

Computer Assisted Reading (CAR) versus Traditional Print Format in EFL Academic Reading Comprehension

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Abstract

In this study two modes of reading (CAR and traditional print mode) were compared in regards to their effectiveness for L2 reading comprehension. A group of 120 English major students were divided into three classes: CAR, Traditional, and Control. Based on the English proficiency scores each class was divided into two groups (high and low levels of proficiency). Three classes were taught by the same teacher and covered the same materials in their weekly four-hour reading lesson over one semester. From the three classes only CAR and Traditional groups received reading strategies instruction. This study also investigated the effect of gender and role of the teacher in CAR class. The data came from English proficiency test, reading comprehension test (pre-test), questionnaire, reading comprehension test (posttest), observation, and students' emails. The results indicated that strategy instruction had an impact on reading comprehension. In other words, CAR and traditional mode evoked better reading comprehension than the control group and Car resulted in better performance when compared to the traditional mode. Interestingly, EFL students with a higher proficiency level showed a significantly higher level of reading comprehension of the text when compared with those students with a lower proficiency level. Regarding the gender the findings indicated that gender played no significant role

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in CAR class. Finally, based on the observation and students emails the researcher concluded that the nature of the EFL teacher's role changed in CAR class when compared with the traditional class.

Keywords: computer assisted reading, traditional print format

Introduction

Computer development and technical advancements have been burgeoning during the last twenty years. Improvements in the efficiency and quality, and refinements in computers and software along with decreased costs have made computer technology more and more accessible. Despite these advances, and given that reading development and instruction is a pedagogical priority at all academic levels, the impact of computers on the teaching of reading has been minimal. Although there have been numerous uses of computers in the area of reading, the possibilities for computer use in the reading classroom far outweigh many existing practices.

In current internet age, however, with its proliferation of information needed for academic purposes, students are exposed not only to conventional text presentation but also to electronic texts. The explosion of information adds an additional challenge to foreign language readers: they must be able to navigate through various text forms and actively create an individualized learning environment that would enhance the creation of meaning. To cope with academic reading of both conventional and electronic texts, readers require reading skills and strategies.

A number of researchers have encouraged the use of a computer environment for reading instruction (Kemp, 1993; Chun, 1994; Singhal, 1998; and Hancock, 1999). It was noted that the network computer environment creates a climate whereby learners gain autonomy and thus become empowered for reading beyond the language learning classroom (Peterson, 1997).

Computerized environments offer new possibilities to combine visual, verbal and auditory modes in multimedia presentations. The effectiveness of these capabilities available to L2 learners via multi-

media has been the focus of several studies.

Chun and Plass (1996) investigated the effects of multimedia on reading comprehension. The results of these studies showed that the use of multimedia facilitated overall reading comprehension and that vocabulary annotations consisting of both visual and verbal information were more effective than verbal information exclusively.

In contrast to this research, other studies on the effectiveness of computer multimedia were not able to prove that computers improve student performance. Donato and Coen (1987) claimed that they were not able to prove that computer use resulted in higher achievement than traditional modes of instruction.

Although the effectiveness of computerized multimedia environment on L2 reading comprehension has been a focus of several studies, research so far yielded somewhat conflicting results, especially when computerized environment was directly compared with traditional print medium. It is also unclear whether lower proficiency learners benefit more from computerized reading when compared to higher proficiency learners. The present study compares the efficacy of these two presentational modes on reading comprehension among EFL students of two proficiency levels, and compares the nature of the EFL teacher's role in these modes of reading comprehension. Moreover this study examines the gender differences in dealing with instruction via computer software.

Hypotheses

For the purpose of this study the participants were randomly assigned to the Control, Traditional print and Computer assisted reading (CAR) groups. The following five null hypotheses were formulated:

H# 1: There is no significant difference between the posttest scores of the EFL students from the two treatment groups and posttest scores of the EFL students from the control group.

H# 2: There is no significant difference between the posttest scores of

the EFL students from CAR group and the posttest scores of the EFL students from traditional print group.

H# 3: There is no significant difference between the posttest scores of the EFL students with a higher proficiency score and the posttest scores of the EFL students with a lower proficiency score.

H#4: There is no difference between males and females in dealing with instruction via computer.

H#5: There is no significant difference between CAR group and traditional print reading group regarding the teacher's role.

Method

Participants

The populations for this study consisted of 120 college students of English language. To measure the effect of gender half of the participants were males and half of them were females. All the participants took a proficiency test first. Then they were divided into two subgroups: those with a higher proficiency score and those with a lower proficiency score. The participants from each subgroup were randomly assigned to the computer assisted reading (CAR) group, traditional print group and control group.

Instruments

Data collection instruments were:

- 1.English Proficiency Test
- 2.Reading Comprehension Pretest
- 3.Reading Strategies Questionnaire
- 4.Computer Assisted Reading Program (first treatment)
- 5.traditional Print Reading Program (second treatment)
- 6.Reading Comprehension Posttest
- 7.Students' emails

To divide the participants into high and low proficiency levels, all of them took a proficiency test. The proficiency test was the

Michigan test of English language proficiency. It consisted of three parts: part I was a grammar test; part II was a vocabulary test; and part III was a test of reading comprehension. To know how much participants are familiar with reading strategies a reading test was given to them (pretest). The researcher used standardized reading test for this purpose. After taking the reading test a questionnaire about reading strategies was given to test takers. By this questionnaire the participants gave a report on their strategy use. Having the test takers assess strategy use after the test allowed the researcher to assume that test takers' overall reading comprehension performance was directly influenced by their strategy use in a natural way. This questionnaire was based on O'Malley and Chamot taxonomy and allowed test takers to make strategy use on a 5-point Likert scale: 1(never) 2(sometimes) 3(often) 4(usual) 5(always). The researcher used this questionnaire for her own information.

Computer Assisted Reading: it is a computer program that the researcher made through which strategies of reading were instructed. This software is based on the reading textbook "Brush Up Your English" written by Dr. Mehdi Nowruzi. Computer Assisted Reading (CAR) program is designed for Iranian college students of English language. CAR refers to instruction of reading strategies presented on a computer. Teachers can use this program to improve their students' reading strategies and build up their vocabulary. This program allows students to progress at their own pace and work individually. It provides immediate feedback, letting students know whether their answers are correct or wrong. Students may print out their answers at the end of each unit. Students submit their assignments, questions and request for clarification to the instructor via electronic mail. In addition to the obvious benefits to the students, there is less student anxiety, greater motivation, and greater feeling of success.

Traditional Print Reading Program: a traditional version of the above program was created in a way that it resembled a book. The information given in the print version was identical to the information in the software. The researcher had to keep in mind intrinsic format differences between computer software and print media making

necessary adjustments to both versions. For example, computerized graphics were replaced with static illustrations in the main body of the text. In this class reading strategies were taught in a conventional classroom using traditional print format.

At the end of semester all the participants of three groups took another reading test (posttest) and the results were compared to see which group performed better. The posttest was a standardized reading strategies test.

Analysis of students' emails is another instrument that the researcher used as an evidence to support the research findings.

Results

After scoring the tests, the results were put under a series of statistical analysis to provide answers for the research questions. The researcher used SPSS version 12 in the analysis of research data. Based on research hypotheses, inferential statistics such as analysis of variance (One Way ANOVA), GLM Univariate Analysis, T-test, F test, and Scheffe test were used to test the hypotheses.

To test the first two hypotheses the researcher has extracted the student's scores on reading strategies test before and after the study. In the first hypothesis the researcher assumed that the two experimental groups (CAR, Traditional) performances are higher than the control group and in the second hypothesis it was assumed that the performance of CAR group will be better than the traditional group. In the light of inferential statistics the researcher has used a One Way Analysis with three groups. The results revealed the null hypotheses are rejected and that there is a significantly different group means at an alpha level of 0.05 [$F= 82.56$, $df= 2,117$, $Sig-. /05$]. Table 1 calculates the number of cases, mean, standard deviation, standard error of the mean, minimum, and maximum of the dependent variable for each group.

Table 1: Descriptive Analysis of Each Group

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
CAR	40	7.1250	2.32255	.36723	1.00	11.00
Traditional	40	3.7750	1.88771	.29847	-1.00	7.00
Control	40	1.4250	1.72296	.27242	-2.00	5.00
Total	120	4.1083	3.07004	.28025	-2.00	11.00

Table 2: ANOVA of Each Group

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	656.467	2	328.233	82.56	.000
Within Groups	465.125	117	3.975		
Total	1121.592	119			

Once it was determined that differences exist among the means, post hoc range tests namely Scheffe showed which means differ. Pairwise multiple comparisons test the difference between each pair of means, and yield a matrix where asterisks indicate significantly different group means at an alpha level of 0.05. As we can observe from table 3:

1. The mean of CAR students performance is higher than other groups (M=7.12).
2. The mean of traditional students performance is lower than the CAR but higher than the control group (M=3.77).
3. The mean of control group is lower and significantly different from other two groups (M=1.42).

Table 3: Results of Post Hoc Tests (Scheffe) and Means for Groups in Homogeneous Subsets

Group	N	Subset for alpha = .05		
		1	2	3
Control	40	1.42		
Traditional	40		3.77	
CAR	40			7.12
Sig.		1.000	1.000	1.000

* The mean difference is significant at the .05 level.

These results led to the conclusion that there was indeed a significant difference between posttest means of three groups involved in the study. The analysis of the data showed that at the .05 level of significance there was noted a statistically significant difference between the posttest scores of the subjects from the CAR group as compared to the posttest scores of the subjects from the Control group. Results of the analysis show that when leveled on their pre-test scores, the students who received reading strategy instruction, either in CAR or traditional format, did score significantly higher than the participants from the control group. Consequently, the first null hypothesis was rejected.

The post hoc tests showed a significant difference between the posttest scores of the CAR group and the Traditional print group. Thus the second null hypothesis was also rejected.

In the third hypothesis after measuring student's English proficiency the researcher has divided them in two groups as low and high levels of proficiency. According to the research null hypothesis there is not a significant difference between them in posttest reading. Table 4 calculates the number of cases, mean, standard deviation, and means difference for the dependent variable for each group. The result of testing revealed that the null hypothesis is rejected and a difference has been observed. [t-test=-8.02, df=118, sig=.05]. So the analysis proved that students with higher proficiency levels achieved

a significantly higher level of reading comprehension than those students with a lower proficiency level.

Table 4: t-Test Analysis of High and Low Levels Groups of Proficiency

	proficiency level	N	Mean	Std. Deviation	Mean Difference	T	Df	Sig.(2-tailed)
posttest	Low	60	22.21	4.58	-6.41667	-8.023	118	.000
	High	60	28.63	4.16				

Moreover, in order to find out whether the students proficiency levels are different in three groups, the researcher has done a GLM Univariate analysis. The results indicated that their level of proficiency has not been changed during the study. [$F=1.228$, $df=2, 114$, $sig=.29$].

Table 5: The GLM Univariate Analysis

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Groups	694.050	2	347.025	25.740	.000
Proficiency	1235.208	1	1235.208	91.619	.000
Group * proficiency	33.117	2	16.558	1.228	.297
Error	1536.950	114	13.482		
Total Corrected	81071.000	120			
Total	3499.325	119			

A R Squared = .561 (Adjusted R Squared = .542)

The fourth hypothesis assumes that gender doesn't have any effects on students' posttest reading scores after the study. Here the researcher has just chosen CAR group and done a t-test analysis.

Table 6 calculates the number of cases, mean, standard deviation, and means difference for the dependent variable for each group. The result of testing revealed that the null hypothesis is approved and a significant difference was not observed between male and female students. [t-test=-.181, df=38, sig=. .85].

Table 6: t-Test Analysis of Male and Female Scores in Posttest

	Gender	N	Mean	Std. Deviation	Std. Error Mean	T	Df	Sig.(2-tailed)
posttest	Female	20	28.4000	5.51934	1.23416	-.181	38	.857
	Male	20	28.7000	4.93217	1.10287			

With reference to the fifth hypothesis, i.e., the teacher's role in the computerized reading classroom, as compared to the teacher's role in the traditional classroom, a noticeable difference was observed. Based on the researcher's observations in the computerized environment, the teacher's role could be described as that of an observer and facilitator. Through the use of computer, the teacher could interact with each student during every class meeting. As a result, the students in CAR groups had more opportunities to get individual assistance, and to clarify points. Moreover, the teacher-student interaction was conducted in complete privacy. The teacher was free to talk to individual students while others were working. The teacher provided assistance when it was appropriate and necessary without interfering with the students' initiative regarding the pace of work. It also provided the teacher with of observing individual work taking place at any computer. In this class students were allowed to determine their own rate, path, feedback, and schedule. Active and privacy of the student was emphasized. The researcher used the students' emails to support her statements.

In the traditional class, the role of the teacher was much authoritative. In this class it was the teacher who decided upon everything. The teacher dictated the pace of work and the students were expect-

ed to follow it. In this class the teacher planned what the students should read, and decided what kind of help to extend and to whom.

During the semester the researcher did not attend the CAR class for two sessions to see if the students face any problem in her absence. From the emails that the researcher received from students she found out that the problems that they had in her absence were more than the times that she was present the class. This led the researcher to conclude that it is better for the teacher to be present in the class. Although the teacher acts as a facilitator and she is shared with the computer, but it must be recognized that computer is not meant to replace the teacher. The teacher should be available for further assistance and questions so that students should not be deprived of human contact. So the fifth null hypothesis is rejected.

Discussion

In this study two modes of reading were compared in regards to their effectiveness for L2 reading comprehension: The computer assisted reading (CAR) and the traditional print mode. It was hoped that reading by computer would produce better performance than the traditional reading method. Consistent with Culver (1991), Kemp (1993), Chun (1994), Hong (1997), Singhal (1998), and Hancock (1999), the results of this study indicate that the medium of instruction does have an impact on the level of reading comprehension, with the CAR mode resulting in better performance when compared to the traditional print mode. The overall significantly higher scores with the CAR are attributed to several features of this medium that were incorporated in this software including electronic dictionaries, animations and fast and convenient delivery of these multimedia reading supports through well-designed strategies and orientation cues.

Students in the CAR class expressed more positive responses than those in traditional class to their learning environment. In the present study, students in the CAR class reflected on the numerous benefits they experienced by participating in the use of technology in learn-

ing reading strategies. Some factors extracted from students' emails and comments, which describe the classroom environment.

Firstly, the significant difference between the two classes was classroom interest. The students in the CAR class showed significantly higher interest in their learning in the class than the students in the traditional class. In other words, students in CAR class showed that the materials were presented in an interesting way and the class was well organized. These findings are similar to findings of other studies relating to computer assisted reading. The use of computers in language teaching appears to increase interaction with a variety of interesting, enjoyable and useful materials and tasks, which sustains and enhances the students' interest (Arroyo, 1992; Chun and Plass, 1997).

Next, students in the CAR class believed that the electronic medium had facilitated communication with the teacher, resulting in assistance and support being easily available. In fact, participants perceived their teacher to communicate enthusiastically with students and to be more available for assistance. A comparison between the two classes suggests the possibility of a positive impact of the computerized environment in terms of this factor.

Lastly, reduction of anxiety is one of the advantages of the CAR class. An important factor in lessening anxiety during learning is privacy. If the instructor records all students' scores as the students work, it inhibits the students' use and enjoyment of the materials. In the CAR class students saw the correct answers at the end of each exercise and the teacher planned to leave record-keeping optional and for final test scores only.

Therefore, the question is no longer whether or not to use computers as an educational tool, but rather how they can be used most effectively as part of the learning process. The multimedia computer provides important capabilities to assist in meeting this challenge.

Based on the analysis of the questionnaires which was given to students after the pretest, it was found that students were not familiar with the reading strategies. After giving treatments to CAR and traditional groups The result of the study indicated that reading strategy

instruction has a significant effect on reading comprehension as the scores of control group compared with the scores of CAR and Traditional groups. Thus, these results concur with the findings of the studies of Anderson and Vandergift (1996), Chamot, Barnhardt, El-Dinary, and Robbins (1999), and Janzen (2001). These researchers believe that teaching readers how to use strategies should be a prime consideration in the reading classroom.

The results of the study demonstrated that the students with higher proficiency performed significantly better on the posttest reading than the students with the lower proficiency. According to Yorio (1971) "the reading problems of foreign language learners are due largely to imperfect knowledge of the language". So, the relative attention should be given to this factor in foreign language reading pedagogy. Those readers of a foreign language with low proficiency level need to increase their ability in foreign language.

In agreement with Jennings and Onwuegbuzi (2001), Show and Gant (2002) and in contrary to Collis (1985), Adams and Bruce (1993), and Murray (1993) who believed that male tend to be more interested in computers than females, the results of this study indicate that gender plays no significant role in dealing instruction via computer software and male and female students benefited equally from participation in CAR class. Male and female students had positive attitude toward computers. This may reveal that the increasing number of female internet users is altering women's attitude regarding computer. Within this time, with greater adoption of technology by women, the difference observed in the earlier studies will disappear in later studies.

And finally, consistent with Levin, Ferez and Reves (2000) the result of the study indicate that computer change the nature of the EFL teacher's role in the academic reading class. The teacher's role in a computerized EFL classroom is mainly of mentor and facilitator. The teacher provides assistance when it is appropriate and necessary. Computer relieves teachers of some of burden of preparing and correcting large numbers of individualized exercises in basic concepts and skills and of recording grades. In essence, computer

assisted reading (CAR) to teach reading holds great promise for becoming powerful instructional tools that increase students' engagement in reading, enhances reading comprehension, and improve reading strategies. By using such a tool, teachers can vary the pace of instruction, review and reinforce learning, teach and address specific skills and strategies, enhance motivation, and provide immediate feedback. Another possibility that computers can offer, contrary to the traditional class, is privacy. When the reader works with the computer, only the machine and the teacher know his mistakes, so the student is freed from the fear of being ridiculed for his mistakes by his classmates. During traditional classes students having problems with reading comprehension very rarely volunteer to give an answer to a comprehension check question, as they are afraid they could be laughed at for not being able to master a level of reading skills and strategies which the majority of their group has already mastered.

Eventually, they become passive readers and very often only skim through the text just to be on the safe side in case the teacher asks them for the answer. The computer encourages such students to try and become active. There is no time allotted for all the students to read the text, so the students who need more time to read the text can take their time and work at their own pace, which certainly increases comprehension. Since no colleagues judge their results, worse students are not afraid to answer the questions. It frees them to focus on the further development of reading strategies, previously hindered by the fear of being mocked. Thus, computerized reading comprehension exercises may be particularly beneficial for learners regarding themselves as less able. Since the computer activity of whatever kind, be it a text with questions, a maze, or a riddle, can not be completed without the learner's full participation, the student must be active all the time, which is easy taking into consideration the fun factor provided by the computer applications. The student can no longer just passively listen to the teacher, as it happens during the traditional classes. These features combined increase the likelihood that students' engagement in reading instruction will be increased.

It must be recognized that the computer is not meant to replace the teacher or reduce the number of teachers needed, but rather improve and enhance classroom reading instruction. The thrust of computer assisted reading is to raise the quality of education, not to reduce its cost. Well-designed multimedia computer programs can allow students to apply what they learn in meaningful reading activities that meet their individual needs, and such programs can also stimulate interest and increase motivation.

Instructional programs can be developed to teach reading and comprehension skills and strategies that go beyond simple busy tasks that students often respond negatively to. Reading instruction via the computer has the potential to actively engage students in the reading and learning process because of its capabilities to meet their varying needs, and help students perceive the value of success, and their own potential as readers. Teachers should look on computers as a new and powerful tool for helping them to teach their students more effectively.

Conclusion

The overall finding of this research is that computer assisted reading (CAR) has a positive impact on reading achievement. Computer applications to teach reading hold great promise as instructional tools to increase students' engagement in reading, promote reading comprehension, and improve reading skills. CAR can assist teachers in developing a more individualized approach to reading instruction to meet the diverse range of students' needs in classrooms. Teachers can be empowered to vary the pace of instruction, review student learning, teach and reinforce specific skills and strategies, improve motivation, and provide students with relevant and timely feedback.

Reading instruction aligned with computer assisted reading can serve as a powerful teaching tool to assist teachers in helping students reach their potential in reading.

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