THE EFFECT OF INTERACTIVE VS. SIMULTANEOUS DISPLAY OF MULTIMEDIA GLOSSES ON IRANIAN IMPULSIVE VS. REFLECTIVE EFL LEARNERS' READING COMPREHENSION

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Abstract

This quasi-experimental study was an attempt to investigate the effect of interactive vs. simultaneous display of multimedia glosses on reading comprehension of reflective vs. impulsive Iranian EFL learners at intermediate level. To this end, Nelson reading proficiency test was given to 150 Iranian EFL learners studying at Kian Language institute in Bushehr, Iran, as a homogeneity test and a pretest along with impulsivity questionnaire BIS 11 (Barrat, 1995) and reflectivity questionnaire (Kember et al., 2000). Considering 1 standard deviation above and below the mean scores on the test and the results of the questionnaires, 4 experimental groups were formed. Following 10 sessions of treatment in which 20 reading texts with interactive glosses were practiced with participants in interactive experimental groups and the same 20 reading texts were practiced with participants in simultaneous experimental groups, all participants took a piloted version of a researcher-made reading posttest. The results of the tests were analyzed using two-way ANOVA testto seek the answers to the research questions. The findings of the study revealed that the exposure tointeractive display of multimedia glosses hadmore effect than simultaneous glosseson both impulsive and reflective EFL learners' reading comprehension at intermediate level.The findings of the study can be used by educational systems and language teachers who aim at using multimedia glossed in language classes and who are concerned with matched or mismatched learning styles of the learners.

Keywords: interactive multimedia glosses, simultaneous multimedia glosses, reflective learners, impulsive learners, reading comprehension

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Background of the Study

Reading has been an inseparable component of language classes since the inception of first teaching methodology (e.g., grammar translation method) (Larsen-Freeman, 2005). Almost all language teaching methodologies such as the direct method, audio-lingual method and more recent methodologies such as task-based approach have made use of reading tasks to enhance EFL learners' comprehension (Larsen-Freeman, 2005). This can, per se, perpetuate the significance of enhancing EFL learners' reading skill in language classes. Thus, quite a number of efforts in form of teaching approaches and classroom techniques have been made to make textual input more comprehensible to learners.

A relevant technique to increase EFL learners reading comprehension is the use of various types of glosses as marginal notes with reading excerpts. In the last decades, effectiveness of glosses has been investigated by scholars (Bowles, 2004; Hulstijn, Hollander, &Greidanus, 1996; Jones, 2004; Jones &Plass, 2002). These investigations have supported their use as a vehicle for learning (Hulstijn&Laufer, 2001; Mayer, 2001, 2002, 2005). These studies have been carried out with regard to different types of glosses categorized as textual, visual, both textual and visual, or auditory.

On the other hand, in recent years, researchers in the field of applied linguistics have paid more attention to learners' learning styles which is an important factor that influence the process and outcomes of learning. Wang (2008) defines learning style as people's preferences in the way of thinking and gathering information. It is known that cognitive styles are an important part of learning styles. More specifically, cognitive learning styles are defined as the way individual learners process data. It is an underlying construct and a characteristic of human beings (Brown & Perry, 1991). Cognitive styles have many classifications. They were once classified into field-independent style and field-dependent style, analytic style and global style, reflective style and impulsive style, and tolerance and intolerance of ambiguity. Psychological studies have been conducted to determine the degree to which, in the cognitive domain, a person prefers to make either a quick (impulsive) guess at an answer to a problem or an answer to a problem or a slower, more calculated (reflective) decision. Inductive reasoning was proved to be more effective with

reflective individuals, suggesting that generally reflective persons could benefit more from inductive learning situations (Brown, 2000).

Though recent years in the field of applied linguistics have been years of investigation on learning styles and various issues such as the use of glosses, no prior study has yet investigated the effect of interactive and simultaneous glosses on reading comprehension of Iranian impulsive and reflective EFL learners. That can explain the reason why this study was intended to be carried out.

Statement of the Problem

The fact that reading comprehension is of prime significance to EFL learners; especially those who aim at learning English to enter higher educational systems in which English is the medium of education, has put the focus of many recent researches on finding more suitable approaches, methods, and techniques to increase learners' reading comprehension (Cabral, 2008). On the other hand, many reading comprehension tests such as the IELTS are accompanied with pictorial glosses. Besides, many online reading sources are accompanied with both multimedia and pictorial glosses. These two issues along with learners' cognitive styles (e.g., impulsivity and reflectivity) raise a question to scholars in the field which could be broken down as follows:

The first query with regard to all these issues is whether or not different types of multimedia glosses have an equal effect on EFL learners' reading comprehension. The second query is to know whether or not the effect of interactive and simultaneous multimedia glosses on impulsive and reflective EFL learners is equal since no prior study has delved into this issue.

The main problem under study is to know which type of multimedia glosses is suitable for impulsive and reflective learners.

Another problem with the studies carried out so far is inadequate attention paid to the effect of multimedia glosses on reading comprehension of impulsive and reflective learners. Many prior studies' focus has been on the effect of multimedia glosses and vocabulary retention or recall without considering learners cognitive styles.

Research Questions

According to the problems directed in the previous section and the variables in this study which are interactive versus simultaneous display of multimedia glosses, impulsive versus reflective learners, and reading comprehension, the answer to the following research questions were sought in this study.

Q1: Does interactive multimedia glosses have more effect than simultaneous one on Iranian EFL learners' reading comprehensionat intermediate level?

Q2: Does interactive multimedia glosses have more effect than simultaneous one on Iranian impulsive EFL learners' reading comprehension at intermediate level?

Q3: Does interactive multimedia glosses have more effect than simultaneous one on Iranian reflectiveEFL learners' reading comprehension at intermediate level?

Research Hypotheses

Hand in hand with the above mentioned research questions the following hypotheses are formulated.

H1: Exposure to interactive display of multimedia glosses has more effect than simultaneous one on Iranian EFL learners' reading comprehension at intermediate level.

H2: Exposure to interactive display of multimedia glosses has more effect than simultaneous one on Iranian impulsive EFL learners' reading comprehension at intermediate level.

H3: Exposure to interactive display of multimedia glosses has more effect than simultaneous one on Iranian reflective EFL learners' reading comprehension at intermediate level.

Purpose of the Study

This study conducted to understand possible ways to increase EFL learners' reading comprehension. Although there are myriad ways in which EFL learners' reading comprehension can be increased, this study had its focus on the use of glosses and learners' cognitive styles. So the first aim of the study was to compare the effect of exposure to interactive display of multimedia glosses and simultaneous glosses onIranian intermediate EFL learners' reading comprehension.

The second purpose of the study was to find out whether or not the effect of interactive versus simultaneous multimedia glosses on impulsive versus reflective Iranian EFL learners' reading comprehension is equal. In fact, the study aimed at taking into account EFL learners' cognitive styles and comparing the effect of multimedia glosses with regard to impulsivity and reflectivity.

Significance of the Study

This study focused on the effect of interactive display of multimedia glosses and simultaneous glosses onIranian intermediate EFL learners' reading comprehension, considering the style of learners. The findingscan be useful, providing reasonable answers to some unanswered questions in the field of language learning, specially reading skill.

For example, the findings of this study can be useful for language teachers. Understanding the effect of different multimedia glosses on EFL learners, considering their styles, can help language teachers to employ more effective multimedia glosses,for impulsive or reflective ones, while teaching reading skill.Language learners, on the other hand, will understand that reading skill can be improved by different multimedia glosses. This can, in turn, save their time and increase their ability in reading comprehension. So, the findings of this studymay be helpful firstly for teachers and secondly for languagelearners.

Course designers and material developers can also benefit from the findings of the study, considering that they can provide different types of multimedia glosses to aid foreign languagelearning, particularly reading comprehension and give a different and attractive environment to English classrooms than the customary andboring classroom lectures.So far, however, there has been little discussion about the style of learners and the effect of different multimedia glosses. Then, Course designers and material developers can take into account this issue while designing classroom materials.

Review of the Related Literature
Introduction

This part gives a brief review of the works already done related to the main variables of this research work. The main variables in this research are interactive versus simultaneous display of multimedia glosses and reading comprehension of impulsive versus reflective Iranian learners learning English as their foreign language.

Theoretical Overview

Lomicka (1998) states that the issue of glosses in not a novel one. In fact, the concept of glosses has been around since the Middle Ages. However, the modern form and function of glosses is different. Glosses can be used as a strategy for learning vocabulary, and many researchers have consensus that glossing is an influential approach for improving vocabulary acquisition and reading skill (Farvardin&Biria, 2012; Hong, 2010; Ko, 2005; Lomicka, 1998).

The history of glosses in education reveals that glosses were basically learner-generated (Roby, 1999) e.g. learners used to write marginal notes around a text to be able to better understand it. Finding out about the usefulness of the technique, teachers also used glosses as a teaching technique to better convey concepts (Roby, 1999). The form, position and language of the glosses caused this novel issue to be categorized into different taxonomies (Zarei&Hasani, 2011). Textual, pictorial, visual or combination of such glosses were created and used in language classes and researchers began to investigate their effect on different areas of the language. Thus, the focus of more recent research has been on finding the most effect type (Yoshii, 2006).

Taxonomy of Glosses

Glosses are usually studied in the following ways: a) single versus multiple-choice glosses, b) meaning inferred glosses versus meaning given ones (Roby, 1999). However, Roby (1999) believes that more sophisticated taxonomy of glosses dependent on the gloss authorship, gloss presentations, gloss function, gloss focus, gloss language and gloss form. In terms of authorship glosses are divided into those written by learners and those written by professionals. Gloss presentation involves priming glosses or prompting glosses. 3. Gloss functions are of two types (e.g. procedural and declarative). Procedural function includes metacognitive, highlighting and clarifying, and declarative function includes encyclopedic and linguistic functions .The linguistic

subset of declarative functions is divided into lexical function (signification and value) and syntactical function. Next, gloss focus which has to do with textual or extra textual materials. Gloss language includes L1, L2, and L3. And finally, gloss form which includes verbal, visual (image, icon, video with or without sound) and audio form.

Empirical Review

There are many empirical studies that show the different effects of different glosses. For example, Farvardin and Biria (2012) found that MCG (multiple choice glosses) makes lexical retention easier than other gloss types (single gloss in first language and single gloss in second language). Yoshii (2006) claims that there is no difference between L1and L2 glosses for vocabulary learning and both of them have a positive role in vocabulary learning and reading comprehension. Roby states that "Glosses are many kinds of attempts to supply what is perceived to be deficient in a reader's procedural or declarative knowledge" (1999, p.96).

Gloss and Reading Comprehension

There are a number of studies about the effect of glossing on reading comprehension. Glossing, as a type of input modification, facilitates vocabulary learning and reading comprehension (Ko, 2012). Glossing makes L2 reading more effective (Chen & Good, 2009). It assists reading comprehension by providing additional information, such as definition and synonyms (Ko, 2012). Lomicka (1998) investigated the effect of glosses under three conditions: full glossing, limited glossing, or no glossing. She confirms that full glossing may promote a deeper level of text comprehension. Ko (2005) also investigated the effect of different kinds of glosses (no gloss, L1glossing, L2 glossing using qualitative and quantitative measures) on reading comprehension. He found that L2 glosses were more influential than L1 glosses. Glosses act as a mediator between text and the learner by providing additional information about difficult words and facilitate both reading comprehension and vocabulary learning (Ko, 2005).There are many advantages for glosses in learning a new language, according to Hong (2010):

The presence of gloss can reduce students' burden of dictionary consultation, avoid the interruption of reading process and prevent learners from making wrong inference for the

unknown words in the particular context. Thus, gloss can not only ensure learners' exact understanding of the text but also help learners know the meaning of the new words (p.68).

Nagata (1999) points to four advantages of marginal glosses.1. They are more convenient to use compared to books such as dictionaries. 2. They enhance EFL learners understanding by making them more conscious.3. They create associations between forms and meanings of the words 4.words are retained as learners frequently refer to them. Likewise, Ko (2005) enumerates four advantages for glossing: First, glosses can help readers know new words better by preventing wrong guessing. Second, glossing may lessen interruption during the process of reading. Third, glosses can help readers to create a relationship between prior knowledge and new information in the text. Fourth, glosses allow readers to become more autonomous with less dependence on their teacher. In addition, they do not interrupt the reading process since the definition is easily available in the text (Yanguas, 2009).

Furthermore, Koren (1999) vows that glossing is the easiest way to learn the meanings of words when they are in context, but he refers to some disadvantages of using glossary as follows: 1. Glossary has to be prepared by the teacher, or written for each text, or found in specific text books, contrary to the use of dictionary that can be done independently by the students.

Turke and Ercetin (2012) conducted a study to find out how different types of glosses could affect learning the incidental vocabulary. The participants of this study were 82 students randomly selected. They read a glossed text and their reading comprehension was checked through a recall protocol and a multiple-choice test. Unannounced vocabulary tests were used to measure incidental vocabulary learning. The results of the study showed that the participants had a better performance on reading and vocabulary tests when glosses were simultaneously displayed.

In another study the effect of multimedia glosses on L2 reading comprehension and vocabulary productionwas investigated by Zarei and Hassani (2011). The participants were 65 female students of a high school in Qazvin, Iran. The participants were divided into 4 groups, three multimedia gloss groups and one control group. After analyzing the data gathered from the

participants it was indicated that multimedia glosses led to better performance of the participants in vocabulary production.

Method

Participants

The participants of the study were randomly chosen among 150 Iranian EFL learners in Kian language institute inBushehr, Iran. The population was given Nelson reading proficiency test as a homogeneity test and a pretest. One hundred language learners; with their scores 1SD above and below the mean score were selected for the study. Next, the participants were given an IELTS reading test as the pretest along with a valid Persian version of Reflective Thinking questionnaire (Kember et al., 2000) and Barratt (1995) BIS 11 Impulsiveness questionnaires, in order to be categorized into 2 reflective groups including about 50 learners and 2 groups of impulsive learners including 50 learners.

The participants formed four different experimental groups for the study. The table below (Table 1) shows the participants data.

Table 1

Participants' Data

Group		N	Proficiency Level	Gender
Interactive (Group1)	Gloss/Impulsive	25	Intermediate	Mixed
Interactive (Group2)	Gloss/Reflective	25	Intermediate	Mixed
Simultaneous (Group3)	Gloss/Impulsive	25	Intermediate	Mixed
Simultaneous (Group4)	Gloss/Reflective	25	Intermediate	Mixed

Instruments

Nelson Reading Proficiency Test (NELSON)

Nelson ReadingProficiency Test including 30 test items was utilized to assess knowledge of the participants and to see if they are homogeneous based on their English readingproficiency level. The validity and reliability of the Nelson test have been estimated several times before by other researchers and it is considered as highly valid and reliable test of English proficiency (Shahivand&Pazhakh, 2012, p. 18).

Reflective Thinking Questionnaire

Kember et al. (2000) reflective thinking questionnaire consists of 16 statements about actions and modes of thinking during a course of study. This likert-scale questionnaire asks students to show their level of agreement with each statement. Students are also asked to give a quick response to the statements. A valid Persian version of this questionnaire wasused in this research.

Impulsivity BIS 11Questionnaire

Barratt (1995) BIS 11 Impulsiveness Questionnaire contains 30 statements and assesses Impulsiveness. This is a test to measure some of the ways in which students act and think. It asks them to read each statement and put an X on the appropriate circle on the page. The learners are required to not spend too much time on any statement and answer quickly and honestly. Scores are allocated to the four-point Likert scale, ranging from "rarely/never", "occasionally" to "often" and "almost always/always". A valid Persian version of this questionnaire is prepared by Ekhtiari, et al., (2008) will be utilized in this study.

A Researcher-made Posttest of Reading

The researcher designed a thirty-item reading test to examine the participants' reading proficiency after the experiment through the posttest. Item analysis was run to calculate item facility (IF) and item discrimination (ID) of the test. Reliability and validity of the test items was also calculated through a pilot study.

Procedure

Having administered Nelson reading proficiency test to homogenize the population, reflective thinking questionnaire (Kember et al., 2000) and impulsive thinking questionnaire(Barratt, 1995) were given to the participants. Considering one standard deviation above and below the mean score on the reading proficiency test and the results of the cognitive thinking questionnaires, the participants were distributed into four different experimental groups.

The treatment course lasted for 10 sessions. In the interactive impulsive group and interactive reflective group the learners were allowed to select the type of multimedia information they prefer along with the reading comprehension texts they were studying, whereas in the simultaneous display condition for simultaneous impulsive and simultaneous reflective groups, verbal (definitions) and visual (associated pictures) information were presented to the participants in a single gloss and the learners were not allowed to choose the type of gloss they preferred. A total of 20 reading texts were practiced in the interactive experimental groups from 'Steps to Understanding' reading series. Same reading texts were practiced in the simultaneous experimental groups with fixed verbal and pictorial glosses.

Design of the Study

This study is a quasi-experimental one since, there is no control group assigned though there is randomization in participants' selection. The independent variables in the study are interactive multimedia glosses and simultaneous multimedia glosses since the researcher aims at investigating their effect on the dependent variable which is reading comprehension. The moderator variables in the study are impulsivity and reflectivity of the learners.

Data Analysis

This study entitled "The Effect of Interactive Versus Simultaneous Display of Multimedia Glosses on Iranian Impulsive Versus Reflective EFL Learners' Reading Comprehension" aims at exploring the following three research questions:

Q1: Does interactive multimedia glosses have more effect than simultaneous one on Iranian EFL learners' reading comprehension at intermediate level?

Q2: Does interactive multimedia glosses have more effect than simultaneous one on Iranian impulsive EFL learners' reading comprehension at intermediate level?

Q3: Does interactive multimedia glosses have more effect than simultaneous one on Iranian reflective EFL learners' reading comprehension at intermediate level?

Piloting Researcher-made Reading Test

Before starting the main study, the researcher-made test was piloted. In piloting phase, thirty students took the 30 item multiple-choice test and by assigning 1 point to correct answers and 0 to the wrong answers, the test was scored. Normality test was done to ensure about normal distribution of the scores as an assumption for reliability test. Considering Table 2 which shows the test of normality for different tests of the study, the ratios of skewness and kurtosis over their respective standard errors were within the acceptable range of +/-1, indicating the normal distribution of the all tests' dataincluding the pilot test (based on research manuals).

Table 2

Test of Normality, All Tests

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pilot Test	30	-.715	.427	.166	.833
Nelson Reading Proficiency Test	150	.324	.198	-.326	.394
Nelson Reading Proficiency Test Group 1	25	.078	.464	-.337	.902
Group 2	25	.299	.464	-.688	.902
Group 3	25	.064	.464	-.935	.902
Group 4	25	.043	.464	-1.011	.902
Reading Post Test Group 1	25	.401	.464	-.359	.902
Group 2	25	.317	.464	.110	.902
Group 3	25	.427	.464	-.198	.902
Group 4	25	.425	.464	.414	.902

Then, descriptive statistics which is shown in Table 3 was done. The mean score was ($M =$ 21.43) and the standard deviation was ($SD = 5.283$).

Table 3

Descriptive Statistics, Pilot Test

	N	Mean	Std. Deviation	Variance
Pilot Test Scores	30	21.43	5.283	27.909

Next the reliability test based on Crombach's Alpha method was carried out. The test result on Table 4, ($\alpha = 0.807$, $p = 0.05$) proved that the test reliability was acceptable according to many scholars ($\alpha > 0.7$).

Table 4

Reliability Statistics, Pilot Test

Cronbach's Alpha	N of Items
.807	30

$p = .05$

For evaluating test items, item analysis was also done. Results showed that the item facility of test items was between 0.5 and .08 and discrimination indices were between 0.25 and 0.5, ($0.5 < IF < 0.8$ and $0.25 < DI < 0.5$) which are in the acceptable ranges. The researcher calculated the construct validity of the test items using factor analysis. Each item of the tests was considered as a factor and the test results were used to see if there is adequate correlation between the scores. SPSS extracted the factors for the subjects. Factor analysis results for researcher-made reading test items were between 0.76 and 0.92; indicating that the factors considered in the analysis showed enough correlation and that the tests scores were valid.

Homogeneity Test

Nelson reading proficiency test was administered150 language learners to homogenize them based on their reading proficiency level. Considering one standard deviation above and below the mean score on reading proficiency test and the results of the cognitive thinking questionnaires, one hundred ($N = 100$) participants were selected and distributed into four different experimental groups. To make sure that the all groups were homogenous in term of reading proficiency, the researcher used the one-way ANOVA test. Some other tests (normality and Levene's test) were

done to check that the data meet the assumptions for applying the ANOVA test. Descriptive statistics for all 150 learners and four different groups (Table 5) indicated that the overall mean score of the test for ($N = 150$) was ($M = 17.13$) and ($SD = 4.888$). The mean score for the first group ($N = 25$) was ($M = 17.04$) and ($SD = 2.318$). For the second group ($N = 25$) the mean was ($M = 16.06$) and ($SD = 3.069$). For third group ($N = 25$) the mean was ($M = 17.32$) and ($SD = 2.155$). Finally for the fourth group ($N = 25$) the mean was ($M = 16.36$) and ($SD = 2.234$).

Table 5

Descriptive Statistics, Nelson Reading Proficiency Test

	N	Mean	Std. Deviation	Variance
All Learners	150	17.13	4.888	23.888
Group 1	25	17.04	2.318	5.373
Group 2	25	16.60	3.069	9.417
Group 3	25	17.32	2.155	4.643
Group 4	25	16.36	2.234	4.990

According to Table 2, distribution of scores for four groups was normal and the first assumption for applying the ANOVA test was met. By applying Levene's test, the homogeneity of variances of four groups was checked and the amount of significance in Table 6 (Sig = 0.148), which is greater than 0.05, shows that the variances of four groups were equal. So the second assumption for applying the ANOVA test was met.

Table 6

Homogeneity of Variances, Nelson Reading Proficiency Test

Levene Statistic	df1	df2	Sig.
1.821	3	96	.148

Then the ANOVA test was carried out. According toTable 7, one-way ANOVA test, the *F*value ($F_{3,96} = 0.762$, $p = 0.518$) indicated that there was not a statistically significant difference among the groups and they were homogenous in term of reading proficiency.

Table 7

ANOVA, Nelson Reading Proficiency Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.950	3	4.650	.762	.518
Within Groups	586.160	96	6.106		
Total	600.110	99			

P= .05

Main Study

To check the research hypotheses, the results of reading posttest were analyzed using a two-way ANOVA test. Descriptive statistics also was done which is shown in Table 8. According to Table 2, distribution of the scores for four groups was normal and by applying Levene's test, the homogeneity of variances of four groups was checked and theamount of

Table 8

Descriptive Statistics, Reading Post Test

	N	Mean	Std. Deviation	Variance
Group 1	25	19.44	3.097	9.590
Group 2	25	18.76	2.803	7.857
Group 3	25	17.48	2.584	6.677
Group 4	25	16.48	2.786	7.760

significance in Table 9 (Sig = 0.148), which is greater than 0.05, shows that the variances of four groups were equal. So,all the assumptions for applying the two-way ANOVA test were met.

Table 9

Homogeneity of Variances, Reading Post Test

F	df1	df2	Sig.
.394	3	96	.758

Table 10 shows the results of applying two-way ANOVA to the scores of reading posttest as the dependent variable.2 × 2full-factorial ANOVA examined the effects of treatment (interactive glosses andsimultaneousglosses) and style (impulsivityandreflectivity) on reading scores. The

main effect oftreatmentwas statistical ($F_{1, 96}$= 14.096, $p < .0005$, partialeta-squared=.128), but the effect of style ($F_{1, 96}$= 2.213,p = .140, partial eta-squared=.023) and the interaction between treatment and style($F_{1, 96}$ = .08, p =.778, partial eta-squared=.001) were not statistically significant. This model explained R^2 = 14.6%of the variance in reading scores.

Table 10

Two-way ANOVA, Reading Post Test (Dependent Variable)

Source	Type II Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power[b]
Corrected Model	130.640[a]	3	43.547	5.463	.002	.146	.930
Intercept	32544.160	1	32544.160	4082.906	.000	.977	1.000
Treatment (Interactive/Simultaneous)	112.360	1	112.360	14.096	.000	.128	.961
Style (Impulsive/Reflective)	17.640	1	17.640	2.213	.140	.023	.313
Treatment * Style	.640	1	.640	.080	.778	.001	.059
Error	765.200	96	7.971				
Total	33440.000	100					
Corrected Total	895.840	99					

a. R Squared = .146 (Adjusted R Squared = .119)

b. Computed using alpha = .05

Mean scores (Table 8) showed that group1 (*M* = 19.44, *SD* = 3.097) and group2 (*M* = 18.76, *SD* = 2.803) participants performed betterthangroup3 (*M* = 17.48, *SD* = 2.584) and group4 (*M* = 16.48, *SD* = 2.786). So **the first hypothesis of the study (H1) was supported** andexposure to interactive display of multimedia glosses had more effect than simultaneous one on Iranian EFL learners' reading comprehension at intermediate level.

By comparing the mean scores of the four group and considering the results of two-way ANOA test (Table 10), which indicated that being impulsive or reflective had no significant effect on reading comprehension, it can be concluded that exposure to interactive display of multimedia

glosses has more effect than simultaneous one on both impulsive and reflective Iranian EFL learners' reading comprehension at intermediate level. Then, **hypotheses two and three (H1 & H2) of the study were supported too.**

Discussion

The finding of this study proved that exposure to interactive multimedia glosses has more effect on reading comprehension of both impulsive and reflective learners than the simultaneous glosses.The interactive multimedia glosses seemed to be more helpful for reading and comprehension of texts, since the learners were allowed to choose the type of multimedia glosses, then, they actively engaged in the process of learning and paid more attention to the learning material and consequently improved their reading comprehension.

Ariew and Ercetin (2004) claimed that there is no relationship between the use of glosses and reading comprehension in the second language. In a partial agreement with their research results, the findings of this study also proved that not all types of glosses can affect reading comprehension of EFL learners, though both impulsive and reflective learners benefited from using interactive glosses.

Sakar and Ercetin (2005) also concluded EFL learners at intermediate level and advanced level do not benefit from the use of glosses in language classes in terms of vocabulary learning and reading comprehension. In terms of proficiency level, this study proved that intermediate learners can make use of interactive multimedia glosses to enhance their reading comprehension, though simultaneous multimedia glosses did not prove to have such an effect.

Zarei and Hassani (2011) in a study conducted in Qazvin, Iran, concluded that the use of multimedia glosses can have positive effect on EFL learners reading comprehension. In partialagreement with their study, the findings of this study proved that interactive display of multimedia glosses have more effect on reading comprehension of EFL learners than simultaneous display of multimedia glosses.

Conclusion

As a general outcome of the study it can be claimed that the use of interactive multimedia glosses have more effectthan the use of simultaneous display of multimedia glosses on reading comprehension of intermediate Iranian EFL learners. Secondly,the effect of interactivemultimedia glasses on reading comprehension of impulsiveor reflective learners is nearly the same and different cognitive style of the learners does not affect their ability in developing reading skill.

The current study has some implications for foreign language teachers and learners. Teachers can find better techniques to teach new reading passages. Teachers can enhance students' vocabulary knowledge and consequently their comprehension of the reading text. Moreover, learners can enhance their reading comprehension through new ways, by consulting textbooks and manuals which offer different types of glosses about reading comprehension. However, the participants of the study were intermediate level learners. Other studies can be done with elementary or advanced level students.

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