



Enhancing EFL Learners' Reading Comprehension Ability through Multimedia-Based Visualization

Saloomeh Niknejad *

Department of Foreign Languages, Zanjan Branch, Islamic Azad University, Zanjan, Iran

Behzad Rahbar

Department of Foreign Languages, Zanjan Branch, Islamic Azad University, Zanjan, Iran

Abstract

The present study was conducted to measure the impact of multimedia-based visualization on Iranian EFL learners' reading comprehension. The current study is based on the researcher's motivation to find empirical evidences in intermediate English language learners. To do so, the reading comprehension texts was provided through two methods; first, static visualization in which students received reading texts with static pictures; second, dynamic visualization in which the reading texts were provided with animated pictures. The results of independent sample t-test showed that dynamic visualization was more effective than static one in enhancing EFL learners' reading comprehension.

Keywords: visualization, dynamic, static, multimedia, reading comprehension

INTRODUCTION

With the general growth of technology in language teaching and learning, it is startling that the relationship between language learning and computer has gained a high status in recent years. Recent advancement and development in the field of technology has represented professional interest in the furtherance and dissemination of information. Actually, technology has made information readily more accessible to teachers and pupils than it used to be. These advances in technology have improved that there has been a marked increase in the use of learning opportunity and instruction that integrate various media including static texts, animated texts, aural narratives, static diagrams, pictures, photographs, animations, and videos (Pusack & Otto, 1990; Narayanan & Hegarty, 2000). Throughout history, there has been a scrutiny of studies (e.g., Feaver, 1977; Slythe, 1970; Anglin, Vaez, & Cunningham, 2004) that has divulged increasing use of visualization as complementary to textual materials (paper-based textbook) in education. as many educators have been willing to embrace new computer-based material, i.e. visualization particularly for learning and instructional applications, it is important to scrutinize their effect on learners' learning in the educational context.

A new era is considered as a platform for applying and incorporating Computer Assisted Language Learning (CALL) into foreign language learning and instructional context. Levy (1997) succinctly defines computer-assisted language learning as “the search for and study of applications of the computer in language teaching and learning (p. 1).” Nowadays, nobody can ignore the fundamental role of information and communication technology in the learning and teaching context. Harris, Sutton and Johnson (2001) state that unlike traditional teaching approaches, which were generally teacher-directed and confined exclusively to paper-based textbook, the non-traditional approaches come to exist in order to enhance the quality of teaching and learning in the classroom.

With the entry of computers into education in the past decade, language education has gone through significant changes. Khamkien (2012) believes that, “because of the availability of computer and education technologies in today’s world, computers have entered and have strongly influenced our life in every domain of communication” (p. 55). He further adds that the increasing use of computer in today’s world is due to faster and easier communication, which takes place between learners or speakers of language. With the arrival of computers in the instructional contexts, the new era is considered as a platform for applying CALL, that is, “the search for and study of applications of the computer in language teaching and learning” (Levy, 1997, p. 1). Recent advances in technology make it possible for teachers and learners to see more interactive uses of CALL. Furthermore, it makes an increase in the integration of various media into the computer system (Pusack & Otto, 1990). Instructional materials using texts, graphics, animation, pictures, videos, and sound to present information is called multimedia. Multimedia developed and integrated using computer have provided virtual surge of computer based multimedia instructional applications (Lawrence, 1996). Brett (1995) advocates Lawrence’s terms and states, “increase in the speed, storage capacity and memory size of computers, together with developments in the sophistication of software, now enable computers to deliver video, sound, text and graphics” (p. 77), paving the way not only for the process of teaching but also for its further usage in most language classrooms.

Through utilizing internet, multimedia, and other digital instruments, students can acquire new knowledge straightforwardly (Chun & Hsiu, 2011). As Harris, Sutton and Johnson (2001) state, unlike traditional teaching approaches, which were generally teacher-directed and confined exclusively to paper-based textbook, the non-traditional approaches (learning and teaching through computer technology) come to exist in order to enhance the quality of teaching and learning in the classroom. In relation to this, as Warschauer and Healey (1998) states, “in recent year, specialists have expressed an immense interest in using computers for language teaching and learning. They continue that before now, only a small number of specialists gave much attention to the use of computers in the language classroom. But with the arrival of multimedia computing and the Internet, the role of computers in language instruction has now become a major concern for large numbers of language teachers throughout the world” (p. 57).

Chastain (1988) utters that "reading is a basic and complementary skill in language learning. Second language students need to learn to read for communication and to read greater and greater quantities of authentic materials" (p. 216). He further adds that reading for meaning or reconstructing the writer meaning is at the crux of the reading process. Actually, understanding or comprehending a text is the primary purpose of reading.

Along the lines of Anderson and Pearson (1984), to assist the processing and understanding of new unfamiliar information, a previous acquired schema should be stored in the long-term memory. Consequently, under this condition first language reading comprehension takes place. Hong (2007) states that "there are many factors influencing reading comprehension such as reader's characteristics, nature of reading materials, and reading tasks, etc." (p. 15) since individual differences, particularly learning styles which play a decisive role in L2 learning (Ehrman, Leaver, & Oxford, 2003), careful consideration should be given to issue of learners' differences. As Hoffler and Leutner (2011) state, "In recent years, the role of individual differences on learning with visual representations has been more and more focused on" (p. 209). Learning styles of students is one area of higher education, which has been given growing attention. Some studies have revealed that academic performance of university students is associated with their learning styles (Aripin, Mahmood, Rohaizad, Yeop, & Anuar, 2008).

Of the relevance to the aim of the present study is the question of enhancing the quality of reading multimedia-based texts through visualization. Thus, to find out whether the use of a multimedia-based system helps the students to better learn language and its components, the present study seeks to explain the learning of a language in relation to visualizations and compare the effect of using these approaches against the traditional approaches. In addition, this study seeks to identify the relationship between learners' learning style and multimedia-based reading comprehension.

In recent years, English has been given a high status in Iran. According to Tabatabaei and Banitalebi (2011), "in today's schools, reading in an L2 is a very challenging task" (p. 59). Hong (2005, p. 15) states that "from the cognitive view, reading is a conversation between reader and author, and thus the widely accepted models of fluent reading are an interactive one in which a variety of processes interact with text features."

The present study sought to investigate the effect of visualization on reading comprehension of Iranian EFL learners. It is assumed that paying heed to nature and types of visualization as well as investigating the effect of them on EFL learners' reading comprehension becomes prerequisite for language learning. Thus, the following research question was posed:

- Does visualization have any significant effect on Iranian EFL learners' reading comprehension ability?

METHOD

Participants

A sample of 60 Iranian intermediate-level students (females and males) participated in this experiment. These participants were selected from a larger sample of 74 students from a Iran Language Institute (ILI) located in the city of Zanzan by Oxford Placement Test. Participants' age range was between 20 and 25. Their native language was Persian and Azari. Then, the participants were randomly divided into two groups. The first group received multimedia-based texts with static visualizations, the second group was given multimedia-based texts with dynamic visualizations.

At the time of the study, all of the participants have been learning English at least for seven semesters in English language learning institute; therefore, it was assumed that these students were familiar with reading tasks. In addition, all of them were placed in the intermediate levels by the Oxford Placement Test.

Instruments

To collect data, this study made use of the following instruments: a) Oxford Placement Test (OPT) consisting of 70 items, including 10 multiple-choice and true-false reading, 10 writing, and 50 multiple-choice language use items. According to the Oxford Placement Test (Solutions) (2007), the intermediate learners are those who attain 31 and above (out of 50) on grammar and vocabulary section, and 8 and above (out of 10) on reading; b) a computer software, produced by a computer technician, which could play reading texts with static and animated pictures. This software packages, used on all versions of windows, was prepared by C# (C sharp). This software program is able to show a same text with two formats: the first format is multimedia-based texts with dynamic visualization (animation); the second format is multimedia-based texts with static visualization. The instructional module, used in the study, consisted of the two different reading texts that were provided for two groups of the study. Based on reading texts, reading comprehension questions were prepared. True/false questions and multiple-choice questions comprised the reading comprehension questions used for data collection; c) a reading comprehension test was developed and utilized to appraise the participants' reading comprehension ability. It was used before and after the treatment sessions functioning as pretest and posttest. This instrument consisted of 10 true/false and 20 multiple-choice items about the main points of the texts.

Procedures

At the beginning of the study, the reading comprehension pretest and posttest was piloted on 30 intermediate level EFL learners, who were similar to the participants of the study in terms of proficiency and age were asked to answer the reading tests to see if there were any ambiguous items and if any modifications were needed. After pilot testing the instruments, five items of the reading test were modified in terms of comprehensibility.

The psychometric characteristics (i.e., reliability and validity) of reading comprehension test were scrutinized. The validity of the reading comprehension was examined through the development and use of a detailed item specification as the blueprint and the judgment of 5 experts in the field of Applied Linguistics to ensure that the test was carefully and accurately planned to include reading comprehension abilities. The internal consistency or reliability of the reading comprehension test was also estimated through conducting Cronbach's alpha. The results showed that the reading comprehension test was satisfactorily reliable ($r = .81$). Therefore, the reading comprehension test showed a very good internal consistency and was reliable.

Based on the performance of the participants on OPT, 60 intermediates were selected. In this case, the participants whose scores fell within the range of intermediate cut-off scores (determined by OPT) were held in the study, and those who did not were excluded from the study. Regarding this, 14 learners were excluded from the main analysis.

The participants of each group had to choose the static/animation options. The static group received reading texts with static pictures and the animation reading texts with animated pictures.

Reading of each reading text, all groups took the reading comprehension test including true/false items and multiple-choice items. Taking place in a computer lab, firstly, the participants completed the consent form, which was one part of the software. Regarding the organization of the software, in the bottom was a navigation bar that helped students to go back or move forward within the instructional module. Reading materials were placed on the left side of the software screen and visual materials, either static or animated, were displayed on the right side of the screen. At the end of the study, post-test was administered in order to assess learners' reading comprehension ability.

RESULTS

Descriptive statistics such as mean and standard deviation of the pre-test scores are shown for both control and experimental group subjects in Table 1.

Table 1. Descriptive statistics of the groups' pretest scores

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Static	30	15.30	1.76	.32
	Animation	30	14.93	1.99	.36

The mean score of static group members ($M = 15.30$) was not very much different from the mean score of those in the animation group ($M = 14.93$). However, the value of p under the *Sig.* (2-tailed) column in Table 2 should be consulted to make certain whether this difference between the two mean scores was statistically significant or not.

Table 2. Results of the independent samples t-test for comparing the groups' pretests

	Levene's Test		T-test for Equality of Means						
	F.	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal Variances Assumed	.22	.63	.75	58	.45	.36	.48	-.60	1.34

According to Table 2, there was not a statistically significant difference in vocabulary pretest scores for the subjects in static ($M = 15.30$, $SD = 1.76$) and animation groups ($M = 14.93$, $SD = 1.99$), $t(58) = .75$, $p = .45$ (two-tailed). This is so because the p value was greater than the specified level of significance (i.e. .05). If the p value were less than the level of significance, the conclusion would be that the two groups were significantly different in terms of their pretest vocabulary scores.

Once it was concluded that the two groups were similar in terms of their reading comprehension ability at the outset of the study, any potential significant difference in their posttest could be attributed to the treatment, i.e. using visualization. The comparison of posttest scores of the control and experimental groups are presented in Tables 3 and 4 below.

Table 3. Descriptive statistics for comparing control and experimental groups' posttests

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Posttest	Static	30	35.23	1.99	.36
	Animation	30	43.93	3.66	.66

The mean score of static group members ($M = 35.23$) was less than the mean score of the learners in the animation group ($M = 43.93$). Nonetheless, to determine whether this difference between the mean scores was statistically meaningful or not, one had to check the value of p under the *Sig.* (2-tailed) column in Table 4.

Table 4. Independent samples t-test for comparing static and animation groups' posttest

	Levene's Test		T-test for Equality of Means						
	F.	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal Variances Assumed	19.23	.00	-6.16	58	.00	-4.70	.76	-6.22	-3.17

Based on the information in Table 4, there was a statistically significant difference in posttest scores for the learners in static and animation groups ($t(58) = -6.16$, $p = .000$) (two-tailed). Thus, visualization has a considerable effect on EFL learners' reading

comprehension. In addition, animation group outperformed the static group on the posttest. Therefore, the research question of the study was verified.

DISCUSSION AND CONCLUSION

The present study was designed to explore the impact of visualization on Iranian EFL learners' reading comprehension based on the researcher's motivation to find empirical evidences in Iranian English language learners. The reading instruction was provided through two methods; first, through the static visualization, second, dynamic visualization. The results of independent sample t-test showed that dynamic visualization was more effective in enhancing EFL learners' reading comprehension.

The results of the present study support those of Hegarty (2004) who found that creating documents that allow students to browse the information in any order was more useful than being constrained by the linear ordering of information in printed books.

The findings of this study confirm those of Tversky, Morrison and Betrancourt (2002) who reviewed several studies to scrutinize the role of animation in learning, looking into how visualization could facilitate learning. Their review focused on uses of animation to teach complex systems, mechanical, biological, physical, operational, and computational. They found that if only animation was used in the process of learning it could not facilitate learning. Actually, they concluded that most of the successes of animation seemed to be due to the advantages in extra information conveyed or additional procedures, rather than the animation of the information per se.

This study approves the results of Mayer and Moreno (2002) who examined the role of animation visualization in multimedia learning including multimedia instructional messages and micro world games. They presented a cognitive theory of multimedia learning and summarized a program of research, yielding seven principles for the use of animation in multimedia instruction. They confirmed that animation would lead to improve human learning especially when the goal was to promote deep understanding.

The results of this study proved that reading comprehension while using visualization would lead to better comprehension among EFL learners. Visualization increased the motivation of learners to improve their reading comprehension as they experienced different ways to learn reading. In addition to the fact that visualization was innovative for the participants of the study, it could provide opportunities for them to be more successful in their reading comprehension. They were involved in the process of learning by interactive visuals and activities, so it helps them promote reading comprehension. It was, also, found that by the use of visualization module as the one investigated in this study, EFL learners more opportunities to communicate in EFL classes.

Teachers' non-use of instructional media is one of the major reasons for lack of motivation among students (Javanbakht, 2014). The results of this study recommend EFL teachers to use reading instruction techniques in their classrooms. Furthermore,

the selection and the implementation of the appropriate kind of visualization materials can have a considerable effect on reading comprehension and consequently it would help save teachers' time and energy.

In this study, the type of strategies and communication style of participants were not investigated. Another research can use an attitude questionnaire to understand the types of strategies and communication style that learners used in the visualization classroom.

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