

The Relationship between Learning Styles and Vocabulary Recall among Sensorineural Hearing Loss EFL Learners

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Abstract

The present study sought to investigate the relationship between learning style and vocabulary recall of hearing loss EFL learners. Sixty hearing loss Iranian students (26 male and 34 female) of junior high and high school level from two schools in Alborz Province, Iran, were randomly selected for the goal of the present study. Based on the results of learning style questionnaire, the students were divided into three groups (visual learners, aural learners and kinesthetic learners) according to their preferred learning style. The instruments of the study were as follow: 1) A sample of Oxford Placement Test (2001) to measure the students' proficiency level, 2) Learning Style Questionnaire (Chislet& Chapman, 2005) to investigate the participants' learning styles, 3) A list of 45 concrete vocabulary items to investigate the vocabulary knowledge of the participants at the pre-test stage, 4) three sets of 10 vocabulary items (visual, auditory, and kinesthetic words) to teach in three different environments which were visual, aural, or kinesthetic, and 5) three post-tests of vocabulary recall with one week interval after each training session to measure the students' recall ability. The results of ANOVA revealed that types of word instruction lead to a statistically significant difference in vocabulary recall of students with various preferred learning styles, i.e., vocabulary scores increased sharply when the word instruction was based on auditory and kinesthetic. However, for the participants with visual and kinesthetic learning styles, the vocabulary scores reduced when the words were instructed through auditory training. On the other hand, kinesthetic word instruction was not significantly different from visual word instruction. In addition, the results of non-parametric Chi-Square Test followed by Eta statistics showed that the relationship between learning style and vocabulary recall was statistically significant. To sum up, it can be said that considering different learning style in vocabulary instruction is an effective way, which improves the vocabulary recall.

Keywords: learning styles; vocabulary recall; hearing loss; EFL learners

INTRODUCTION

Hearing is the most important sense in human life, especially in the field of language learning. It has undeniable role in speech development, ease of communication and social development as well. Hearing process, which consists of receiving and comprehending sound, has the main role in speech development. Any disorder to the process can impede the development of speech. When there is a hearing problem, the process of obtaining language input faces a great difficulty. Ramírez Moreno, Tapasco Castañeda, and Zuluaga Candamil (2009) state that a hearing impaired person is the one who has difficulties in understanding oral information and having natural and fluid conversations. Hearing loss can be classified into several categories. According to Hyjáňková (2010) there are five types of hearing loss: 1. Mild, 2. Moderate, 3. Moderately – Severe, 4. Deaf – Severe, and 5. Profound Deafness. The present study focuses on the third and fourth categories (Moderately – severe hard of hearing, deaf – severe hard of hearing). Hearing loss individuals have poor vocabulary knowledge because they cannot hear words to learn. Vocabulary plays a great role in language learning. Knowledge of vocabulary leads to better understanding of a language. Granowsky (2002, cited in Riankamol, 2008), claim that according to many researchers, vocabulary knowledge will enhance the communication process and it affects reading comprehension. Barani, Mazandarani, and Rezaei (2010) write that no matter how well our grammar is, we cannot communicate smoothly when we do not know the words.

Thai Mai (2007) claims that vocabulary learning is the core element in language learning and links four language skills together and make the process of communication effective and easy. "Vocabulary is basic to communication and often seems as the greatest source of problem by second language learners"(Kassaian. 2007, p.55).

Learning of any element of language depends on several factors. One of these significant factors is learning style preferences. As Reid (1995) states, learning styles are "natural, habitual, and preferred ways of absorbing, processing, and retaining new information and skills"(cited in Tuan & Long, 2010, p. 43). How individuals learn particular information and retrieve them is termed the individual's learning style. According to Karthigeyan and Nirmala, (2013), learning styles are innate preferences of individuals, which not only guide them to learn language elements, but it also affects their academic success. Dunn (1983) states that taking learning styles into account leads to students' achievement hence it shows that the way things are taught has a greater impact than the content covered in a course of study.

Different definitions of learning styles are available in the literature. The one that is considered in the present study belongs to Reid (1987). She called her model sensory preference. Sensory preferences are categorized into four main areas: visual, auditory, kinesthetic, and tactile. Visual learning according to Reid (1987, cited in Fu, 2009) consists of seeing. Visual learners are interested in seeing graphs, textbooks, videos, pictures, diagrams, and charts. Auditory learners are interested in listening to lectures, participating in talks and discussions. Kinesthetic learners enjoy physical movements. Wilson (2011) asserts that these learners prefer to involve physically in learning a task.

In addition, tactile learners who are not considered in this study prefer to learn by touching something with their hands. As Xu (2011) asserts this type of learners feel comfortable with the total physical response approach. As the significant role of vocabulary was mentioned before, it is very important to help learners learn and recall vocabulary better. Hence, it is beneficial to consider learners' particular learning style preferences toward vocabulary instruction.

This research aims at investigating the relationship between learning style preferences and vocabulary recall of hearing loss EFL learners. Unfortunately, there are not many researches available regarding learning styles preferences of individuals who have disorders in one of their senses, such as hearing. It can be concluded, therefore, that conducting research pertaining to learning styles of hearing-impaired participants is essential. Hearing-impaired learners are mostly educated with hearing learners; therefore, the process of educating them is the same as hearing learners. As such, they encounter numerous difficulties such as not hearing the words correctly, not understanding the meaning of words when they are expressed orally by the teacher, and so on. Turnbull et al (2002, as cited in Hyjáňková, 2010) maintains that, "Learning language is the single greatest challenge for children who are deaf or hard of hearing." The main problem of teaching to hearing impaired individuals, as Eisner (2012, p.5) states is not "that deaf and hard of hearing children are unable to learn but that educators are not recognizing and teaching to their students' unique learning styles." Thus, hearing impaired learners feel anxious and are not comfortable with the learning conditions. To our knowledge, very few studies are available regarding hearing-impaired individuals who learn English as a second or foreign language.

The aim of this study is to investigate, firstly, the learning styles of hearing impaired EFL learners and finding the best way for teaching vocabulary to them, and secondly, to check their vocabulary recall and retention ability through visual, auditory and kinesthetic presentation of words.

LITERATURE REVIEW

Theoretical background

One of the most important factors in learning is the learning style preferences of individuals that may affect their learning process. Ellis (2005) names seven factors while explaining individual learner differences: beliefs, affective state, age, aptitude, learning style, motivation, and personality. Learning styles refers to different approaches or ways of learning."

Vocabulary knowledge is a core to learning a language. Padidar, Tayebi, and Shakarami (2015, p. 249) state that vocabulary is the building block of every language. It has pivotal role in learning language as well. The richer the vocabulary knowledge of a language, the easier the process of learning that language will be. Vocabulary knowledge is significantly influenced by listening. Obtaining information and learning can be done by listening to others. Hence, it can be said that hearing is the most significant factor in

the learning process. However, deaf or hard of hearing individuals cannot count on this skill as a way of acquiring language. Turnbull et al 2002, (as cited in Hyjánková, 2010), confirms that, "Learning language is the single greatest challenge for children who are deaf or hard of hearing." Paul (1996) claims that hearing disorders leads to poor vocabulary knowledge. On the other hand, it can be concluded that poor vocabulary knowledge negatively affects reading skill. Eisner (2012) suggests that language leaning ability can be affected by the degree of hearing loss. However, Eisner (2012) claims that learning and communication depends on many factors such as individuals' preferred learning style.

Research background

In this section, previous works related to learning style, vocabulary recall, relationship between learning style and vocabulary recall, and learning style of hearing loss individuals and their vocabulary recall with respect to the preferred learning style are reviewed briefly;

To our knowledge, there are not numerous studies available in the field of vocabulary learning of hearing impaired individuals regarding their learning style(s) preferences. To check the vocabulary learning of this specific population according to Luckner and Cooke (2010), only 10 studies (24%) were conducted to examine the effect of a specific program, method, approach, or set of activities on the deaf or hard of hearing students' vocabulary learning. Luckner and Cooke (2010) provided a rich summary of the vocabulary research with students who are deaf or hard of hearing, who have quantitatively reduced vocabulary knowledge according to numerous studies (Cole and Flexer, 2007; Easterbrooks and Estes, 2007; Schirmer, 2000; Trezek, Wang, and Paul, 2010).

Massaro and Light (2004) investigated the effectiveness of a Language Wizard/Player with a special computer-animated tutor for teaching new vocabulary items to hearing loss individuals. The result of the reassessment test showed that the program was effective and retention of words was nearly perfect. Pittman, Lewis, Hoover, and Stelmachowicz (2005) in their study tried to investigate rapid word learning in 5- to 14-year-old children with normal and impaired hearing. The result of the study showed that the ability to learn words rapidly appears to be poorer in children with hearing loss

Thi-Mai (2007) in a study claims that vocabulary plays a great role in ease of communication. She tried to investigate the impact of guessing and using dictionary in the retention of the English vocabulary. The result of her study shows that the connection between sound and spelling of words must be presented in the instruction process since the ignorance of such an issue leads to ineffectiveness of recalling the words. She also suggested that using meaningful practices such as sentence completion, matching, and fluency could enhance the process of learning new words and students' long-term memory.

Kassaian (2007) in a study tried to investigate the relationship between learning style and vocabulary retention among sixty-six university students. The author reported that visual learners performed better than auditory learners. She further suggests that matching learning style with the instructional process can influence the result of learning in a positive way.

In her study under the title of “A Study of Learning Styles, Teaching Styles and Vocabulary Teaching Strategies in Chinese Primary School”, Fu (2009) tried to investigate teachers’ strategies in teaching English vocabulary with respect to combining learner styles. The result of Fu’s study showed that the learning styles of many students and the teaching styles of many teachers do not match. Therefore, students may face problems while learning vocabulary. Although students have various learning styles in each academic context, teachers can change their own styles and strategies and provide a variety of activities to meet the needs of different learning styles. The results of this study suggested that multisensory approach might offer some benefits to meet diverse learners’ needs.

In their study, Kafipour, Yazdi, and Shokrpour (2011), tried to explore the relationship between vocabulary level and learning style of Iranian EFL learners. They found that there is a strong relationship between individual learning style and vocabulary level. Gilakjani (2012) in his study tried to investigate the impact of learning styles on teaching, where issues such as learning styles, general learning styles, Multiple Intelligence Theory (MIT) and their significance in teaching to Iranian EFL university students were defined. In the study, the author reported that, according to previous studies, the most favorable learning style among EFL students is kinesthetic and tactile styles.

Abdollahi and Tahriri (2012) in their study tried to investigate the relationship between learning style and vocabulary recall. They claim that in vocabulary recalling, the visual learning style shows better results than the auditory style. They reported that visual vocabulary instruction through pictures is much more effective than auditory presentation. Vaseghi (2013) studied the learning styles preference of Iranian High school students who live abroad. The results indicated that all six learning style preferences (Reid’s learning style model) were positively preferred. Among the six styles, kinesthetic was the most favorable one.

Padidar, Tayebi, and Shakarami, (2015), conducted a study with the purpose of investigating relationship between students’ different learning styles and their degree of vocabulary retention among 110 high school Iranian EFL learners in Dehdasht. The major research questions were: 1. Is there any correlation between students’ learning styles, namely, visual, auditory and kinesthetic, and their degree of vocabulary retention? From this major question emerges another minor question, which is stated as follows: 2. If the answer to the first research question is positive, which one of the three groups of learners, namely visual, auditory and kinesthetic learners, has a better performance in retaining new words? Results showed that statistically significant

relationships exist between learning styles and vocabulary learning and recall, especially in visual learners.

The current study intended to investigate the relationship between preferred hearing loss individuals' learning style and vocabulary recall. As such, the study was done based on the following three major research questions:

1. What are the preferred learning styles of Iranian hearing-impaired EFL learners?
2. Are there any statistically significant differences among visual, auditory, and kinesthetic learners in terms of learning vocabulary?
3. Is there any statistically significant relationship between different learning styles (visual, auditory and kinesthetic) preferred by hearing impaired EFL learners and their vocabulary recall?

H01. There are no statistically significant differences among visual, auditory, and kinesthetic learners in terms of learning vocabulary.

H02. There is no statistically significant relationship between different learning styles (visual, auditory and kinesthetic) preferred by hearing impaired EFL learners and their vocabulary recall achievement.

METHOD

The design of the present cross sectional study was quasi-experimental design. Data collection was done through using quantitative method. A questionnaire was used to provide quantitative data. There is only one group namely, experimental group in order to study the difference between vocabulary teaching methods and preferred learning styles

Participants

The participants of the study consisted of sixty Iranian hearing impaired (26 male and 34 female) junior and high school students who were non-English major individuals, chosen randomly from two schools in Karaj, Alborz province, Iran. The study consisted of a fairly equal mix of boys and girls; however, female students outnumbered male ones (8 girls more than boys). Their age ranged from 13 to 22 with the mean age of 17.06, with Persian as the native language. In addition, according to the placement test given as a pre-test. Accordingly, their English level was assessed beginners. All the students studied English at a middle school in Iran. In addition, they wore hearing aid from 15 to 20 years.

Instruments

In this study, various instruments were used to collect data in order to answer the research questions. Five different instruments used in this study were as follows:

Placement test

A sample of Oxford Placement Test (2001) taken on August 15th 2015 was used to check participants' English level. As it was noted, beginner EFL learners were under investigation in the present study; therefore, this placement test would ensure the homogeneity of the students. The test consists of 60 grammar and vocabulary multiple-choice items. Each item has four choices from "a" to "d". The result showed that all sixty EFL learners who participated in the test were at the beginner level.

Questionnaire

The background questionnaire and learning style preference questionnaire (the questionnaire was an approved adapted and translated version of VAK learning style questionnaire, Chislet & Chapman, 2005; cited in Kassaian, 2007, Fu 2009, Abdollahi & Tahrir, 2012) was administered to sixty hearing impaired EFL participants to check their preferred learning style(s). The participants completed 30 statements in the present study, each statement consisted of three choices, and according to their answers the participants preferred learning style were marked as visual or auditory or kinesthetic; therefore, there were three groups of learners with a specific learning style. The individual and group learning styles from the items were omitted, as they were not relevant to the present study. To validate the questionnaire, the Farsi version of questionnaire from the similar study was used in order to elicit data from Iranian hearing-impaired EFL learners.

Vocabulary pre-tests

A list of 45 concrete vocabulary items as a pre-test to investigate the vocabulary knowledge of the participants. These words came with three Persian meaning alternative from "a" to "c" from which the students were supposed to choose the best answer. Then, 30 of the words were selected for the instruction phase. These items were taught visually, auditorily and kinesthetically (10 words visually, 10 words auditorily, and 10 words kinesthetically) with their Persian meaning. The test was first piloted in a sample group ($n = 14$) with the estimated reliability of ($\alpha = .924$) which was indicative of its good reliability.

Vocabulary recall post-test

Three valid and reliable tests of vocabulary recall (one test for visual words: one for auditory words and one for kinesthetic words, were designed and used after three different teaching situations at regular time intervals (once a week) in order to check how many words and how well they were able to recall each group of words they had learned. The three tests were assigned a score (10 points for each test) to visual, auditory and kinesthetic learners for recalling words in the above mentioned styles; hence, each group would have three sets of scores for three different teaching situations. Their long-term memory was checked through these tests as well.

Procedure

First, the students were randomly selected from different levels of two school. The researcher explained the main goal of the study to them and they voluntarily participated in the study. The research was conducted in 6 sessions (6 hours) of instruction during approximately two months. English level of the participants was measured through OPT published in 2001. Accordingly, all of the participants were beginners. Then, the learning styles questionnaire (piloted with the reliability $\alpha = .70$) and background questionnaire were distributed among them during their classroom hour in the winter term of the year 2016. They had to respond by choosing one alternative for each statement in the learning style questionnaire, which best describes their individual characteristics.

In the following session, a pre-test of 45 vocabularies was administered to them to check their knowledge of the words as well (piloted with the reliability index of .92). At the next stage, a list of 30 concrete words of the vocabulary items was taught to the participants in the classroom during 6 sessions. The vocabulary items were taught to the students through three different methods: 10 words through visual style, 10 words through aural style, and 10 words through kinesthetic style. The words were randomly selected from among the words of the Internet Picture Dictionary (Retrieved from <http://www.pdictionary.com>).

After determining the students' learning style, investigating their proficiency level, and the level of pre-determined vocabulary items knowledge, the instructional phase of the study began. There were six teaching sessions in which words were taught in three different situations via different activities regarding specific learning styles. One additional session was held to administer the last recall test.

In the first session, five words that were used in five sentences with Persian meaning of each were presented orally to students twice. In the second session, they were given a recall test. The previously taught words were read aloud and the students were required to write the Persian meaning of the words on a paper, then five words were again presented similarly to those introduced in the first session. In the third session, they were given a recall test for the five previously learned words similar to the second session test.

For visual instruction, five words were presented visually, i.e. each word came with the corresponding picture via PowerPoint software on a projector screen. In the fourth session, they were given a recall test for the five visually learned words; next five words were presented visually similarly to the previous session. Each ten words were reviewed twice in each session.

In the fifth session for kinesthetic instruction, the students were asked to bring some sheets of paper, a pair of scissors, and different coloring pencils. Five words with the picture while the Persian meaning was presented to them on the projector through using PowerPoint software; they were then asked to create their own picture by

drawing a picture similarly to the presented one and also to cut the papers into small cards, these cards were called “picture cards”. Then they had to write the name and Persian meaning of the words on the other pieces of paper and cut them into smaller cards, which were called “meaning cards”. Next, they had to match their own created picture cards with the meaning cards. This activity was done twice in the session. In the sixth session, they were asked to match their own picture cards with the meaning cards. After the test was administered, five more words were taught similarly to the last session. In the seventh session, they were given the last recall test.

Vocabularies were selected according to the participants' English proficiency. Since they had hearing difficulty, the auditory words were taught to them with a clear, loud enough voice twice. The distance between the researcher's table and the participants' chairs was about 50cm, where the class was located in the quietest place available at the school. At the end of the term, the result of the tests was compared with each other regarding the learning styles questionnaire to check whether their preference for learning styles has any effect on their learning process.

Data analysis

To provide an answer for the first research question, descriptive statistics including frequency and percentage were computed to determine the learners' preferred learning style. To answer the second research question, repeated measures ANOVA was run to examine the possible differences among the participants with different learning styles. Next, the non-parametric Chi-Square Test followed by Eta statistics as measure of association were run to answer the third research question and to examine whether the relationship between learning style and vocabulary recall was statistically significant. The results and the relevant interpretations of the findings are presented in the following sections.

RESULT

Learning Styles of all the Participants

The result of the learning style questionnaire revealed that overall, 23.3 % of the sample preferred to use auditory learning style. Of the total sample, 26.7% preferred the visual style, and 50% preferred kinesthetic style. In other words, the preferred learning style of the majority of the participants' in the present study was kinesthetic (see table 1).

Table 1. Frequency and Percentage for the Categories of Learning Style

	Frequency	Valid Percent
Auditory	14	23.3
Visual	16	26.7
Kinesthetic	30	50.0
Total	60	100.0

Table 2. The Proportion of the Participants with Three Types of Learning Styles

	Observed N	Expected N	Residual
auditory	14	20.0	-6.0
visual	16	20.0	-4.0
kinesthetic	30	20.0	10.0
Total	60		

The observed frequencies from the data are presented in Table 2. The results showed that 14 out of the 60 (23.33%) had auditory learning style. The expected N specified was (20). For the learners with auditory learning style, 20 cases were expected, while 14 were observed. For the learners with visual learning style, 20 cases were expected, while 16 were observed. However, for the learners with kinesthetic learning style, 20 cases were expected, while 30 were observed.

The following Test Statistics table reported the results of the Chi-Square Test, which compared the expected and observed values. The results showed that the discrepancy was statistically significant (Asymp. Sig. = .022).

Table 3. Test Statistics for the Three Groups

	group
Chi-Square	7.600
df	2
Asymp. Sig.	.022

The chi-square goodness-of-fit test indicated that there was significant difference in the proportion of the participants with three types of learning styles identified in the sample, $\chi^2(2, n = 60) = 7.60, sig = .022 \leq .05$.

Differences among visual, auditory, and kinesthetic learners in terms of learning vocabulary

ANOVA with repeated measures was run to compare the three groups' mean scores (visual, auditory, and kinesthetic) on vocabulary tests. The participants were measured three times to see the changes that might have occurred due to the intervention (three types of vocabulary teaching based on the three types of learning styles). In other words, the repeated measures ANOVA was run to understand whether there was a difference in vocabulary recall among participants with different learning styles. "Vocabulary recall" was the dependent variable, while the independent variable was "types of vocabulary instruction". Before running the repeated measures ANOVA, the data were checked to see if they met the necessary assumptions that are required for the repeated measures ANOVA.

The first assumption that the dependent variable should be measured at the continuous level was met since the dependent variable was measured on an interval scale. The second assumption was that the independent variable should consist of at least two categorical matched pairs. The related groups in the present study indicated that the

same subjects were present in three situations. In other words, the same subjects in each group had been measured on three occasions on the same dependent variable that was vocabulary recall. In addition, there was no dependency in the scores between the participants. The third assumption indicated that there should be no significant outliers in the related groups that were checked by computing the trimmed means that showed that there were no outliers in the distribution (See Table 4). The fourth assumption implies that the distribution of the dependent variable in the groups should be approximately normally distributed. Therefore, normality was tested using the skewness and kurtosis tests through using SPSS Statistics (See Table 4).

Table 4. Descriptive for the Three Series of Vocabulary Scores

Group				Statistic	Std. Error
Posttest scores (visual words. 10 points)	Auditory	Mean		6.00	.574
		95% Confidence Interval for Mean	Lower Bound	4.75	
			Upper Bound	7.24	
		5% Trimmed Mean		6.05	
		Skewness		-.59	.597
		Kurtosis		1.53	1.154
	Visual	Mean		8.87	.221
		95% Confidence Interval for Mean	Lower Bound	8.40	
			Upper Bound	9.34	
		5% Trimmed Mean		8.91	
		Skewness		-1.05	.564
		Kurtosis		1.181	1.091
	Kinesthetic	Mean		7.60	.327
		95% Confidence Interval for Mean	Lower Bound	6.93	
			Upper Bound	8.26	
5% Trimmed Mean		7.75			
Skewness		-1.65	.427		
Kurtosis		1.17	.833		
Posttest scores (auditory words. 10 points)	Auditory	Mean		7.14	.670
		95% Confidence Interval for Mean	Lower Bound	5.69	
			Upper Bound	8.59	
		5% Trimmed Mean		7.26	
		Skewness		-1.31	.597
		Kurtosis		.917	1.154
	Visual	Mean		1.25	.4873
		95% Confidence Interval for Mean	Lower Bound	2.21	
			Upper Bound	4.28	
		5% Trimmed Mean		3.16	

Posttest scores (kinesthetic words. 10 points)	Kinesthetic	Skewness	.40	.564
		Kurtosis	-.99	1.091
		Mean	2.53	.370
		95% Confidence Interval for Mean	Lower Bound	1.77
			Upper Bound	3.29
		5% Trimmed Mean	2.40	
	Auditory	Skewness	.92	.427
		Kurtosis	.53	.833
		Mean	6.14	.627
		95% Confidence Interval for Mean	Lower Bound	4.78
			Upper Bound	7.49
		5% Trimmed Mean	6.15	
	Visual	Skewness	-.15	.597
		Kurtosis	-.78	1.154
		Mean	7.06	.3923
		95% Confidence Interval for Mean	Lower Bound	6.22
			Upper Bound	7.89
		5% Trimmed Mean	7.06	
	Kinesthetic	Skewness	-.59	.564
		Kurtosis	.55	1.09
		Mean	9.76	.201
		95% Confidence Interval for Mean	Lower Bound	9.35
			Upper Bound	10.17
		5% Trimmed Mean	9.98	
		Skewness	-.26	.427
		Kurtosis	.21	.833

First, 5 percent of the highest and the lowest cases were removed and a new mean score was calculated. Then, the first mean values and the new trimmed means were compared to inspect the possible differences between the two means for the three sets of vocabulary tests. The findings showed that the extreme scores did not affect the means. These results implied that, since the trimmed means and the mean values were nearly the same for the vocabulary test scores, the values were not too different from the remaining distribution. Moreover, since the values of skewness and kurtosis were all within the range of ± 2 , the distributions were normal.

The last assumption is known as sphericity that is the variances of the differences between all combinations of related groups must be equal. It was tested through performing Mauchly's test of sphericity in SPSS Statistics (See Table 5).

Table 5. Mauchly's Test of Sphericity

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Epsilon Huynh-Feldt	Lower-bound
factor1	.947	3.022	2	.221	.950	1.000	.500

Sphericity was tested using the Mauchly's Sphericity Test. Since the Chi-Square value obtained was not significant, it meant that the assumption was not violated.

After examining the main assumptions that underlie the repeated measures ANOVA, descriptive statistics were provided for the three sets of scores (Mean, Standard deviation, N). See table 6.

Table 6. Descriptive Statistics for the Three Sets of Scores

	group	Mean	Std. Deviation	N
Posttest scores (visual words. 10 points)	auditory	6.0000	2.14834	14
	visual	8.8750	.88506	16
	kinesthetic	7.6000	1.79271	30
	Total	7.5667	1.96034	60
Posttest scores (auditory words. 10 points)	auditory	7.1429	2.50713	14
	visual	3.2500	1.94936	16
	kinesthetic	2.5333	2.02967	30
	Total	3.8000	2.81521	60
Posttest scores (kinesthetic words. 10 points)	auditory	6.1429	2.34872	14
	visual	7.0625	1.56924	16
	kinesthetic	9.7667	1.10433	30
	Total	8.2000	2.24590	60

In Table 6, in general, the lowest vocabulary mean score was for Time 2 ($X = 3.80$) when the words were taught through auditory procedure and the highest was at Time 3 (after teaching the words through kinesthetic procedure). After providing instruction based on visual instruction of the words, the participants who had visual learning style performed better than the participants with auditory or kinesthetic learning styles did ($X_{\text{auditory group}} = 6.00$, $X_{\text{visual group}} = 8.87$, $X_{\text{kinesthetic group}} = 7.60$).

When the word instruction was based on auditory representation of the words, the participants who had auditory learning style outperformed the participants with visual or kinesthetic learning styles ($X_{\text{auditory group}} = 7.14$, $X_{\text{visual group}} = 3.25$, $X_{\text{kinesthetic group}} = 2.53$). Following the word training based on kinesthetic instruction of the words, the participants who had kinesthetic learning style as their dominant leaning style did better than the participants with visual or auditory learning styles ($X_{\text{auditory group}} = 6.14$, $X_{\text{visual group}} = 7.06$, $X_{\text{kinesthetic group}} = 9.76$).

To see if these differences in mean scores were statistically significant, the repeated measures ANOVA was run and it was interpreted using the multivariate test reporting values for Wilks Lambda (see Table 7).

Table 7. Multivariate Tests for the Three Types of Tests

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
factor1	Pillai's Trace	.727	74.683 ^b	2.000	56.000	.000	.727
	Wilks' Lambda	.273	74.683 ^b	2.000	56.000	.000	.727
	Hotelling's Trace	2.667	74.683 ^b	2.000	56.000	.000	.727
	Roy's Largest Root	2.667	74.683 ^b	2.000	56.000	.000	.727

The Wilks' Lambda and the associated probability value given in the column labelled Sig are presented in Table 7. According to Pallant (2008), the most commonly reported statistic is Wilks' Lambda. The value for Wilks' Lambda is (.273), with a probability value of .000 (which means $p < .05$). The p value was less than .05; therefore, it could be concluded that there was a statistically significant effect for different types of word instruction. This suggested that there was a change in vocabulary scores across the three different times.

To examine whether the difference between the three types of word instruction was statistically significant (i.e. not likely to have occurred by chance), the effect size that showed the strength of the associations was computed. It was computed to measure the degree to which the variables were associated with one another. The effect size indicates the relative magnitude of the differences between the means, or the amount of the total variance in the dependent variable that is predictable from knowledge of the levels of the independent variable (Tabachnick & Fidell 2007, p. 54). Partial eta squared effect size statistics indicated the proportion of the variance of the vocabulary scores that was explained by the independent variable (types of word instruction). To interpret the strength of the different effect size statistics, the following guidelines proposed by Cohen (1988, p. 22) were used:

Table 8. Cohen's Guidelines for Interpreting Eta Squared

Size	Eta squared (% of variance explained)
Small	.01 or 1%
Medium	.06 or 6%
Large	.138 or 13.8%

The value obtained in Table 8 was (.727). Using the commonly used guidelines proposed by Cohen (1988), this result suggested a very large effect size. After calculating the effect size, the tests of within-subjects effects was run to determine if there was an overall significant difference between the means at the different time points.

Table 9. Tests of Within-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
factor1	Sphericity Assumed	383.322	2	191.661	83.453	.000	.594
	Greenhouse-Geisser	383.322	1.900	201.730	83.453	.000	.594
	Huynh-Feldt	383.322	2.000	191.661	83.453	.000	.594
	Lower-bound	383.322	1.000	383.322	83.453	.000	.594
Error(factor1)	Sphericity Assumed	261.818	114	2.297			
	Greenhouse-Geisser	261.818	108.310	2.417			
	Huynh-Feldt	261.818	114.000	2.297			
	Lower-bound	261.818	57.000	4.593			

Table 9 presented the *F* value for the "*types of instruction*" factor, its associated significance level and effect size (Partial Eta Squared). As the data did not violate the assumption of sphericity (see Table 3), the values in the "Sphericity" row were documented. The mean scores for vocabulary tests were significantly different ($F(2, 114) = 83.453, p < 0.05$).

Since the overall ANOVA yielded a significant result and suggested that there was a difference somewhere among the groups, pairwise comparisons were conducted to assess which means differed from each other. Pairwise Comparisons presented the results of the Bonferroni post hoc test, which displayed which set of scores (Time 1, Time 2, and Time 3) differed from one another. This information is presented in table 9, which compares each pair of time points and indicated whether the difference between them was significant. Based on Table 4.10, the difference for auditory and visual instruction was significant ($p \leq .05$). Moreover, the difference for kinesthetic and visual word instruction was significant ($p \leq .05$). However, there was not a statistically significant difference between the performance of the participants after giving the instruction based on auditory and kinesthetic word instruction ($p \geq .05$).

Table 10. Pairwise Comparisons for the Three Sets of Scores at Three Time Points

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	3.183*	.276	.000	2.631	3.735
	3	-.166	.274	.548	-.714	.383
2	1	-3.183*	.276	.000	-3.735	-2.631
	3	-3.349*	.324	.000	-3.997	-2.700
3	1	.166	.274	.548	-.383	.714
	2	3.349*	.324	.000	2.700	3.997

Table 10 displayed the significance level for the differences between the individual types of instruction. It was noticed that there was a significant difference in vocabulary scores between time 1 and time 2 ($p = .00$), and between time 2 and time 3 ($p = .00$), but

no significant differences between time 1 and time 3 ($p = .548$). From the Mean Difference (I-J) column, it could be found that the greatest difference among the participants was between types two and three of word instruction. It means that the vocabulary scores differed highly when the word instruction was based on auditory and kinesthetic. The vocabulary scores for the participants with visual and kinesthetic learning styles reduced at the time point that the words were instructed through auditory training.

In sum, the repeated measures ANOVA with a Sphericity assumption determined that mean vocabulary scores differed significantly between time points $F(2, 114) = 83.453$, ($p < 0.05$). Post hoc tests using the Bonferroni correction revealed that auditory word instruction for the participants with visual and kinesthetic learning styles caused a decrease in vocabulary scores from time 1 to time 2 (from $X = 7.56$ to $X = 3.80$, respectively), which was statistically significant ($p = .000$). Moreover, kinesthetic word instruction increased the mean score to ($X = 8.20$), which was statistically and significantly different to auditory word instruction ($p < .05$). However, kinesthetic word instruction ($X = 8.20$) was not statistically significantly different to visual word instruction ($p \geq .05$). Therefore, it could be concluded that types of word instruction lead to a statistically significant difference in vocabulary recall of students with various preferred learning styles. However, this difference is not significant for visual and kinesthetic types of word instruction. There was a significant effect for time, Wilks' Lambda = .273, $F(2, 56) = 74.683$, $p < .05$, multivariate partial Eta squared = .727 (see also the following figure).

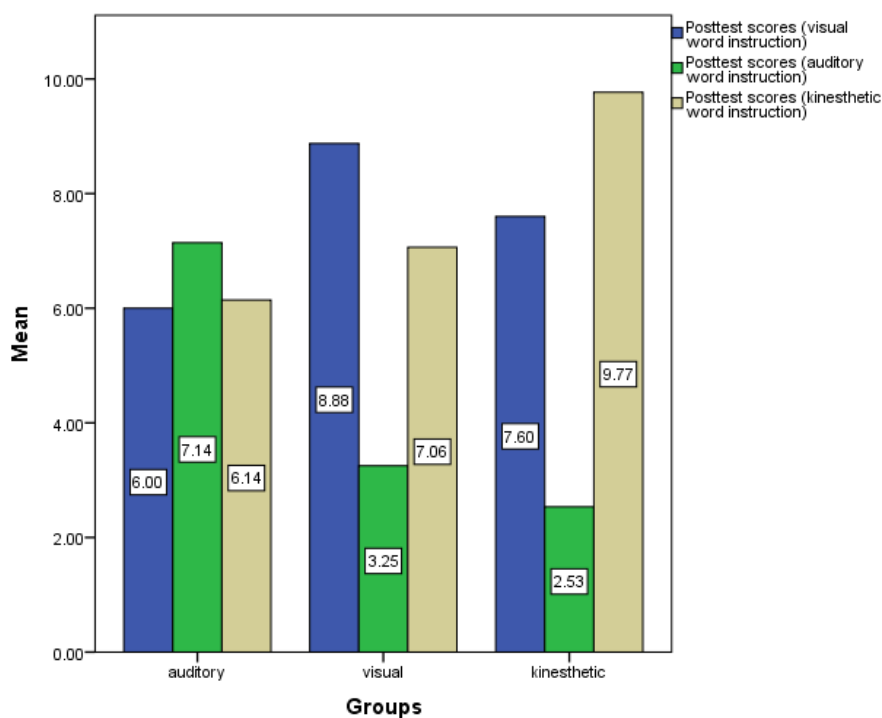


Figure 1. the Means of the Three Groups on Three Sets of Vocabulary Tests

The relationship between different learning styles (visual, auditory, and kinesthetic) preferred by hearing impaired EFL learners and their vocabulary recall

To provide answer for the third research question, the following Chi-square test was used to examine the possible relationship between learning style and vocabulary recall.

Table 11. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square (visual instruction)	45.339	18	.000
Pearson Chi-Square (auditory instruction)	47.753	20	.000
Pearson Chi-Square (kinesthetic instruction)	59.158	16	.000
N of Valid Cases	60		

The two-sided asymptotic significance of the Chi-square statistic for the possible relationship between the participants' learning style and their vocabulary recall was lower than (0.05) for all the three series of vocabulary tests after accomplishment of three specific word instruction based on preferred learning styles. Therefore, it was safe to say that the relationship between these two variables among learners with different learning styles was statistically significant. This rejected the second null hypothesis implying that there is a significant relationship between preferred learning style and vocabulary recall of hearing-impaired EFL learners. To show the strength and direction of this relationship, Eta test was run the results of which are presented in the following table:

Table 12. Directional Measures

			Value
Nominal by Interval	Eta	Posttest scores (visual word instruction) Dependent	.522
Nominal by Interval	Eta	Posttest scores (auditory word instruction) Dependent	.669
Nominal by Interval	Eta	Posttest scores (kinesthetic word instruction) Dependent	.718

Based on the results of Eta test, there appeared to be association between learning style and vocabulary recall. From among the three series of the tests, the highest degree of relationship was found between the vocabulary scores obtained when kinesthetic word instruction was practiced (Eta= .718). In comparison, the least amount of association was found between vocabulary scores and the first series of vocabulary scores when the word instruction was based on visual learning (Eta= .552). The mid relationship was also reported between the vocabulary scores obtained when auditory word instruction was practiced (Eta= .669).

DISCUSSION

The main aim of the present study was to find the most effective learning and teaching strategies for teaching vocabulary to hearing loss English learners by considering their

preferred learning style. It is widely believed that learning styles models should have a direct effect on educational success; therefore, as Wilson (2011, p.37) claims, there is strong evidence that learning styles influence students' attention to and perceptions of learning experience. As Kassaian (2007, p.55) claimed, "Vocabulary is basic to communication and often seems as the greatest source of problem by second language learners." According to Massaro and Light (2004), children with hearing loss have serious problems in producing both spoken and written vocabulary. Therefore, neglecting the hearing loss individuals' problems in educating, lack of EFL teachers' awareness about the hearing loss individuals' preferred learning style and lack of sufficient research in the field of studying hearing loss English learners, their preferred learning style, and the knowledge of their vocabulary were the most motivating reasons to conduct the present study.

Considering learning style, there are numerous studies (Claxton & Ralston, 1978; Shirani Bidabadi & Yamat, 2010; Pourhossein Gilakjani, 2012; Wilson, 2011) that show the significance of the learning styles' role. Therefore, investigating learning style of students is a significant factor in teaching and learning process.

Regarding teaching approaches to vocabulary, it was found that in most of the EFL classes the vocabulary items are taught in a passive, old fashioned way, i.e., the teachers of EFL classes mostly teach the words aurally while students merely write the meaning of the words in their own language without involvement, and as a result they are mostly unable to recall the words later. On the other hand, the vocabulary knowledge of hearing loss learners is significantly lower than hearing learners.

All of the problems foregoing motivated the researcher of the present study to implement multiple ways of presenting vocabulary to hearing loss learners with regard to their preferred learning style. Many approaches are available for teaching vocabulary to learners. Regarding individuals' differences, perceptual learning styles are one of the most significant factors. Vocabulary can be taught through considering three most useful perceptual learning styles: auditory, visual, and kinesthetic. These ways of teaching enhance vocabulary knowledge and reinforce later recall of the words.

The results of the research questions that were analyzed statistically in the previous section are discussed below.

To investigate the preferred learning style of hearing loss EFL learners, descriptive statistics including frequency and percentage were computed. The finding revealed that overall, 23.3 % of the sample preferred to use auditory learning style. In other words, the least preferred style among the participant was obviously auditory style since they cannot use their hearing ability as effectively as hearing individuals. This result is in contrast to that of Cheng Zhihong (2001) in which the auditory style was the dominant style. Of the total sample, 26.7% preferred the visual style, and 50% preferred kinesthetic style. In other words, the preferred learning style of the majority of the participants in the present study was kinesthetic. This result is similar to that of Reid (1987), Gilakjani (2012), and Vaseghi (2013) in which the highest number of

participants had kinesthetic learning style. The finding of the first research question suggested that although hearing loss learners can hear, they might not benefit from auditory instruction. Hence, the teaching approaches to these individuals should be as less auditory as possible.

To test and answer the second research question, the data were analyzed through using ANOVA with repeated measures to compare the three groups' mean scores on vocabulary tests. Taking differences among visual, auditory, and kinesthetic learners in terms of learning vocabulary into account, it could be concluded that types of word instruction lead to a statistically significant difference in vocabulary recall of students with various preferred learning styles. However, this difference is not significant for visual and kinesthetic types of word instruction, i.e., the vocabulary scores differed highly when the word instruction was based on auditory and kinesthetic.

The vocabulary scores for the participants with visual and kinesthetic learning styles reduced at the time when the words were instructed through auditory training. From this finding, it can be concluded that the first influential learning style in vocabulary recall among hearing loss individuals is kinesthetic style. It seems that this finding is similar to that of Reid's (1987) study. He found that kinesthetic and tactile learners outperformed learners with other learning style preferences. However, the least frequent scores belong to learners with auditory learning style preference.

Based on the results, the first null hypothesis was rejected. Henceforth, it can be said that this result is in line with numerous research works such as Abdollahi and Tahriri (2012), Kassaian (2007), Kafipour, Yazdi, and Shokrpour (2011) in which vocabulary recall scores for auditory group was lower than other groups.

The present study showed that there is a strong relationship between different learning styles (visual, auditory, and kinesthetic) preferred by hearing impaired EFL learners and their vocabulary recall. Based on the Chi-square statistic and the results of Eta test, it appeared that there is a significant relationship between learning style and vocabulary recall. The second null hypothesis that suggested there is no statistically significant relationship between different learning styles was rejected. This is in line with the previous studies (Fu, 2009; Kassaian, 2007; Alavinia, & Farhady, 2012; Abdollahi & Tahriri, 2012; Padidar, Tayebi, & Shakarami, 2015)

CONCLUSION

The findings of the current study revealed the relationship between learning styles and vocabulary recall of hearing loss EFL learners. It clarifies some important points, which help EFL instructors to facilitate the process of teaching and learning. Due to the questionnaire straightforward design and its reliability, teachers can use this tool to assess their students' learning style preferences, and match the teaching method and approaches to their style. The main purpose of this study was to enhance and promote hearing loss individuals' learning achievement regarding their own preferred learning modes.

The results of the present study suggest that in hearing loss learners' classrooms, teachers can benefit from using pictures along with the concrete words to teach vocabulary to visual learners; in other words, illustrations that go with the words are attractive to them. On the other hand, kinesthetic learners, who were the majority of the participants, enjoy taking in information while doing hands-on activities. Body involvement is an important factor when it comes to teaching to kinesthetic learners.

To sum up, based on the quantitative analysis of the learning style questionnaire and the result of the post tests, it can be concluded that considering learning style preferences in language learning is a significant factor fostering the learning process. It is beneficial to teach language elements that suit the students' preferred learning style. The main goal of considering individuals' differences in their learning style is to shift the focus from traditional approaches to more student-centered ones. The results of the present study will hopefully stimulate further research in identifying and investigating more innovative instructional methods and approaches suitable for hearing loss learners, and secondly, pave the way for the further research that deals with education for hearing loss population.

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