THE EFFECT OF TEACHING VOCABULARY THROUGH ICT ON VOCABULARY LEARNING OF INTERMEDIATE IRANIAN EFL LEARNERS

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ABSTRACT
The main objective of the present research was to investigate the effects of teaching vocabulary using information and computer technology (ICT) on vocabulary learning and retention of Intermediate Iranian EFL learners. To achieve this purpose, seventy six first grade students of Bentolhud a high school, Tehran, Iran were selected by school master. Thirty seven students in one class were chosen as the experimental group and thirty nine students in another class were chosen as the control group. These students were given a pre-vocabulary test in order to measure their vocabulary knowledge. Then one class (experimental group) received ICT-based instruction while placebo was given to the traditional method group (control group). Treatment length was four sessions. After that, both groups were given an immediate post-vocabulary test and two weeks later a delayed post vocabulary test. The data obtained by t-test, reliability, skewness analysis, and Cronbach’s alpha showed that students who used ICT tools to learn highly new vocabulary, learned a significantly larger number of words than those in the control group. They decreased their reaction time for word learning as compared to the control group and they exhibited significantly better vocabulary retention than the control group. The students in the experimental group studied approximately eighty of the highly new words in English on the computer for ninety minutes per week for four sessions whereas the students in the control group spent the same amount of time in vocabulary learning through traditional method. Although both groups showed progression in vocabulary gain and a decrease in reaction time for learning new words, the experimental group showed significantly greater gains than the control group students.

Keywords: Vocabulary Teaching; ICT; Vocabulary Learning; Vocabulary Retention

INTRODUCTION
The English language is considered to have the largest vocabulary in the world (Crystal, 2002) and learning vocabulary is an essential part of mastering a second language (Schmitt, 2008). Apart from the importance of vocabulary learning, new technologies challenge traditional conceptions of both teaching and learning and information and communication technologies (ICT) provide an array of powerful tools that may help in transforming the present isolated, teacher-centered and text-bound classrooms into rich, student-focused and interactive knowledge environments (The UNESCO World Education, 2005). Most computer assisted language learning (CALL) programs place a considerable emphasis on vocabulary learning implicitly or explicitly. Some efforts made to aim for a clear conceptualization of computer assisted vocabulary learning (CAVL) so that it can be developed into a distinctive sub-domain of CALL. Ma (2009) constructed a CAVL framework as an inseparable component of a CALL application. Most of CALL applications are dominated by vocabulary exercises (e.g., gap-filling, text-reconstruction, vocabulary games). Ma (2009) proposed that CAVL applications should possess a number of pedagogical criteria: a) the learning activities should provide opportunities for learners to notice the word form and access its meaning as well as connect the two; b) at least two types of linguistic information, visual and aural, should be presented; c) the program should incorporate or be linked to electronic dictionaries or lexical concordances; d) explicit focus should be put on the target items so that learners can rehearse, manipulate or recognize the lexical information. Based on Ma (2009), a new framework is constructed which incorporates pedagogical considerations with the current technology advancement, i.e., the ubiquitous nature of online technology and the rapid growth
of language learning software/applications. Hubbard (2001) provided an updated version of Ma (2009) through working implicit and explicit learning into his model. The update version of the model is presented in Figure 1.

![Figure 1: A new framework for CAVL applications (updated from Ma, 2009)](image)

Lexical resources/aids refer to various meaning technologies for learners to access the meaning of the new vocabulary items. They include open online resources such as the search functions offered by Google, web-based or localized electronic dictionaries and various corpus-based online lexical concordances. These resources are facilitative in nature and thus primarily tools. Electronic dictionaries have a number of potential advantages over paper dictionaries. First, electronic dictionary can respond to learners’ input intelligently. Second, only necessary lexical information is displayed and extra information can be displayed upon request. In addition, lexical information can be accessed in multiple channels simultaneously: textually, pictorially, and aurally. The electronic dictionary can also simulate the human lexical memory by organizing lexical entries as synonyms or hyponyms.

Most studies about ICT in Iran confirm the wider positive benefits of ICT for learning and learners in such areas as motivation and skills, concentration, cognitive processing, independent learning, critical thinking teamwork and all important skills for the language learner. In the other study, Tabar and Khodareza (2012) confirmed that computer assisted vocabulary instruction (CAVI) facilitated the complex process of L2 vocabulary learning. Graney and Mokhtari (1993) suggested that practice with high frequency vocabulary through CAVL benefits great reading. This is because computer as a tool offers potential to enhance vocabulary instruction, external stimulation, rich graphics, and online rewards. These in turn provide ample opportunities for learners to encounter new words in multiple contexts by allowing them quick access to text and graphic and immediate access to vast information (Wood, 2001). Although most teachers might be aware of the importance of technology, rarely teachers use it for teaching vocabulary. So, the purpose of the current study is to find out the effectiveness of teaching vocabulary by new technology (ICT) on vocabulary learning and its compare with traditional modes of
learning on first grade students of Bentolhuda high school in Rasht. To achieve the purpose of the study, two research questions were formulated as follows:

RQ1: Does teaching vocabulary through ICT have any significant effect on vocabulary learning of intermediate Iranian EFL learners?

RQ2: Does teaching vocabulary through ICT have any significant effect on vocabulary retention of intermediate Iranian EFL learners?

Considering to the important role played by ICT in learning vocabulary, the two following null hypotheses were developed:

H01: Teaching vocabulary through ICT does not have any significant effect on vocabulary learning of intermediate Iranian EFL learners.

H02: Teaching vocabulary through ICT does not have any significant effect on vocabulary retention of intermediate Iranian EFL learners.

MATERIALS AND METHODS

Methodology

Context of the Study ADN Participants

Seventy six students participated in this study. The participants who aged between 13-15 were conveniently chosen among first grade students of Bentolhuda high school in Rasht. This study was conducted with the participation of seventy six female students from two intact classes. One class is thirty seven students and the other class is thirty nine students. Therefore, it can be claimed that there exists nonequivalence between students of two classes. Thirty seven students in a class were taught by the ICT tools and thirty nine students were taught by the traditional method.

Materials

Three types of instruments including word lists, vocabulary, and ICT tools: Four word lists were prepared for high school first grade students. These words were selected from high school students’ first grade book. This book was published by Ministry of Education. Each word list contained 20 words consisted of noun, adjective, verb and adverb. These word lists were taught to the subjects within four sessions; that is, every session participants worked on one word list. These words were taught to the experimental group using the ICT tools and CAVI software and while they were taught to the control group using the traditional method.

In this study, vocabulary tests were chosen from the standardized vocabulary tests of Ministry of Education and first grade book of high school. Each of the tests consisted of 40 vocabulary items and students answered the questions in 25 minutes. All items were given 0.5 point each, and there was no penalty for guessing. The items in pre-test and post-tests were multiple-choice completion. In this part, a sentence with a missing word was presented; students chose one of four choices given to complete the sentence. To check the reliability of the tests, they were piloted before the treatment. Cronbach alpha coefficient equaled 0.80 for the pre-test and 0.78 for post-test which shows the internal consistency of the test. To check for validity, the researchers consulted a group of TEFL experts. The confirmed the validity of the tests.

The researcher used educational software developed by Ministry of Education named Andisheh designed with creative exercises based on the context of the lessons in their book. Andisheh software has two CD-ROMs that consist of computerized dictionary and vocabulary tests and amusements. Some words in the dictionary of one CD are showed by pictures. When a new word is clicked the definition of word and its part of speech in sentence with examples from book are showed. In addition, students listened to the pronunciation of words by both CDs.

Interactive Whiteboard (IWB) was used to allow presentation of students work in a more interactive and collaborative way; show video clips that present and explain difficult concepts; demonstrate how an educational software program works; display Internet resources in a teacher-directed manner; allow students to work creatively through learning activities in whole-class mode or in small groups and to present their work in multi–media form for class viewing and discussion.
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There were also some other ICT tools like digital projector and the Internet which were used by experimental group.

Procedure

To determine the possible consequence of the research process the following procedure was carried out: Before running the main study, a vocabulary test consisting of 40 items was piloted on fifteen students of Bentolhuda high school who were typical the main participants in terms of their foreign language proficiency. The piloted vocabulary test was used as pre-test, post-test, and delayed post-test. In this study two intact classes consisted of seventy six first grade students of Bentolhuda high school in Rasht were chosen by schoolmaster. The number of students in one class was thirty seven students and the other class was thirty nine students.

A pre-test was administered to students of both groups in order to measure the vocabulary knowledge of students. One of two intact classes was conveniently chosen to receive the special treatment (experimental group) and the other class was taught in the traditional method (control group). Thirty seven students in ICT class (experimental group) were divided into six groups. In each group the best student was chosen as agent. The vocabulary of four lessons in first book of high school was taught during four sessions. Each class met one time a week about 90 minutes in the morning. In each session, students were taught 20 words from their book. The researcher herself taught both classes. The ICT group was taught using CAVI software, IWB, the Internet and websites. First, the researcher used Andisheh software for teaching vocabulary. The researcher began to show students new words one by one on IWB by digital projector from the front of the class. The digital projector allows everything that is happening on the computer screen to be projected on to the whiteboard where everyone in classroom can see it clearly. The touch-sensitive whiteboard allows users, either the teacher or students, to interact with the information being displayed. In addition, students listened to the pronunciation of words. For each new word was showed a sentence and a picture on IWB. Teaching vocabulary was presented with textual visual and audio media. In part of dictionary, when the researcher clicked on a word, students could see the definition of the word, hear the pronunciation of it, see the grammatical form of it such as noun, adjective, verb and adverb and see the word in a sentence example. Students wrote the definition of words in their word lists. Then each agent was asked to pronounce some new words. When she made a mistake in the pronunciation of a word, she corrected her pronunciation with putting her finger on the word and listened to its pronunciation again. In the part of vocabulary tests, there are kinds of exercises. They were provided with computerized multiple choice tests, fill in the blanks with missing words, match the synonym and antonym words, crossword or word search puzzles and amusements. In other words, they were actively engaged in vocabulary practice. One agent of each group came to the board and selected the correct choice or moved the correct answer with her finger to a suitable blank. In the part of amusement, there is a crossword puzzle and students found new words and moved them to a defined column. Moreover, they were given computer-based immediate feedback on their answers to questions.

The researcher used different websites and software for more exercises, such as (www.mostafapursina.com/tags/) and (www.zaban.blogfa.com). These weblogs belongs to a teacher of Education. It consists of teaching all parts of high schoolbooks. Weblog (www.English-city.blogfa.com/post 957) was used for teaching vocabulary, too. Students listened to correct pronunciation of all vocabulary through Weblog. Solving the puzzles, vocabulary games, recognizing synonym and antonym words, and the samples of vocabulary tests were activities that existed in these weblogs for students in ICT group. In these sites, there are a lot of questions of midterm and final-term examinations. These questions were showed on IWB and students answered to questions. At the end of each session, ICT groups at for a quiz consists of 20 questions and it took 10 minutes to answer the questions. Students who were taught in a traditional method, on the other hand, listened to the pronunciation of vocabulary items existed in their book. The researcher pronounced words for students. The traditional method group (control group) was asked to write new words on their notebooks at home and memorize
word lists with L1 equivalents for the purpose of being asked questions orally. Students were required to answer the book's vocabulary questions such as fill in the blank with missing words, guessing words from the context, synonyms and antonyms tests in book exercises. After each activity, the researcher checked the answers of students and made any necessary corrections. In traditional teaching, vocabulary was measured by paper and pencil tests or oral examination.

Treatment was four weeks for ICT group. After forth session, both groups were given the immediate posttest. A delayed vocabulary post-test was administered to students two weeks later in order to test the retention. It took 25 minutes for students to answer the questions of this exam. The questions of pre-test, post-test, and delayed post-test were similar. The period of instruction for both groups was same and it lasted two month.

RESULTS AND DISCUSSION

Results

Before running the parametric statistical tests namely independent samples t-test, skewness analysis was implemented to check out the normality assumption. The results revealed that normality speculation was accomplished in the distribution of the scores. The statistic of skewness for vocabulary test (pre-test experimental group) equaled to .505, that for the vocabulary test (immediate post -test experimental group) came to -1.160, and for the vocabulary test (delayed post -test experimental group) came to - .442. Moreover, the skewness for vocabulary test (pre-test control group) made .726, for vocabulary test (immediate post-test control group) totaled -.134, and for vocabulary test (delayed post-test control group) came to .273. The findings all indicated that the distributions were symmetric and the normality assumption was established.

After assigning the two intact classes into two groups (control and experimental), they were given a vocabulary test to examine the possible initial differences between the two groups regarding their vocabulary knowledge before introducing the specific treatment for the ICT group (the experimental group). The descriptive statistics related to pretest vocabulary test are presented in Table 1.

Table 1: Descriptive statistics: group statistics for the control and experimental groups’ pre-test (PR)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Std.</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test(PR)</td>
<td>Experimental</td>
<td>37</td>
<td>7.6486</td>
<td>3.70785</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>39</td>
<td>7.6667</td>
<td>4.29095</td>
</tr>
</tbody>
</table>

For the vocabulary test given at the beginning of the study, the mean scores for the experimental and control groups were (7.64) and (7.66), relatively. Besides, the standard deviation for the control group was somewhat higher than that of the experimental group (SD experimental group = 3.70, SD control group =4.29).

The independent sample t-test procedure was conducted for any statistical difference between the ICT group and the traditional method group (control and experimental groups). The results are presented in Table 2.

Table 2: Independent samples test for the control and experimental groups’ pre-test (PR) vocabulary scores

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest scores</td>
<td>1.29</td>
<td>.25</td>
<td>-.02</td>
<td>74</td>
<td>.98</td>
</tr>
</tbody>
</table>

Since Sig. (2-tailed) was higher than (0.05), it could be assumed that the two groups had equal variances and as a result the first test was taken into consideration.

Based on Table 2 there was no significant difference between the mean scores of the two groups in pre-test of vocabulary (t=-.02, p>0.05), that is the control and experimental groups were almost at the same
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level of proficiency in terms of their vocabulary in the administered vocabulary test at the beginning of the study.

After the treatment, post-treatment vocabulary test was given to the students of both groups. The descriptive statistics are provided in Table 3. In fact, learners’ performance in the experimental group (Mean =14.89) far outweighed that of the control group (Mean =12.76) in immediate posttest of vocabulary test.

Table 3: Descriptive statistics: group statistics for the control and experimental groups’ immediate post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Deviation</th>
<th>Std.Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Test</td>
<td>37</td>
<td>14.891</td>
<td>3.48635</td>
<td>.57315</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>39</td>
<td>12.769</td>
<td>4.43349</td>
<td>.70993</td>
</tr>
</tbody>
</table>

However, this difference of means needed to be checked for statistical significance. After the experimental group received the treatment, another independent samples t-test was executed to compare the experimental and control groups in terms of their vocabulary learning after introducing the specific treatment to the experimental group and placebo for the control group. This time the results revealed that ICT based vocabulary instruction has effect on vocabulary learning of the two groups differently (t=2.31, 0.02 <.05). T-test results are indicated in Table4.

Table 4: Independent samples t-test for the control and experimental groups’ immediate post-test (IPO)

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO</td>
<td>1.29</td>
<td>.25</td>
<td>-.02</td>
<td>74</td>
<td>.98</td>
</tr>
</tbody>
</table>

The results of independent samples t-test reflected that there was a significant difference between the two groups in their immediate post-test (t= 2.31, p<0.05). According to the findings, the experimental group significantly performed better than the control group in the immediate post-test of vocabulary. The results showed that teaching ICT-based vocabulary had been advantages in the improvement of students’ vocabulary ability for the experimental group and thus the first null hypothesis is rejected.

Regarding the second research, to measure the students retention of vocabularies, a delayed post test was conducted to compare the obtained results of the two groups. The descriptive results of the delayed post-test given to the participants two weeks after the end of the intervention is presented in the table 5.

Table 5: Descriptive statistics: group statistics for the control and experimental groups’ delayed post-test (DPO)

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Deviation</th>
<th>Std.Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed Post-Test (DPO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>39</td>
<td>11.730</td>
<td>4.71956</td>
<td>.75574</td>
</tr>
<tr>
<td>Experimental</td>
<td>37</td>
<td>14.743</td>
<td>3.34710</td>
<td>.55026</td>
</tr>
</tbody>
</table>

The mean score of the experimental group (mean = 14.74) was (3.01) points higher than that of the control group (mean experimental group= 11.73). In addition, the degree of scatteredness of the scores for the control group (SD control group = 4.71) was somewhat higher than the degree of deviation of scores around the mean score for the experimental group (SD experimental group = 3.34).

A post test was also conducted to check if the difference between immediate and delayed post test scores has been statistically significant or not. T-test results are shown in Table 6.
Information and communication technologies must be harnessed to support EFA (Education for All) goals at an affordable cost. They have great potential for knowledge dissemination, effective learning and the development of more efficient education services. This potential will not be realized unless these technologies serve rather than drive the implementation of education strategies.

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To be effective, especially in developing countries, ICT should be combined with more traditional technologies such as books and radios and be more extensively applied to the training of teachers. Education must reflect the diversity of needs, expectations, interests and cultural contexts. This poses particular challenges under conditions of globalization given its strong tendency towards uniformity. The challenge is to define the best use of ICT for improving the quality of teaching and learning, sharing knowledge and information, introducing a higher degree of flexibility in response to social needs, lowering the cost of education and improving internal and external efficiencies of the education system (UNESCO, 2005).

**Implications**

This study provided an evidence for facilitating effect of ICT on vocabulary learning of Intermediate Iranian EFL learners. Therefore, language teachers may use available ICT tools and CAVI programs to enhance learners' vocabulary. In the present study, collaborative learning, computerized immediate feedbacks and animations of the program and IWB might be considered fundamental factors for ICT effectiveness on students' vocabulary learning. Collaborative learning fosters learner autonomy while students collaborates on gap fill vocabulary exercises that observe on IWB, they not only acquire knowledge together, but also share diverse learning experiences from one another in order to express themselves and reflect on their learning.

In addition to using CAVI programs for vocabulary instruction in language classes, such kind of programs can be used by students at home. Thus, students take responsibility for their own learning. CAVI programs can also be used to improve students' pronunciation and this will help to eliminate teacher induced pronunciation errors. The computer and the associated whiteboard software are fundamental to the process. The digital projector allows everything that is happening on the computer screen to be projected on to the whiteboard where everyone in classroom can see it clearly. The touch-sensitive whiteboard allows users, either the teacher or students, to interact with the information being displayed. The interactive whiteboard captures the pen or user's finger inputs and detects where the user is touching the board, this information is then used as input to the computer running the interactive whiteboard software (NCTE, 2009). Thus, IWBs increase enjoyment and motivation and enable teachers to integrate ICT into their lessons while teaching from the front of the class.

In brief, ICT integration in education has its merits. Its use not only changes the traditional ways of teaching, but also requires teachers to be more creative in adopting and customizing their own teaching materials and strategies (Reid, 2002). However, before integrating ICT into the curriculum, teachers should be trained on how to use computers efficiently. The teachers should also know the content of the software and confirm its convenience for their learners.

Also, teacher education programs should teach pre-service teachers not only how to use hardware and software, but also how to incorporate computers into their teaching strategies and activities (Abbott & Faris, 2000). Further, school culture for ICT integration is important. School culture consists of the vision, plans, norms and values that are shared by school members (Maslowski, 2001). Overall, implementing effective teaching with technology integration requires changes in teachers' knowledge, beliefs, and school culture.

Limitations of Using ICT in Teaching and Learning Vocabulary

Factors influencing the use of ICT can be divided into external factors and internal factors. A variety of external factors have been identified that influence the progression or effectiveness of technology integration in schools. These include technology availability, accessibility of ICT equipment, time to plan for instruction, technical and administrative support, school curriculum, school climate and culture, faculty teaching load and management routine. Among these external factors, the most common are lack of access to computers and software, insufficient time for course planning, and inadequate technical and administrative support (Chen, 2008).

Technology availability and overall support are important to technology integration. The higher the support structure and technology availability, the higher the technology integration efforts are made by teachers. Several internal factors also influence technology integration outcomes. Internal factors related to teachers include: understanding of ICT use; beliefs, which may conflict with the application of ICT;
attitudes toward technology integration; perceptions, including intention or motivation to use ICT; self-confidence and knowledge; technology skills; readiness to use ICT; and technology self-efficacy (Tezci, 2011). Chen (2008) discovered two common issues associated with internal factors. First, teachers may implement policies based on limited or improper theoretical interpretations and comprehension of ICT use. Second, teachers may be under pressure to cover all content and be unwilling or hesitant to let students spend more time exploring content on their own with technology due to their other conflicting beliefs. These issues imply that teacher beliefs may not resonate in their practices. A school culture emphasizing competition and a high stakes assessment system can discourage teachers from integrating technology into their classrooms. Thus teacher beliefs influence ICT use in the classroom.

Suggestions for Further Research
This research was conducted on first grade students of high school. A study on different age group and proficiency level can be conducted to see whether ICT has different effects on them. In this study, the effect of teaching vocabulary through ICT was investigated on learning vocabulary. Future research may examine the effect of ICT on speaking, listening, reading, and writing skills.

In this study, the researcher used only one computer. Future research can be conducted on individual and personalized learning and students work on individual computers or tablet. In this study, students of one class participated in treatment. In future research a teleconferencing classroom may invite the same level students in school to gather together simultaneously for a topic discussion.

Conclusion
Based on the obtained results, the following factors caused the success of the experimental group:
• ICT fosters autonomy, capability and creativity in students, IWB presented educational resources in a new and impressive way. It displayed video clips and the Internet resources in a teacher-directed manner.
• CAVI made the students actively involved in the learning process. The computer program provided an immediate feedback and opportunity to correct a mistake for students.
• Web quests are the model used for getting students to design effective ICT-supported learning.

This study provided an evidence for facilitating effect of ICT on Iranian EFL learners' vocabulary learning. Therefore, language teachers may use available ICT tools and CAVI programs to enhance learners’ vocabulary. Limitations of using ICT in teaching and learning are lack of access to computers and software, insufficient time for course planning, and inadequate technical and administrative support.

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