred reading style. This is probably due to the fact that in education system of Iran students of humanities such as Persian literature, law, political science, etc make use of reading texts as the only sources of their knowledge. They also try to develop their knowledge memorizing and understanding the texts.

Findings of the present study revealed the reading style was the first dominant preferred style for all participants with different majors. This result is not consistent with the findings of Jackson-Allen et al. (1994), Littin (2002), Reese et al. (2008), Kia et al. (2009) and Williams (2010), who argued that kinesthetic style was the most dominant learning style for children. Therefore, the difference between the findings of the present study and the findings of the related studies might be rooted in the other variables such learners' age which need further exploration by those interested in this field.

The results also showed that the percentage of style learning preferences among learners with different majors varied significantly. For example, while kinesthetic learning style was preferred by only 6.6 percent of students of humanities, it was preferred by 18.3% of students of basic sciences, and 25 % percent of engineering students. Such a difference might be because of the nature of these fields and the contents of the materials which they receive. Therefore, further research is needed to deeply explore the reason for different learning style preferences among students with different fields. Another reason might be the differences between the contexts in which this study and the other studies were carried out.

Relationship between learners' majors and learning style preferences

The chi square results revealed a significant relationship between learners' majors and the learning style preferences. That is, the frequency of learning style preferences by students with different majors was not the same. Therefore, it could be strongly argued that students with different majors do not make use of the same learning styles to learn language and consequently they cannot be taught through the same teaching strategies and styles.

Learning style and language achievement

The results of ANOVA test showed that there was a significant difference between language achievements of Iranian students with different learning style preferences. Students who preferred reading style had better language achievement than the students with the other learning style preferences. The significant association between learning style preference and reading achievement found in the current study result is consistent with previous research. Virostko (1983) assessed the preferred time of day learning style sub-factor in relation to reading with two student groups from grade three and four. One group studied reading when reading was scheduled at times preferred by them, the other group studied reading at a scheduled time that was a mismatch with their preferred time. The study found a significant effect for time of day learning style preference on reading achievement. Students who studied at the time they preferred achieved

greater results in reading than those who did not. Furthermore, MacMurren (1985) found a similar effect for the intake learning style sub-factor on reading achievement. Forty students from grade six who had high or low preferences for the intake element on Dunns' inventory were divided randomly into two experimental groups. One group studied reading with an intake environment while the others studied without. Significantly higher reading achievement was reported for students whose intake sub-factor learning styles preference matched the intake environment in both groups. The results of the present were also consistent with previous studies (Wallace, 1992; Yazicilar et al., 2009). Further to this, other researchers emphasized learning styles and academic achievement and the interaction of these characteristics to school grade (Collinson, 2000; Matthews, 1996; Yazicilar et al., 2009).

VII. CONCLUSIONS

In line with the results of the study, it could be concluded that:

1. This study concludes that learning style is one of many factors that affect students'.
2. Students who prefer reading style are more successful than the students who prefer the other styles.
3. Students' majors influence type of learning style preferences

The results indicated that reading style is the dominant learning style among Iranian EFL learners and there is a significant relationship between learners' fields of study and their learning styles. Also, students with reading style have the highest language achievement and the students with visual personality type have the lowest performance.

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