

The Effect of the Use of Interactive Whiteboards on Iranian EFL Students' Reading Comprehension Performance

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Abstract

The purpose of the research reported in this paper was to investigate the effect of the use of Interactive Whiteboard on Iranian EFL students' reading comprehension performance. For this purpose, the samples of intact students were selected, and assigned randomly in two groups: the control group (N=30), and the experimental group (N=30) All students were female, at the same social class, never experienced overseas trip, and their ages were between 14 and 15. The two groups were given a similar reading comprehension test as a pre-test. Yet, the researchers did not depend on this and administered a sample reading comprehension test to determine their level of reading comprehension performance and find out whether the experimental and control groups were homogenous or not. After the assumptions of normality and homogeneity have been met, the two groups were given two different instructions. The experimental group participants were taught by the use of Interactive Whiteboard, and the control group participants were taught by the use of traditional methods of teaching reading. After three months of instruction, the two groups were given a similar test as a post test. The researchers applied Independent-Sample T-Test to capture differences, if any, between the experimental and the control groups and to determine the possible effect of Interactive Whiteboard use on students' reading comprehension performance. Results showed higher reading comprehension performance among the participants of the experimental group who used Interactive Whiteboard than the participants in the control group who did not use Interactive Whiteboard.

Keywords: interactive whiteboard, reading comprehension

I. INTRODUCTION

There is no doubt that technology-enhanced education is becoming an increasingly important component of teaching and learning language as well as other subjects. The use of modern technology application (video conferencing, a synchronous tutorials, speech recognition etc.) affects the techniques we learn and use to teach languages (Chen, Belkada & Okamoto, 2004). In fact, digital technology has played an important role in facilitating the

ways materials are delivered and shared not just from teachers to learners, but also among learners themselves. A significant number of researchers have investigated the impact of technology in language teaching and learning in different settings and contexts (for example, Lee, 2000; Crystal, 2001). Most of this research has proved that technology can bring improvement in students' achievement. According to Lee (2000), computers have numerous benefits for teaching and learning process, which include (a) improving students' practices through experimental learning, (b) enhancing students' motivation, (c) improving students' achievement, (d) creating more authentic activities and materials, (e) encouraging greater interaction between teachers and students and among students themselves, (f) emphasizing students' individual needs, and (g) enlarging global understanding. "Technologies have the potential to revolutionize the teaching and learning process, offering students opportunities to learn in new ways" (Crystal, 2001). Technology has become a critical component in classrooms during the 21st century, with districts implementing to improve teaching, facilitate learning, and increase students' involvement in classrooms.

One example of the use of technology in classrooms is interactive white board (IWB) which has the potential to improve teaching and learning experiences by offering useful ways to students to interact with electronic context (Campbell, 2010).

A. Interactive Whiteboard

An interactive whiteboard is a touch-sensitive screen that works in conjunction with a computer and a projector. IWBs are devices which are connected to a computer, which in turn are connected to a multimedia projector. The first IWB was manufactured by SMART Technologies Inc. in 1991. Interactive whiteboards were originally developed for office setting and are relatively new addition to education (Smith, Higgins, Wall, & Miller, 2005). IWBs have two modes (1) the control mode: such as electronic pen, or stylus act as mouse, it is computer control mode, and (2) the writing mode: the use as an actual writing implement, it is writing mode. Applications of IWB are dependent on the software that is installed and used on the computer connected to the IWBs. Educators were the first people to recognize the IWBs potential as a tool for learning, meeting and presenting, and they continue to comprise the largest user base for this technology, particularly in the United States and the United Kingdom.

B. Interactive Whiteboard and its Uses

Some of the many applications are hiding and retrieving, printing notes, capturing and manipulating web content, shading, coloring and animation, In addition, more recent IWBs allow teachers to connect over the internet to a library of subject specific flash content like virtual calculator, interactive maps, and more. Certain factors play a major role in how IWBs are used in education and are sometimes called "contextual factors" (Schuck & Kearney, 2007). Contextual factors are school culture, teacher training, time to practice and prepare materials, teacher confidence, and technical support. Other factors are classroom set up, and the quality of equipment (Higgins *et al.*, 2007; Smith *et al.*, 2005).

Student's engagement in learning process has been shown to increase when an IWB is used to deliver content. Enjoyment increases during the use of an IWB. The text accompanied by video, sound and students are more at task behaviors when an IWB is used during instruction. The use of an IWB to teach elementary social studies was shown to increase the learning of context material based on pre- and post-test scores (Amolo & Dees, 2007).

"Students who have IWBs showed improved academic progress in mathematics and science, and have positive impact" (Somekh, *et al.*, 2007). Swam (2008) also found statistically significant achievement gains for students whose teacher used an IWB, and small positive achievement gains were also seen in reading and language art. In an impact study that was held in UK (BECTA, 2002) which investigated the impact of information and communication technology (ICT) on education attainment, the positive association between IWBs and higher achievement in a rational test for English and mathematics were also found. Interactive whiteboards affect learning in several ways, namely: raising the level of students' engagement in a classroom, motivating students and promoting enthusiasm for learning, supporting many different learning styles which are used in a variety of learning environments, increasing students attendance, designing lessons around IWBs which help educators streamline their preparation, being more efficient in their information and communication technology (ICT) integration, and increasing their productivity overall.

In general, teaching and learning activities with IWBs may include the following uses (Březinova, 2009; Brown, 2009; Swan, Schenker, & Kratcoski, 2008):

1. Motivating teachers to incorporate and develop more digital resources such as video clips, films, sounds, songs, interviews, electronic microscopes, instructional games, online interactive websites etc.
2. Enabling teachers to write, highlight, edit on-screen and save changes for further use; this makes it easier to build a collection of learning materials that can be regularly updated.
3. Motivating students by allowing them to come to the front of the class and demonstrate their knowledge by completing a diagram, a sentence, a picture, etc.
4. Viewing and browsing the Internet from the whiteboard, allowing all students to see and interact with visited websites in a teacher-guided manner.
5. Providing an electronic flipchart, with all notes and diagrams saved as an HTML file for later use (e.g. for printing).
6. Promoting collaborative learning by allowing students to add their contribution to the discussion by writing directly on the whiteboard. In addition, groups can view and solve interactive problems
7. Demonstrating how educational software works.
8. In a networked environment, allowing teachers to monitor each student and choose which screen is displayed on the whiteboard.

9. Catering more effectively for students with special needs, for example by using the large fonts and bright colors to help those who have trouble staying on task.
10. Running online tests and displaying instant feedback to the group.

This technology is very popular among educators and rather popular among teachers. English teachers use this technology to teach vocabulary and English literacy, and during latest decade plenty of useful materials were produced in this realm, even though the impact of this technology and its application on EFL student's literacy, and usefulness of this material are still unanswered questions. All in all, there is a common sense among teachers, students and the government to use IWBs to increase the quality and quantity of learning and teaching and to create new dimensions to learning and teaching in which students themselves take the responsibility of their own learning. In spite of the wide use of IWBs to teach different area of knowledge, how to use IWBs to teach EFL students' literacy and most of all to teach reading, and measure its effect on the students' reading performance is still a burning problem. Teachers usually teach reading by the use of old-fashion techniques and strategies established long before. Using IWBs encourages using new ways of teaching reading in which students learn cooperatively within their own group.

What follows is a brief elaboration on reading skill, in general, and reading comprehension, in particular, which seems to help develop a clearer understanding of reading comprehension.

C. Reading

Reading is the most important activity in any language class, not only as a source of information, and a pleasurable activity, but also as a means of consolidating and improving one's knowledge of the language. Reading must not be seen as a passive activity, but an active one in which the reader brings his personal knowledge or schema to the text in front of him or her. The interactivity is triangular: between the reader, the text, and the message. The goal is to engage the thought, facts, viewpoints, bias, etc. that the writer has put together on the page. Reading is the receptive skill in that the reader is receiving message from the writer. (Mirhassani & Ghaemi, 2007).

D. Top-Down Model of Reading (Process)

It can be taught of as "reader driven" where schemata that the reader brings to the text drives comprehension. Here focus is on reader. The process account of reading takes the reader rather than the text as a point of departure. It is the combination of the interactive and bottom up models of reading. They put great emphasis on background knowledge and value what the reader brings to the reading. In the 1980s and 1990s, the role of the reader shifted. In early account of reading, the reader was seen as passive; reading along with listening was referred to as 'passive skills '. There was then a shift in emphasis from a passive, acquiescent

reader to an active one. More recently the ground has shifted again to talk of reading as 'interactive' rather than simply 'active'. (Mirhassani & Ghaemi, 2007).

E. Reading Comprehension

Reading comprehension is defined as the level of understanding of a text. This understanding comes from the interaction between the words that are written and how they trigger knowledge outside the text (Tompkins, 2011). Comprehension is a "creative, multifaceted process" dependent upon four language skills: phonology, syntax, semantics, and pragmatics (Tompkins, 2011). Proficient reading depends on the ability to recognize words quickly and effortlessly (Adams, 1994). It is also determined by an individual's cognitive development, which is "the construction of thought processes". Some people learn through education or instruction and others through direct experiences (Tompkins, 2011).

Reading comprehension involves two levels of processing, shallow (low-level) processing and deep (high-level) processing. Deep processing involves semantic processing, which happens when we encode the meaning of a word and relate it to similar words. Shallow processing involves structural and phonemic recognition, the processing of sentence and word structure and their associated sounds. (Cain & Oakhill, 2009)

This study not only seeks the impact of IWBs on EFL reading comprehension performance, but also proposes sustainable ways to teach reading by the use of IWBs. Also the researchers could offer some suggestions about how to use IWBs in English classes, and they could find the other problematic areas in which teachers usually face during the use of IWBs and try to suggest some solutions for them.

F. Research Questions

1. Does the use of interactive whiteboards have any effect on students reading comprehension performance?
2. Is there a significant difference between those students who were taught by the use of IWBs and those who were not?

II. METHODOLOGY

A. Participants

For the purpose of the study, 60 senior high school students from two state high schools in Khoramabad were selected and assigned randomly as control and experimental groups of the study. There were 4 classes involved in the study. The researchers assigned the classes into a control group (N=30) and an experimental group (N=30). All students were female, at the same social class, never experienced overseas trip, and their ages were between 14 and 15. Yet, the researchers did not depend on this and administered a sample reading comprehension test to determine their level of reading comprehension performance and find out whether the experimental and control groups were homogenous or not. The groups were

intact and not randomly selected, but randomly assigned. In this study, the experimental and control groups attended English class 3 hours per week, and received 3 months of instruction. During the course, the students received two different types of instructions. One was provided with traditional methods of teaching reading and the other one (i.e. the experimental group) was provided with the use of interactive whiteboards.

B. Measuring Instruments

To ensure that both the control and experimental groups were equal on their reading comprehension performance before the study, a sample reading comprehension test was administered to the participants. This test was made by the researchers and its validity and reliability had been confirmed before the research began. For the assumption of the normality, the researchers applied Kolmogorov-Smirnov test to see whether the assumption of normality has been met or not. After that, the researchers applied an Independent Sample T-Test to ensure the homogeneity of the groups involved in this study.

After three months of instruction, a similar reading comprehension test which was made by the researchers and its validity and reliability had been confirmed before was administered to the learners. The researchers applied an Independent Sample T-Test again to ensure the possible effect of the IWBs use on students' reading comprehension performance.

Regarding the validity and reliability of the pre- and post-tests, the researchers gave the test to three high school teachers in order to ensure its validity. Cronbach alpha formula was used to show a relative estimate for reliability.

C. Training Instruments

To raise the experimental groups reading comprehension performance, some materials were used. These include Interactive whiteboards, pre-programmed materials, and some researcher-made materials.

An interactive whiteboard is a white sheet that is hung before the class and connected to the computer and reflect programs, pictures, movies, and slides which are projected by the computer. This kind of IWB is a basic kind of IWB which was not touch sensitive but is commonly in use in most schools in Lorestan province and other parts of Iran.

Pre-programmed materials were those materials, which were designed by EFL experts and were provided by the Ministry of Education and contained programs and materials for each grade and were ranked to each lesson.

Researcher-made materials were those materials which were provided by the researcher and contained pictures, movies, PDF and PPT slides and word documents to fulfill the shortcoming of the previous materials were mentioned above or make them fit to the class situation.

The materials which were used in the control group are those applied by many teachers in Iran such as whiteboards, and students' books provided by the Ministry of Education.

D. Design and Procedure

Two groups of intact students from two state high schools were selected and assigned randomly, as the control group (n=30), the experimental group (n=30). In both groups the students were assigned in 6 groups, and then they were given similar reading comprehension tests as a pre-test to see their level of performance in reading comprehension and to ensure the assumption of normality and homogeneity of two groups. After the researchers were ensured that the assumption of normality has been met and the two groups were homogenous then the students were given two kinds of instructions. The control group was taught by the use of traditional methods for teaching reading. First, the new words were taught and practiced by writing them on a whiteboard and putting them in some new sentences, and then the students got into the text. When the text was read by the students, the teacher (one of the researchers) asked comprehension questions and each volunteer group answered them. On the other hand, the experimental group was taught by the use of interactive whiteboards (IWBs) where the whole reading comprehension text was played by a computer program. In the instructions which were provided for the experimental group, the researchers considered process model of reading which is the combination of bottom up model and interactive model of reading where students brought their background knowledge to the process of reading, and motivated to take apart in this process by providing them some pictures or related topics. Here, reading type was the intensive one so vocabulary was taught before students got into the reading process. In the experimental group, the researchers used IWBs to provide some pictures to teach new words of reading and try to select those pictures with a low amount of ambiguity. In the second step the researcher provided some scrambled sentences or pictures to ask the students to put them in the right order, here the teacher could also act as prompter to promote them to notice language features in the text while reading, and help students to make story map out of the images or text. After they put them in the right order, the students were asked to answer comprehension question about the paragraph were recently built by themselves (here the students work in group), when the paragraph was completed, the students were asked to put a key word for each paragraph, at last the students were asked to give a new topic to overall passage. To answer the comprehension question students were asked to select a picture for each comprehension question, it is worth to say that each part of these activities completed in each group. At the end of the course two groups were given a similar reading comprehension test to see the possible effect of interactive whiteboard on students reading comprehension performance if any and decided on the results obtained from that test.

III. RESULTS & DISCUSSION

As stated previously, to answer the research questions, the researchers applied Independent-Sample T-Test using SPSS (SPSS Inc., 2009) to ensure the homogeneity of the two groups and the assumption of normality, and to analyze probable differences between the experimental and control groups' reading comprehension performance.

The pre-test results, using an Independent-Samples T-test demonstrated the amount of F value when the equality of variance was assumed, or t value and p value when the equality of variance not assumed. It could be inferred from the observed reading comprehension pre-test results that for the F value the amount of p .670 is greater than Alpha (.05), also t value of -1.121 did not fall within the critical region defined by the critical value or degree of freedom for 58 which is ± 1.676 and the p -value of .267 is greater than alpha of .05. ($t = -1.121$, $p > .05$). So both groups seemed to be homogeneous on their reading comprehension performance (see Appendix A: Tables 1 & 2).

It is worth saying the assumption of normality which was in favor of retaining null hypothesis was calculated by the Kolmogorov-Smirnov test. The amount of significance value for the control and the experimental groups were greater than Alpha (0.05). It could be inferred that, the amount of dependent variable value distributed normally between the participants of the control and experimental groups (See Appendix A: Table 3). Table 3 showed that the assumption of normality has been met.

In order to see the possible effect of independent variable (IWBs) on dependent variable (student's reading comprehension performance) a similar test as a post-test was administered between the experimental and the control groups. Here again the amount of F when the equality of variance was assumed or the amount of t and p when the equality of variance was not assumed, were considered.

The post-test result demonstrated the Independent Samples T-Test analysis of the similar reading comprehension test between the experimental and the control groups. It could be inferred from the observed reading comprehension post-test results that t value of -3.754 falls within the critical region defined by the critical value of ± 1.676 and the p -value of .000 is smaller than alpha of .05. ($t = -3.754$, $p < .05$). (See Appendix A: Tables 4 & 5). Therefore the null hypothesis is rejected and there was significant difference between the two groups' reading comprehension. It is worth saying that, the amount of F was not concerned in both pre-test and post-test results, because the equality of variance was not assumed.

IV. CONCLUSION

As stated earlier, Interactive whiteboards affect learning in several ways including raising the level of student's engagement in classroom (see, for example, Kent, 2003; Lee & Boyle, 2003), promoting enthusiasm for learning and motivating students (see, for example, Miller *et al.*, 2005; Blanton & Helms-Breazeale, 2000; Bush *et al.*, 2004; Cooper, 2003; Greenwell, 2002; Lathman, 2002).

IWBs support many different learning styles and are in variety of learning environments (see, for example, Salintri, Smith & Clovis, 2002; Jamerson, 2002; Cooper and Clark, 2003; Beeland, 2002; Cunningham *et al.*, 2003). It can be said that, IWBs can indeed provide a multitude of rich learning opportunities for students, from demonstration to jeopardy-type games and everything in between. When students' participation is encouraged; the sky is the limit in terms of students learning potential. IWBs take learning to a whole new dimension, beyond teacher-centered lectures to teacher facilitated explorations, utilizing sight, sound, and touch. In effect, interactive whiteboards can move students from being one-dimensional thinkers to well-rounded critical thinkers.

As was mentioned previously, the majority of research supported the positive effect of IWBs on student's attention, motivation, and participation. In contrary, the particular study written by Solvie (2001), found that there was not a significant difference in students attention and motivation when using an interactive whiteboard as opposed to when one was not used. All in all, in this study, the researcher wanted to see the possible effect of IWBs on EFL student's literacy or on student's reading comprehension performance in detail.

A. Research Implications

Several pedagogical implications emerged from the results of the present study. To begin with, this study could be an attempt to contribute to the Iranian educational reform process. Learning is far and wide entity and should be divided into its sub ordinates, and investigate the impact of technology on each one by one. As stated earlier, IWBs are used in educational environments such as schools and universities. One question will rise here "what and how"? This study the researcher investigated the effect of IWBs on EFL students' reading comprehension performance and found that, the use of such a technology has a positive effect on EFL students' reading comprehension performance, so it is worth to use this technology to teach reading as a language skill. This technology could help students as follow; (a) bare an intended idea in their own mind (b) have a distinct background and point of view about what has gone in each paragraph, (c) have the same conclusion as the author and the teacher intended, (d) making a story map out of a text by putting the pictures in right order as provided by the IWB, (e) encouraging group learning and working in pairs (f) use the process model of reading, (g) use the computer as a median, (h) use pictures more than abstract words, (i) put a key word or a picture for each paragraph, (j) select a picture to answer comprehension questions. Moreover this technology is less time and energy consuming and help teacher to save the time and as far as it is interactive, motivate students, and hold them aware in a process of learning, and with the great number of applications which is provided by this technology it can support different learning styles to teach reading comprehension.

B. Suggestions for Further Research

In order to complete the findings of present study, some further research can be suggested:

- 1- Much empirical research is needed to ensure the positive effect of Interactive Whiteboards on EFL students' reading comprehension performance.
- 2- Further investigation is needed to ensure the possible effect of IWBs on EFL students' language skills and sub-skills, such as, listening, speaking, writing, grammar and vocabulary.
- 3- Similar studies are critically needed in other parts of Iran to see whether the results will be the same as or different from the results of the present study.

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Appendix A

Table 1: Reading comprehension pre-test results: Independent Sample T-Test on group differences

Group Statistics

	co & ex groups	N	Mean	Std. Deviation	Std. Error Mean
Pre-test Results	Control	30	7.47	2.529	.462
	Experimental	30	8.27	2.982	.544

Table 2: Independent Samples T-Test

pre-test Result	Levene's Test for Equality of Variances		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 variance assumed	.184	.670	-1.121	58	.267	-.800	.714	-2.229	.629
Equal variance not assumed			-1.121	56.493	.267	-.800	.714	-2.230	.630

The mean difference is **not** significant at the 0.05 level.

Table 3: Tests of Normality

	co & ex groups	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
pretest score in control & experimental group	1	.250	30	.054	.821	30	.018
	2	.205	30	.092	.897	30	.086

a. Lilliefors Significance Correction

Table 4: Reading comprehension post-test results: Independent Sample T-Test on group differences

	co & ex groups	N	Mean	Std. Deviation	Std. Error Mean
post test score in control & experimental group	1	30	9.40	2.686	.490
	2	30	12.07	2.815	.514

Table 5: Independent Samples T-Test

<i>Post-test results</i>	<i>Levene's Test for Equality of Variances</i>		<i>t-test for Equality of Means</i>						
	<i>F</i>	<i>Sig.</i>	<i>T</i>	<i>Df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Difference</i>	<i>Std. Error Difference</i>	<i>95% Confidence Interval of the Difference</i>	
								<i>Lower</i>	<i>Upper</i>
<i>Equal variances assumed</i>	.210	.649	-3.754	58	.000	-2.667	.710	-4.089	-1.245
<i>Equal variances not assumed</i>			-3.754	57.872	.000	-2.667	.710	-4.089	-1.245

The mean difference is significant at the 0.05 level.