

Computer-Assisted Instruction (CAI) and the internet-Based TOEFL (iBT): A Study of the Effects of a Preparatory Course on Iranian Learners' Reading Abilities and Attitudes

Ahmad Reza Lotfi
Azad University of Khorasgan

Amin Dehghan
Azad University of Khorasgan

Abstract

Technology has not only impacted the world, but also ESL/EFL instruction and assessment. Computer-Assisted Instruction (CAI), as a part of the digital world, plays an important role in second language instruction. The aim of this study was to investigate the effects of computer-assisted instruction (CAI), paper-based instruction (traditional instruction) and self-study (independent) learning on Iranian learners' TOEFL iBT reading comprehension and their attitudes towards computer-assisted instruction and. To do so, 82 male participants were selected from advanced learners of English at Iran Language Institute. Both the participants of computer-assisted and paper-based instruction received 16 sessions of instruction and the independent participants (self-study group) received a 16 session schedule supplying with electronic materials. The results indicated that the participants of computer-assisted instruction group outperformed the other groups significantly. Moreover, the traditional group outperformed the self-study group. It is worth noting that Iranian EFL learners' attitudes toward computer-assisted instruction changed significantly at the end of the instruction.

1. Introduction

For a long-term learning goal, reading is the most important of the four language skills in learning English as Second Language (ESL) or as an English as Foreign Language (EFL) (Carrell, 1987). Carrell also indicated that effective reading is critical for students in EFL contexts and for students with academic purposes. In addition, as more and more Iranian students wish to pursue their studies at graduate and postgraduate levels, preparation for the TOEFL has been become increasingly important. In recent years, Educational Service Testing (ETS) has introduced its Next Generation TOEFL, also known as internet-Based Test (iBT). ETS Test and Score Data Summary for TOEFL® Internet-Based Test (2007, 2008) reports show that Iranian students often find the TOEFL reading comprehension,

especially iBT TOEFL, frustrating. However, iBT TOEFL is going to take the place of Paper-Based TOEFL (PBT) sooner or later. To cope with the competitive edge in the age of technology and information, an effective and efficient reading ability is the key to academic success (Levine, Ferenz & Reves, 2000).

Therefore, this study will determine on how Computer-Assisted Instruction (CAI, henceforth) can be appropriately used to facilitate language learning and iBT TOEFL reading comprehension and how instruction can guide interactions that facilitate human communication and text comprehension. Interactive technology in the form of interconnected texts with links to word definitions, background information, and comprehension questions, has been used to enhance different aspects of second language (L2) reading processing (e.g., Martinez-Lage, 1997).

Technology has impacted foreign language instruction. Numerous ESL/EFL studies (Chapelle, 2001; Egbert, 2002; LeLoup & Ponterio, 2003; Williams & Williams; Levine, Frerenz & Reves, 2000) suggest that technology incorporated in language learning can improve students' academic performance, enhance motivation, and promote learning. The application of practice with the most relevant technology in a particular context is challenging language teachers to achieve effective teaching with technology.

As computer-assisted instruction (CAI) is increasingly integrated into curricula to promote the development of all skills, it is important to understand how software design impacts educational effectiveness. The most basic CAI software is little more than an electronic textbook enhanced with electronic flashcards where the student is presented with a series of facts and answers a series of questions. Existing studies have confirmed that using CAI software can be an effective learning tool.

2. Literature Review

Current technology as an educational tool provides computer-mediated interactions among participants and facilitates language learning and textual interactions. Computer technology has been viewed both as an instructional medium and a cognitive tool. Researchers have proposed that technology as a tool can provide assistance to help individual learners accomplish cognitively challenging tasks (Davis & Linn, 2000; Pea, 1985; Quintana et al., 2002; Salomon et al., 1989; Salomon et al., 1991). In other words, technology pushes learners to their potential levels of development with guidance. Technology, in this regard, is viewed as a "more knowledgeable teacher" or "more capable peer" in the learners' ZPD (Salomon et al., 1989). Instructional supports or prompts, such as reading questions and contextual information, embedded in the

online texts are used to guide readers' access to texts or prompt some aspects of the reading process. Researchers have suggested that the various uses of electronic texts can increase reading comprehension and learning (Anderson-Inman & Horney, 1997, 1999; Reinlcing, 1988, 1992; Reinking and Rickman, 1990; Roblyer, 2003; Salomon et al., 1989). For example, Salomon et al. (1989) found that the seventh graders who used computer tools that included metacognitive reading questions during the reading of 11 texts over three reading sessions showed better metacognitive reconstruction, reading comprehension, and essay writing than did the participants in the content question group and the control group without any text support. Reinking and his colleagues also found that computer-mediated texts with instructional support, such as definitions of key vocabulary, contextual information, and embedded comprehension questions are effective in facilitating immediate L1 readers' reading comprehension (Reinking, 1988; Reinking & Rickcman, 1990; Reinking & Schreiner, 1985). These L1 reading studies have shown that computer technology can model metacognitive strategies and afford reading activities that direct readers' thinking during reading, guide readers to monitor their reading processes, and gradually help them become independent readers.

Since word definitions are the most frequently accessed contextual aids in second language education (Liu, 1995), research on technology and reading comprehension has focused on the use of word definitions. In a body of L2 research, annotations or glosses as contextual aids to read online texts have shown both positive and negative effects on reading comprehension (Chun & Payne, 2004; Chun & Plass, 1996; de Ridder, 2000; Hulstijn, 1993; Kasper, 2003; Leffa, 1992; Lomicka, 1998; Plass, et al., 1998, 2003). These studies found that word definitions embedded in the online text can promote a deeper level of text comprehension by making correct inferences during reading (Chun & Plass, 1996; Kasper, 2003). However, multimedia annotations also impose a high cognitive load on L2 learners because of multiple presentation of information (Plass et al., 2003). While electronic texts provide immediate access to multiple forms of annotations, EFL learners also need to appropriately use online annotations or dictionaries to facilitate their L2 online reading comprehension.

Technology has greatly impacted ESL/EFL instruction. Studies have shown that technology used in language education is effective in helping students learn and increases student's motivation (Cotton, 1992; Chapelle, 2001; Chen & Huang, 2001; Egbert, 2002; LeLoup & Ponterio, 2003; Williams & Williams, 2000). Research (McGrath, 1998; Warschauer, 1996) supports the use of electronic technologies with ESL students to help them acquire the linguistic and technological skills needed for success in the digital age. Other researchers (Leu, 2000; McGrath, 1998) recommend that technologically-based literacy instruction must include opportunities for critical inquiry and problem solving, cooperation and collaboration,

interdisciplinary explorations, scaffolding of instruction, and shifting of control from teacher to student. Technology use increases students' motivation to learn when it promotes active engagement with language and content through authentic, demanding activities that are interdisciplinary in nature (Leu, 2000; McGrath, 1998).

Changing the mode of delivery of a standardized test such as the Test of English as a Foreign Language (TOEFL) from a paper-and-pencil format to a computerized format brings with it both "promises and threats" (Canale, 1986). Improvements planned for computerized TOEFL tests in the next decade, for example, include tailoring item administration to examinees' ability levels, creating new item types which will allow constructed responses, enabling test takers to control the pace of the assessment (e.g., the speed with which the next listening item is presented), adding pictures and graphics to contextualize items, providing immediate feedback on machine scored items, allowing flexible scheduling, and reporting scores faster. These improvements are intended to make the TOEFL test more meaningful to examinees, to English as a second / foreign language (ESL/EFL) teachers, to admissions officers, and to others who use the test scores.

The potentially confounding effect of computer familiarity and computer-assisted instruction on computerized test performance is a threat not unique to the TOEFL iBT program. However, while many studies have investigated relationships between computer experience and variables such as age, gender, attitude, and anxiety (e.g., Loyd & Gressard, 1984; Marcoulides, 1988; Levin & Gordon, 1989; Kay, 1992; Miller & Varma, 1994), there is relatively little literature discussing the effects of computer assisted instruction on performance on computer-based language tests. Further, there do not appear to have been any studies of this issue with Iranian EFL learners' population.

3. Methodology

3.1. Participants

The participants of this study were 82 male learners, selected from among the advanced learners of Iran Language Institute (Yazd Branch). The participants were considered homogenized based on the institute's criteria. In Iran Language Institute (ILI), the learners who have passed ILI devised books of High Intermediate 1, 2 and 3 are regarded advanced. The age range of the learners was between 18 to 27 years old.

3.2. Instrumentation

A thirty-item questionnaire based on a Likert 5-point scale were given to all the participants at the beginning of the study and the computer-assisted instruction (CAI) and the self-study groups of participants at the end of the

instruction who pursued the instruction through electronic learning module to investigate their attitudes toward computer-assisted instruction. TOEFL iBT reading comprehension passages were used as the material of the study during the instruction.

The researcher used Longman Preparation Course for the TOEFL Test: Next Generation iBT 2006 by Pearson Education, Inc. as the main software and Kaplan TOEFL iBT and ETS TOEFL tutorials and samplers as additional aids for the CAI and the independent groups

3.3. Procedure

The participants were randomly assigned to 3 groups, the traditional (31 participants), computer-assisted (18 participants) and self-study group(33 participants). An iBT TOEFL reading comprehension test sampler were administered to all groups as the pre-test. Before the instruction begins, the participants in the self-study group were trained to use the software. A questionnaire was given to both the computer-assisted instruction and the self-study group on the first day and the last day of instruction to investigate their attitudes toward CAI. The 2 hours instruction was given twice a week during 8-week instruction, so it was 16 sessions in total. In each session the participants of the computer-assisted instruction and the independent groups were provided with 1 TOEFL reading comprehension passage and they worked on them under the researcher supervision. It is worth noting that both the self-study and the computer-assisted instruction groups had access to the courses and the materials through the software all the time. Finally, the post-tests were administered after the instruction ended.

4. Results and Discussion

After collecting the data and scoring the tests, statistical analysis was performed using SPSS software. First, the descriptive statistics such as the mean, standard deviation, and range were calculated in order to examine the central tendencies and variability of the scores.

Table 4.1. Descriptive Statistics

	N	Mean	Std. Deviation	Std. Error
T group:(pre -test)	31	35.9160	8.61865	1.54795
T group:(post-test)	31	48.0256	7.67822	1.37905
I group:(pre- test)	33	36.4305	7.76388	1.35152
I group:(post- test)	33	38.3334	8.90828	1.55073

T:	CAI group:(pre-test)	18	36.4697	7.55935	1.78176
	CAI group:(post-test)	18	55.0872	4.88581	1.15160
	Total	164	40.9599	10.22419	.79837

Traditional

I: Independent (self-study)

CAI: Computer assisted Instruction

Then an ANOVA was run to see if there is any significant difference between the groups.

Table 4.2. ANNOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7196.372	5	1439.274	23.104	.000
Within Groups	9842.665	158	62.295		
Total	17039.037	163			

According to the data, the result of instruction was significant ($p < 0.05$) in traditional and CAI group. Moreover, CAI group outperformed the two other groups significantly. On the other hand, the scores of the group who were studied independently (self-study) did not change significantly at the end of the study.

A descriptive analysis of the questionnaires also showed observable changes of the learner's attitudes towards computer-assisted instruction at the end of the study.

Table 4.3. Independent Samples Test for Questionnaire

	F	df	Sig. (2-tailed)
--	---	----	-----------------

5.

Grade	Equal variances assumed	.377	.542	-3.538	49	.001
	Equal variances not assumed			-3.672	38.9 70	.001

Conclusion

As the data shows, computer-assisted instruction can help Iranian EFL learners to develop a higher TOEFL iBT reading comprehension. On the other hand, Iranian EFL learners are not good independent learners and as the results of this study show, the need for an instructor is crucial. Since paper and pencil assessments will be replaced by computerized assessments sooner or later, Iranian EFL learners should be trained through CAI to cope with the new technologies in ESL/EFL instruction and assessment. Moreover, for the development and implementation of effective pedagogy in computer-assisted instructions, there is a need for both teachers and students to become active CALL users and develop their own skills and strategies for selecting and managing CALL materials. Questionnaire results of the study show that an effective CALL classroom have the possibility of changing the Iranian students' attitudes towards CAI. We should not only try to provide possible CALL equipment and infrastructures but also effective training for both teachers and students to handle the new assessments such as TOEFL iBT.

References

- van Aarle, E. J. M., & van den Bercken, J. H. L. (1999). The development of knowledge-based system supporting the diagnosis of reading and spelling problems (II). *Computers in Human Behavior*, 15, 693–712.
- Anderson-Inman, L., & Horney, M. (1997). Electronic books for secondary students. *Journal of Adolescent and adult Literacy* 40 (6), 486-491.
- Bax, S. (2003). CALL - past, present and future. *System*, 31, 13-28.
- Blok, H., Oostdam, R., Otter, M., & Overmaat, M. (2002). Computer-assisted instruction in support of beginning reading instruction: a review. *Review of Educational Research*, 72(1), 101–130.
- Canale, M. (1986). The promise and threat of computerized adaptive assessment of reading comprehension. In C. Stansfield (Ed.), *Technology and language testing* (pp. 29-44). Washington, DC: TESOL.
- Carrel, P.L. (1987). Content and formal schemata in ESL reading. *TESOL Quarterly*,

21(3), 461-481.

Chappelle, C.A. (2001). Computer Applications in Second Language Acquisition:

Foundations for Teaching, Testing and Research. London: Cambridge University Press.

Chen, Y., & Huang, C. (2001). Incorporating English CD-ROM use for technology

college students. Selective Papers from the Tenth International Symposium on

English Teaching and Learning, 324-334.

Chun, D. M ., & Payne, J. S. (2004). W hat makes students click: Working memory

and look-up behavior. *System*, 32, 481-503.

Chun, D. M ., & Plass, J. L. (1996). Facilitating reading comprehension with multimedia. *System*, 24, 503-519.

Cotton, V. J. (1992). Computer-assisted instruction. Northwest Regional Educational

Labratory. Available from <http://www.nwrel.org/scpd/sirs/5/cu10.html>

van Daal, V. H. P., & Reitsma, P. (2000). Computer-assisted learning to read and

spell: Results from two pilot studies. *Journal of Research in Reading*, 23, 181-193.

Davis, E. A., & Linn, M . C. (2000). Scaffolding students' knowledge integration:

prompts for reflection in KIE. *International Journal of science Education*, 22(8), 819-837.

Doughty, C. J., & Long, M . H. (2003). Optimal Psycholinguistic environments for

distance foreign language learning. *Language Learning and Technology*, 7(3), 50-80.

Educational Testing Service (ETS) (2007). Test and Score Data Summary for TOEFL® Internet-Based Test. Retrieved on March 28, 2008, from

<http://www.ets.org/Media/Research/pdf/TOEFL-SUM-0506-iBT.pdf>

Educational Testing Service (ETS) (2005). TOEFL iBT Tips. Retrieved on March

28, 2008, from

http://www.ets.org/Media/Tests/TOEFL/pdf/TOEFL_Tips.pdf

Egbert, J. (2002). A project for everyone: English language learners and technology in

- content-area classrooms. *Learning and Learning with Technology*, 29(8), 36-41.
- Farmer, M., Klein, R., & Bryson, S. (1992). Computer-assisted reading: Effects of whole-word feedback on fluency and comprehension in readers with severe disabilities. *Remedial and Special Education*, 13, 50–60.
- Frederiksen, J. R., Warren, B. M., & Roseberry, A. S. (1985). A componential approach to training reading skills: Part 1. Perceptual units training: Cognition and Instruction, 2, 91–130.
- Hulstijn, J. H. (1993). When do foreign-language readers look up the meaning of unfamiliar words? The influence of task and learner variables. *Modern Language Journal*, 77, 139-147.
- Kasper, L. F. (2003). Interactive hypertext and the development of ESL students' reading skills. Retrieved February 20, 2008, from <http://www.readingmatix.com/articles/kasper/index2.html>
- Kay, R. (1992). An analysis of methods used to examine gender differences in computer related behavior. *Journal of Educational Computing Research*, 8, 277-290.
- Labbo, L. D., & Reinking, D. (1999). Negotiating the multiple realities of technology in literacy research and instruction. *Reading Research Quarterly*, 34, 478–492.
- Pearson Education, Inc. (2006). Longman Preparation Course for the TOEFL Test: Next Generation iBT.
- Leffa, V. J. (1992). Making foreign language texts comprehensible for beginners: An experiment with an electronic glossary. *System*, 20 (1), 63-73.
- Leloup, J., & Ponterio, B. (2003). Second language acquisition and technology: A review of the research. *ED Digest*. Retrieved on February, 12, 2008, from <http://www.cal.org/resources/digest/0311leloup.html>
- Levine, A., Frerenz, O. and Reves, T.(2000). EFL academic reading and modern technology: How can we turn our students into independent critical readers? *TESL-EJ*, 4.1-9. Retrieved on March 10, 2008, from <http://tesl-ej.org/ej16/a1.html>

- Leu , D.J. (2000). Our children's future: Changing the focus of literacy and literacy Instruction. *Reading Online*. Retrieved on March 15, 2008, from <http://www.readingonline.org/electronic/RT/focus/index.html>
- Leu, D. J., Hillinger, M., Loseby, P. H., Balcom, M. L., Dinkin, J., Eckels, M. L., et al. (1998). Grounding the design of new technologies for literacy and learning in teachers' instructional needs. In D. Reinking, M. C. McKenna, L. D. Labbo, & R. D. Kieffer (Eds.), *Handbook of literacy and technology* (pp. 203–220). Mahwah, NJ: Lawrence Erlbaum Associates.
- Levin, T., & Gordon, C. (1989). Effect of gender and computer experience on attitudes toward computers. *Journal of Educational Computing Research*, 5, 69-88.
- Liu, M. (1995). Contextual enrichment through hypermedia technology: Implications for second language learning. *Computers in Human Behavior*, 11, 439-450.
- Lomicka, L. L. (1998). "To gloss or not to gloss: An investigation of reading comprehension online. *Language Learning & Technology*, 1(2), 41-50.
- Loyd, B., & Gressard, C. (1984). The effects of sex, age, and computer experience on computer attitudes. *AEDS Journal*, 40, 67-77.
- Lungberg, I. (1995). The computer as a tool for remediation in the education of students with reading disabilities: A theory based approach. *Learning Disabilities Quarterly*, 18, 89–100.
- McGrath, B. (1998, April). Partners in learning: Twelve ways technology changes the teacher- student relationship. *T.H.E. Journal*. Retrieved on February 20, 2008, from <http://www.thejournal.com/magazine/vault/A1982.cfm>.
- MacArthur, C. A., Ferretti, R. P., Okolo, C. M., & Cavalier, A. R. (2001). Technology applications for students with literacy problems: A critical review. *Elementary School Journal*, 101, 273–301.
- Marcoulides, G. (1988). The relationship between computer anxiety and computer achievement. *Journal of Educational Computing Research*, 4, 151-158.

- Mathes, P. G., Torgesen, J. K., & Allor, J. H. (2001). The effects of peer-assisted literacy strategies for first-grade readers with and without additional computer-assisted instruction in phonological awareness. *American Educational Research Journal*, 38, 371–410.
- Martínez-Lage, A. (1997). Hypermedia technology for teaching reading. In M. Bush & R. Terry (Eds.), *Technology enhanced language learning* (pp. 121-163). Lincolnwood, IL: National Textbook Company.
- Miller, F., & Varma, N. (1994). The effects of psychosocial factors on Indian children's attitudes toward computers. *Journal of Educational Computing Research*, 10, 223-238.
- Pea, R. D. (1985). Beyond amplification: Using the computer to reorganize mental functioning. *Educational Psychologist*, 20 (4), 167-182.
- Plass, J. L., Chun, D. M., Mayer, R. E., & Leutner, D. (2003). Cognitive load in reading a foreign language text with multimedia aids and the influence of verbal and spatial abilities. *Computers in Human Behavior*, 19, 221-243.
- Plass, J. L., Chun, D. M., Mayer, R. E., & Leutner, D. (1998). Supporting visual and verbal learning preferences in a second language multimedia learning environment. *Journal of Educational Psychology*, 90 (1), 25-36.
- Quintana, C., Reiser, B., Davis, E. A., Krajcik, J., Golan, R., Kyza, E., et al. (2002). Evolving a scaffolding design framework for designing educational software. In P. Bell, R. Stevens & T. Satwicz (Eds.), *Keeping learning complex: The proceedings of the Fifth International Conference for the Learning Sciences (ICLS)*. Mahwah, NJ.: Earlbaum. Retrieved December 10, 2003, from <http://www.letus.org/kdi/publications/QuintanaICLS2002.pdf>
- Reinking, D., & Rickman, S. S. (1990). The effects of computer-mediated texts on the vocabulary learning and comprehension of intermediate grade readers. *Journal of Reading Behavior*, 22(4), 395-411 .
- Reinking, D. (1988). Computer-mediated text and comprehension differences: The

- role of reading time, reader preference and estimation of learning. *Reading Research Quarterly*, 23, 484-498.
- Reinking, D., & Schreiner, R. (1985). The effects of computer-mediated text on measures of reading comprehension and reading behavior. *Reading Research Quarterly*, 20, 536-552.
- de Ridder, I. (2000). Are we conditioned to follow links? Highlights in CALL materials land their impact on the reading process. *Computer Assisted Language Learning*, 13(2), 183-195.
- Roblyer, M. D. (2003). Integrating Educational Technology into Teaching. New Jersey: Pearson Education, Inc.
- Salomon, G., Globerson, T., & Guterman, E. (1989). The computer as a zone of proximal development. Internalizing reading-related metacognitions from a reading partner. *Journal of Educational Psychology*, 81(4), 620-627.
- Salomon, G., Perkins, D. N., & Globerson, T. (1991). Partners in cognition: extending human intelligence with intelligent technologies. *Educational Research*, 20(3), 2-9.
- Salaberry, M. R. (2001). The use of technology for second language learning and teaching: A retrospective. *The Modern Language Journal*, 85(1), 39-56.
- Warschauer M. (1996) "Computer Assisted Language Learning: an Introduction". In Fotos S. (ed.) *Multimedia language teaching*, Tokyo: Logos International: 3-20.
- Available from <http://www.ict4lt.org/en/warschauer.htm>
- Williams, H. S., & Williams, P. N. (2000). Integrating reading and computer: An approach to improve ESL students reading skills. *Reading improvement*, 37(3), 98101.
- Wise, B. (1992). Whole words and decoding for short-term learning: Comparisons on a 'talking computer' system. *Journal of Experimental Child Psychology*, 54, 147-167.