Second Language Vocabulary Acquisition in CALL and MALL Environments and Their Effect on L2 Vocabulary Retention: A Comparative Study

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Abstract: In the modern world, the use of technology is an important aspect which has received considerable attention in recent years and has been changing the landscape of language teaching and learning. Computer-Assisted Language Learning (CALL) and Mobile-Assisted Language Learning (MALL) are new realms towards learning a language in general, and learning L2 vocabulary in particular. This study investigated the effectiveness of vocabulary learning via multimedia annotations (still picture annotations and dynamic picture annotations) and a mobile phone-based dictionary. Sixty four Iranian EFL participants took part in this study. The participants were randomly assigned to one of the four groups: a control group that received none of aforementioned treatments and three treatment groups that received 1) still picture annotations 2) dynamic picture annotations, and 3) a mobile phone-based dictionary. Each participant was required to take a pre-test. A vocabulary post-test was also designed and administered to the participants in order to assess the efficacy of each treatment. The results demonstrated that using a dictionary on a mobile phone resulted in a significant difference in participants' vocabulary learning and the participants who had benefited from mobile-assisted learning had a significantly better performance on vocabulary posttest than the participants in other groups.

Key words: Annotation, Multimedia annotation, Multimedia, Picture annotation (still pictures), Video annotation (dynamic pictures), and M-learning (mobile learning).

INTRODUCTION

Vocabulary as "the building block of language" (Schmitt, N., et al., 2001), is considered by some to be the most important aspect of foreign language learning (Knight, S., 1997). According to (Harmer, J., 1994), “without grammar very little can be conveyed, without vocabulary nothing at all can be conveyed”. (Harmer, J., 1994), moreover, states that “If language structures make up the skeleton of language, then it is vocabulary that provides the vital organs and the flesh”. One of the things that students, teachers, materials writers, and researchers have all agreement upon is that important part of mastering a second language is learning vocabulary (Groot, A.M., 2009). However, the best means of achieving good vocabulary learning is still unclear, partly because it depends on a wide variety of factors.

Nowadays more and more computer programs are used in second language (L2) instruction. Most researchers and instructors tend to believe that foreign language learning by means of a computer is a good alternative, if not a better one, for conventional classroom instruction (Hulstijn, J.H., B.T. Atkins, 1998; Mackintosh, K., 1998; Najjar, L.J., 1996). It is believed that the inter-meshing of CALL and MALL can blend learners’ learning environment into their real-life contexts (Wong, L.H., 2010).

Review of the Related Literature:

Advanced technology and increased availability of computers have altered and expanded the field of second/foreign language education. In recent years with the development of computer-assisted language learning (CALL) the need and opportunity for investigating the impact of multimedia on vocabulary acquisition has been increasing (Nikolova, O.R., 2002). According to (Lomicika, L., 1998), with the advance of multimedia application in second language teaching and learning the investigation of annotation has been taken a step further. The computer is able to take a role as an interlocutor in a reading task. As well, it provides additional lexical information in the form of enhanced input for the user or language learner. (Groot, A.M., 2009)

In today’s language classrooms, vocabulary teaching and learning is increasingly supplemented by software products. The most important reason for this is the possibility of integrating different modalities, i.e. pictures, animations, video, and sound in the program and consequently creating interactivity with that (Al-Seghayer, K., 2001; Jones, L.C., J.L. Plass, 2002).

Technological advances make the presentation of computer and web-based multimedia instruction possible which includes: motion, voice, data, text, graphics, and still images (Grabowski, B.L., 2006). One of the most
important advancements is animation, which shows pictures in motion (Dwyer, F.M., C. Dwyer, 2003). Furthermore, (Grabowski, B.L., 2006) considers that although animation gets learners’ attention and increases their motivation, it is still not clear whether animation using strategies make learning easier or not.

**History of Computer-Assisted Language Learning (CALL):**

(Knight, S., 1997; Mackintosh, K., 1998) believes that CALL “is any process in which a learner uses a computer and, as a result, improves his or her language” (Lomicka, L., 1998) points out that “one of the newest resources for language teachers in providing an enriched context for learning is the computer”.

According to (Davies, G., 2002), CALL’s origin and development can be traced back to 1960’s. CALL projects were restricted mainly to universities until the late 1970’s. Since the early days, CALL developed a relationship between technology and pedagogy. (Davies, G., 2002) maintains that early CALL programs focused on an approach which made use of practices associated with programmed instruction. This lead to the term called Computer Assisted Language Instruction (CALI).

Computers have been used for language teaching ever since the 1960’s. According to (Underwood, J., 1984), this period can be divided into three main phases: behaviorist CALL, communicative CALL, and integrative CALL.

**Behaviorist CALL:**

The first phase of CALL implemented in the 1960’s and 1970’s. It followed language teaching approaches that were developed by Bloomfield, American structural linguists of the 1920s. According to the structural or behaviorist phase, the language itself was considered as a set of prescribed structures and forms and its acquisition was nothing but learning set forms and phrases. According to that, the primary and most essential unit of analysis and practice was sentence. These language teaching approaches were mixed in the first CALL software (Tick, nd). Behaviorist approaches to language learning have been rejected the increasing sophistication and developments of computer technology have led CALL to other possibilities. Therefore, the stage was set for a new phase of CALL, communicative CALL.

**Communicative CALL:**

The first phase of CALL implemented in the 1960’s and 1970’s. It followed language teaching approaches that were developed by Bloomfield, American structural linguists of the 1920s. According to (Warschauer, M., D. Healey, 1998), there were three main uses or ‘models’ of computer use in ‘communicative CALL phase:

1. First, there were different kinds of programs which provided skill practice in a non drill format. In these programs the computer was the knower-of-the-right-answer and it was considered as a tutor mode (Villegas, A., 2002). But in contrast to the drill and practice programs the process of finding the right answer involves students’ choice, control, and interaction (Bax, S., 2002).

2. Second, in addition to computer as tutor, another CALL model used for communicative activities involves the computer as stimulus” (Warschauer, M., D. Healey, 1998). Here, the aim of the CALL activity is not making learners discover the right answer, but rather to stimulate students' discussion, writing, or critical thinking (Davies, G., 2002).

3. In the third model of communicative CALL computers considered as tool which sometimes called, the computer as workhorse (Taylor et al., 1989, as cited in (Warschauer, M., D. Healey, 1998). In this role, no language material is necessarily provided by the programs at all, instead it empowers the learner to use or understand language. Some examples of computer as tool include word processors, spelling and grammar checkers, and desk-top publishing programs (Bax, S., 2002).

In general, in this phase learners had a greater degree of choice, control and interaction but computer still stayed as tutor. Computers provided context for students to use the language as they do in real life, such as ordering food in a restaurant and asking for directions to a place. This form of computer-based instruction was similar to cognitive theories which recognized that learning was a creative process of discovery, expression, and development (Warschauer, M., D. Healey, 1998). Here, the aim of the CALL activity is not making learners discover the right answer, but rather to stimulate students' discussion, writing, or critical thinking (Davies, G., 2002).

**Integrative CALL:**

The last phase of CALL is integrative CALL. It started from the1990’s. Warschauer (Jones, L.C., J.L. Plass, 2002) believes that “in the late 1980s and early 1990s many teachers were moving away from a cognitive view
of communicative teaching to a more social or socio-cognitive view, which placed greater emphasis on language use in authentic social contexts” (p.18).

In integrative CALL the computer has a wide range of usage in language learning including: information processing, communicating and publishing, etc. This phase consists of two stages itself: (a) multimedia network, and (b) the Internet. With the advent of the Internet a fundamental transformation in the history of computer-assisted language learning happened. It is the first time that learners can learn a language in an authentic environment with an authentic communication with other learners or the speakers of the target language (Warschauer, M., D. Healey, 1998; Wong, L.H., et al., 2010).

Later (Warschauer, M., 1998) adds that “in integrative approaches, students learn to use a variety of technological tools as an ongoing process of language learning and use” (pp. 58). In multimedia programs, listening and seeing are combined, just like in the real world, skills such as reading, writing, speaking and listening are integrated in a single activity. Students also control the pace and path of their learning and interaction. It also focuses on the content, rather than language form or learning strategies (Davies, G., 2002).

What Is Meant By Mobile Learning (M-Learning)?:

Since mobile phones are widespread everywhere and are popular among students for communication with each other, they may offer a motivating alternative for L2. They also have an important place particularly in young people’s lives. Mobile phones have significant potential in the portability and versatility. They also promoted a pedagogical shift from didactic teacher-centered to participatory student-centered learning (Facer, K., et al., 2004).

Mobile learning can be defined as any educational provision where the sole or dominant technologies are handheld or palmtop devices’ (Traxler, J., 2005). According to (Brown, J., 2010), mobile learning as the exploitation of ubiquitous handheld technologies, aims to enhance and extend the achievement of teaching and learning purposes. He also states that mobile devices make learning environment pervasive. According to (Kukulska-Hulme, A., et al., 2005) mobile learning has a range of attributes:

"It can be spontaneous, personal, informal, authentic, situated, contextual, portable, and ubiquitous (available everywhere) and pervasive (so integrated with daily activities that it is hardly noticed).

(Kukulska-Hulme, A., et al., 2005) believes that mobile learning has long been identified as one of the natural directions in which CALL is expected to move, and as smaller portable technologies which is cheaper, lighter and more powerful. It is going to become a more essential part of language learning courses as opposed to the more supplemental role often assigned to computer labs.

Mobile phone learning is a young discipline that is gaining more and more attention because of its promises for education. This technology may lead to positive effects in learning environments because of its widespread use and functions such as mobility, reach ability, localization, and personalization (Levy, M.M., C. Kennedy, 2005). It helps to raise self-esteem and self-confidence (Attewell, J., 2004). The introduction of mobile communication into classrooms has elevated students’ motivation and promoted teaching efficiency (Rau, P., et al., 2008).

In comparison with computers, mobile devices are cheaper and are used by many because the devices are more affordable and they are an integral part of our everyday lives. (Chinnery, G.M., 2006) notes that "a computer is better than a mobile phone for handling various types of information such as visual, sound, and textual information, but mobile phone is superior to a computer in portability. And some students don’t have their own computer”.

One of the distinct differences between Computer Assisted Language Learning and Mobile Assisted Language Learning is that mobile technologies can fit into the mobile lifestyles of students through assisting them. Mobile devices enable new ways of learning by emphasizing continuity and spontaneity. They are also more personal and portable (Hulstijn, J.H., B.T. Atkins, 1998).

Advantages of Mobile Phones:

In this digital age of time, mobile phones, as the most widespread technology, are used by the overwhelming majority of students worldwide. They own and carry a mobile phone with them most of the time.

According to (Arani, K.A., 2010), since mobile assisted language learning (MALL) is derived from the principles of computer assisted language learning (CALL), it has the capability of providing EFL learners with the same opportunities for independent and targeted reading practice and immediate corrective feedback as has been done through CALL. Therefore, MALL manifests itself as a good language teaching and learning tool.

The use of mobile phones within the classroom has been found to enhance speed in teaching and learning, provide students with freedom of location and time, enable one-to-one learning based on individual educational histories or test results; and allow teachers to keep up the new educational subjects for future education (Oku, M., 2001).

(Geddes, S.J., 2004) classified major advantages of M-Learning (mobile Learning) into three steps: access, context, and collaboration.
Access:
The most significant advantage of the M-Learning environment is the ability to access information where it would not be possible without a mobile device. With acceleration of the information age, this potential is likely to increase. This advantage is not limited to time and location. If People are to increase their employability, business success, personal fulfillment and social development, they will need to be able to access information faster and more effectively (Lowey, S., 2003). “It allows students to exploit small amounts of time and space for learning….” (Traxler, J., 2007).

Context:
It is stated that information technology can provide context through problem solving activities in simulated authentic environments. Real time scenario and problem-based learning activities can be conducted in the application environment through the use of mobile devices.

Collaboration:
It can be used to encourage both independent and collaborative learning experiences. This student-centered learning helps the learners to be more engaged and develop personal intellectual structures that foster a deeper understanding of the content at hand (Stahl, G., et al., 1995).

(Traxler, J., 2007) states that mobile phones enhance, extend and enrich the concept and activity of learning and summarizes different functionalities of the mobile learning:

- Contingent learning, where learners can react and respond to their environment and their changing experiences
- Situated learning, where learning takes place in an environment that makes learning meaningful
- Authentic learning, where meaningful learning tasks are related to immediate learning goals
- Context aware learning, where learning is informed by the history, surroundings and environment of the learner
- Augmented reality mobile learning, where learning builds on local context supplemented by an audio or video overlay
- Personalized learning, where learning is customized for the learning of preferences, history and abilities of individual learners or groups of learners

In recent years, studies on mobile technology-assisted vocabulary learning are on the rise. (Patten, B., et al., 2006) concluded that Dictionary use via mobile devices has often been considered simply a reference for students and is not assumed to induce other vocabulary learning activities. In a recent study that was conducted over two years in one of the UK universities, (Sole, R.C., 2010) showed that mobiles will allow learners to express themselves in a variety of scenarios.

(Başoğlu, E.B., Ö. Akdemir, 2010) conducted a comparative study of vocabulary learning with mobile phones and with paper flashcards. The experimental group used the vocabulary program on the phones to study the target words while the control group worked on the same words on paper flashcards during the same time span. Their findings indicated that “vocabulary learning programs on mobile phones improved students’ acquisition of English vocabulary more than traditional vocabulary learning tool, flash cards” (p. 6)

(Stockwell, G., 2007) conducted different surveys. These studies indicated students’ vocabulary improvement in the environment where students used mobile technologies for prescribed vocabulary learning tasks, or tested designed personalized learning systems to enhance student’s vocabulary learning in a short term in language related courses.

Methodology:
This research followed a quasi-experimental design in order to investigate the effects of multimedia annotations (still picture annotations, dynamic picture annotations) and mobile dictionary on Iranian EFL learners' vocabulary learning. The research, also, involved a pre-test and a post-test. This study was incorporated into the participants’ regular course content. With regard to the importance of vocabulary learning and the application of new technologies in second/foreign language learning, this study was an attempt to investigate and compare the efficiency of using multimedia and mobile phone-based dictionary in learning and retention of new target words. Therefore, the following research questions were addressed in this study:

1-Does teaching through dynamic picture annotations have any impact on Iranian EFL learners' vocabulary learning?
2- Does teaching through still picture annotations have any impact on Iranian EFL learners' vocabulary learning?
3- Does teaching through utilizing mobile phone-based dictionary have any impact on Iranian EFL learners' vocabulary learning?
4-Are there any significant differences among vocabulary instruction strategies (dynamic picture annotations, still picture annotations, and M-based dictionary) in terms of promoting Iranian EFL learners’ vocabulary learning?

Participants:
To test the research hypotheses of the study, 90 learners of Zabansara Language Institute in Naghadeh were given a Preliminary English Test (PET). Those whose scores ranged from 40 to 55 out of 90 were selected to participate in the study. Accordingly, there were 64 participants in the study. The participants in this study, with an age range of 15 to 19, were in the pre-intermediate level, based on their performance on the Proficiency (PET) test. All participants came from a bilingual background i.e. Turkish and Persian. Then, the participants were randomly assigned to four groups: a control group that received no annotation strategies and three experimental groups that received dynamic pictures, still pictures, and mobile phone-based dictionary.

Instrumentation:
To fulfill the present study, the following instruments were utilized:

Mobile Phone Dictionary:
Sara dictionary is a free bilingual mobile dictionary, which can be installed in diverse mobile phones. The distinguished feature of Sara dictionary is that it is not only a dictionary but also has some aids for vocabulary memorizing. Mobile technologies are advancing quickly. Their output became both verbal and visual (Colpaert, 2004), which might facilitate memorizing English words. Sara dictionary provides the meanings of the words to assist word memorizing. Users can choose their own learning goals by choosing the vocabulary database. Sara dictionary, version 1.0, was created by Hamed Abdollahpoor and it is available in www.mobile4use.com. This dictionary includes 146323 English words and 84241 Persian words. The participants, by choosing the kind of dictionary, i.e. Persian to English or English to Persian, can search the meaning of the target words. When a word is displayed on the screen, the learner can read the word by his/her self from phonetic symbol or can click the button on the right top of the screen to listen to the pronunciation of the word. On the screen, the explanation of the word, according to different fields of study, was given to help learners understand the word.

Program:
The researchers utilized online interactive multimedia computer program (an animated dictionary called Kid Crossword available in http://www.kidcrossword.com and a picture dictionary called Little Explorers available in http://www.enchantedlearning.com) in this study to enhance L2 vocabulary acquisition by providing readers with the meaning of a target word. The computer program provided participants with annotations for target words in various modes -such as definition, still pictures, and dynamic pictures- all of which are intended to aid the understanding and learning of unknown words. The participants read the target word’s printed textual definition, or viewed its meaning via a dynamic picture or picture. The course material to be taught was a book called English File by Christina (Al-Seghayer, K., 2003).

The words:
The words are one of the important components of the experiment. In this study the researcher concentrated on the three most common word types: nouns, verbs and adjectives. The reason for using just three word types was for the sole purpose of being able to work with a limited list of words. If all word types were to be included, the experiment would become too extensive. Since it is not always easy to visualize a word in a clear, unambiguous manner, it was tried to choose concrete words rather than abstract words (Kukulska-Hulme, A., L. Shield, 2008).

The Pre-test and the Post-test:
The participants were asked to complete a teacher made Word Recognition Test (WRT) or a multiple choice test. In this test, the 50 target words were presented in their original context taken from the text book (English File by (Dwyer, F.M., C. Dwyer, 2003)). For each word, the participants were asked to choose one correct meaning out of four given choices. Of the four choices, one was the correct meaning, and the other three were distracters. The scoring procedure was straightforward. Therefore, a score of 0 was given for an incorrect or not attempted answer and a score of 1 was given for a correct answer.

Furthermore, in order to make sure of the reliability of tests, the reliability of the test was calculated through Cronbach’s Alpha method which turned out to be low so 18 questions out of 40 were deleted and consequently reliability became 0.808.

A recognition test consisting of 22 words was designed as a measure of the stages in a learner’s developing knowledge of particular words to assess the effect of each strategy. Again in this test, the 22 target words were presented in their original context taken from the text book (English File by (Dwyer, F.M., C. Dwyer, 2003)). For
each word, the participants were asked to choose one correct meaning out of four given choices. Of the four choices, one was the correct meaning, and the other three were distracters.

**Procedure:**

This study required 64 homogeneous learners. Each participant was randomly assigned to one of the four groups so there were three experimental groups and one control group. Each group was given one of the four types of treatments: group A received no annotations, group B received still picture annotations, group C received dynamic picture annotations, and group D received mobile phone-based dictionary. Each group had access to the assigned treatments of new words in their text book.

Data was collected from each of the four groups during their normal class times. First, participants met with the researcher. They were given a brief introduction to the program, its objectives, and its methods. The researchers demonstrated the instruction of the program to participants, how to move from one section to another, how to click on an annotated word, and how to use their cell phones to find the meaning of the new words. The investigator also showed each participant that clicking on words allowed them to hear the selected word pronounced, read a definition, and see either a picture or a video clip. They were told that they could consult the annotated words whenever they wished and as many times as they wished.

The point which should be indicated is that, group A received no annotations. The participants in group B were required to insert downloaded CD in the computer. They typed new words and pressed the Enter key, and then the information related to each word was shown on the screen. First, the participants read contextualized examples and tried to guess the meaning of the new word. Then they could press the picture button on the screen to access its visual presentation (still picture). Participants in group C, like participants in group B, typed new words and pressed the Enter key in order to see its meaning, an example and its visual presentation or dynamic picture. Both group B and group C could see the phonetic form of the pronunciation that was screened in front of the word. Moreover, participants could hear the pronunciation in both British and American accent, by a native speaker. They could repeat the one they liked to improve their pronunciation. In group D, the participants were supposed to download the aforementioned mobile dictionary on their cell phones. Then, they were required to type the target word and press “OK” key to look for the meaning of the word in their cell-phones’ dictionary. In this situation, they were provided with written phonetic form of the word, meaning of the word, and its pronunciation in both British and American accent.

**Design:**

This study investigated the effect of different types of multimedia annotations (still pictures, dynamic pictures) and mobile phone-based dictionary on L2 vocabulary learning. The design to carry out this study was quasi-experimental, with different treatments for experimental and control groups. The experiment was conducted within eleven 60-minute class period. A pretest prior to the learning session was administered. The test consisted of fifty words picked out carefully from the course book (English File by (Dwyer, F.M., C. Dwyer, 2003)). Later the same participants were exposed to the same treatment conditions and then were assessed on the dependent variable after they participated in the experimental treatment. They were also asked to take a post-test to assess the effect of each strategy. The test was a multiple choice consisting of twenty two items from their course book. Every item was a sentence missing a word as a blank to be filled. In other words, the independent variables, that were, printed text definition on mobile-phone screen, printed text definition coupled with still pictures, and printed text definition coupled with dynamic pictures, experimentally were manipulated by exposing all participants to the experimental treatment condition. The dependent variable, acquiring new words in a foreign language, was measured by recognition vocabulary test (post-test). Due to the design of the study for each group a paired t-test was conducted between the pre test and post test scores of their group and also an analysis of covariance (ANCOVA) was employed to examine the effect of the three vocabulary strategies (still pictures, dynamic pictures and mobile-phone dictionary) on L2 vocabulary learning.

**Results:**

Having collected all data from the pre-test, and post-test, the researcher employed SPSS for Windows (version 16-evaluation) to calculate the impact of type of vocabulary teaching strategies: still pictures, dynamic pictures and mobile phone-based dictionary on vocabulary learning. Participants had not been told about the posttest to prevent them from paying more than usual attention to the words after the learning session, which might invalidate the results.

First the mean and standard deviation of each individual test was calculated. Then, at one level, it was compared within that group with their pre-test performance to check whether learning had happened and how well each group had done. At the other stage, it was compared with its counterpart test of the other group to find which strategy had a better influence on learning new words.

As it was mentioned before this study was conducted with 64 participants. The subjects in this study were chosen from among 90 EFL students based on their proficiency scores (those who had received scores between
40-55). Then, 64 participants were randomly divided into four groups. In order to check their homogeneity, a one-way ANOVA was run on their proficiency scores. Table 1 shows the descriptive data for the proficiency scores of these four groups.

Table 1: Descriptive Data for the Proficiency Test (PET)

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>16</td>
<td>49.0625</td>
<td>5.44633</td>
<td>1.36158</td>
<td>40.00</td>
<td>55.00</td>
</tr>
<tr>
<td>Still Picture</td>
<td>16</td>
<td>49.0000</td>
<td>4.13118</td>
<td>1.03280</td>
<td>43.00</td>
<td>55.00</td>
</tr>
<tr>
<td>Dynamic Picture</td>
<td>16</td>
<td>50.1875</td>
<td>3.76331</td>
<td>0.94083</td>
<td>42.00</td>
<td>55.00</td>
</tr>
<tr>
<td>M-Based Dictionary</td>
<td>16</td>
<td>49.7500</td>
<td>4.20343</td>
<td>1.05079</td>
<td>40.00</td>
<td>54.00</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>49.5000</td>
<td>4.35343</td>
<td>0.54418</td>
<td>40.00</td>
<td>55.00</td>
</tr>
</tbody>
</table>

Table 2: ANOVA test of within groups' effects for proficiency scores

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>15.625</td>
<td>3</td>
<td>5.208</td>
<td>.265</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1178.375</td>
<td>60</td>
<td>19.640</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1194.000</td>
<td>63</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 demonstrates that the mean score for all of the four groups are approximately at the same level. As well, according to the results of the ANOVA test in Table 2, there is no significant difference among the four groups in terms of their proficiency scores: (F (3,60) = 0.265, p = 0.850).

The first research question in this study addressed the effect of dynamic pictures vocabulary teaching strategy on the vocabulary learning of EFL learners as following:

1-Does teaching through dynamic picture annotations have any impact on Iranian EFL learners' vocabulary learning?

To answer this question, the researcher conducted a paired t-test between the pre-test and post-test of dynamic pictures group. As the descriptive data in Table 3 shows, during the pre-test the mean score of this group was (12.00), but in the post-test it increased to (13.62). Therefore, there was a difference between the performances of the participants in dynamic picture group in both pre and post-tests. However, in order to see whether this difference was statistically significant or not, the researcher conducted a paired t-test, the results of which are presented in Table 3.

Table 3: Descriptive Data and t-test for the Comparison of the Dynamic Picture Pre-test and Post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>N</th>
<th>t</th>
<th>Std</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test Dynamic Picture</td>
<td>12.00</td>
<td>16</td>
<td>-6.801</td>
<td>4.604</td>
<td>15</td>
<td>.000</td>
</tr>
<tr>
<td>Post-test</td>
<td>13.625</td>
<td>16</td>
<td>3</td>
<td>3.556</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 3, the difference between the pre-test and post-test was statistically significant (t (15) = -6.801, p = 0.00). Therefore, the result indicated that dynamic pictures strategy had a significant effect on improving Iranian EFL learners' vocabulary learning.

The second research question investigated the effect of still pictures vocabulary teaching strategy on EFL learners’ vocabulary learning:

2- Does teaching through still picture annotations have any impact on Iranian EFL learners' vocabulary learning?

Table 4: Descriptive Data and t-test for the Comparison of the Still Pictures Pre-test and Post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>N</th>
<th>t</th>
<th>Std</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test Still Pictures</td>
<td>11.8125</td>
<td>16</td>
<td>-4.463</td>
<td>4.9695</td>
<td>15</td>
<td>.000</td>
</tr>
<tr>
<td>Post-test</td>
<td>13.0625</td>
<td>16</td>
<td>8</td>
<td>4.0738</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As the data in Table 4 indicates, the mean score of the pre-test for this group was 11.8125 and the mean of post-test was 13.0625, thus it indicated an increase in the mean scores from the pre-test to the post-test situations in learner's performance in vocabulary learning through still picture strategy. But in order to see whether this difference was statistically significant, the researcher conducted a paired t-test. According to the results presented in Table 4, it can be maintained that the difference between the pre-test and the post-test of the still picture annotations group reached significance level (t (15) = -4.463, p = .000). Hence, as the results in Table 4 confirmed, still picture annotations had significant impact on improving Iranian EFL learners' vocabulary learning.

The investigation of the possible effects of using mobile phone-based dictionary on EFL learners’ vocabulary learning was the concern of the research question three:
3- Does teaching through utilizing mobile phone-based dictionary have any impact on Iranian EFL learners' vocabulary learning?

Table 5: Descriptive Data and t-test for the Comparison of the Written Annotations Pre-test and Post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>N</th>
<th>t</th>
<th>Std</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>11.500</td>
<td>16</td>
<td>-6.606</td>
<td>5.2798</td>
<td>15</td>
<td>.000</td>
</tr>
<tr>
<td>Mobile-based Dictionary</td>
<td>14.950</td>
<td>16</td>
<td>4.2895</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Table 5, the mean score of mobile-phone based dictionary group in pre-test was 11.5 which increased to 14.95 in the post-test. Therefore, the result proved that using mobile phone-based dictionary had impact on improving Iranian EFL learners' vocabulary learning. It can also be said that the difference between pre-test and post-test of this group reached significance level (t (15) = -6.606 and p = .000).

The fourth research question:

4-Are there any significant differences among vocabulary instruction strategies (dynamic picture annotations, still picture annotations, and M-based dictionary) in terms of promoting Iranian EFL learners' vocabulary learning?

In order to see whether the difference between control group and three experimental groups was meaningful or not, the researcher utilized the ANCOVA test (an analysis of covariance).

Table 6: ANCOVA for the Four Groups’ Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>R Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>163.310</td>
<td>1</td>
<td>163.310</td>
<td>120.771</td>
<td>.000</td>
<td>.672</td>
</tr>
<tr>
<td>GROUP 3: EXPERIMENTAL GROUPS</td>
<td>13110.000</td>
<td>64</td>
<td>205.625</td>
<td>8.227</td>
<td>.000</td>
<td>.295</td>
</tr>
<tr>
<td>Error</td>
<td>952.343</td>
<td>1</td>
<td>952.343</td>
<td>704.276</td>
<td>.000</td>
<td>.923</td>
</tr>
<tr>
<td>Corrected Total</td>
<td>1064.938</td>
<td>63</td>
<td>17.190</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R Squared = .925 (Adjusted R Squared = .920)

As the results in Table 6 reveals, there was a significant difference between the performance of the subjects in control group and those who were in three experimental groups including still picture annotations, dynamic picture annotations, and M-based dictionary (F (3, 59) = 8.227, P = .000). It means that using annotations as a vocabulary teaching strategies had a positive effect on improving participants’ vocabulary learning.

A post hoc analysis was also conducted in order to identify the location of the difference.

Table 7: Post hoc Analysis of Mean Differences among Four groups

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Difference</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Dynamic video</td>
<td>-1.938*</td>
</tr>
<tr>
<td></td>
<td>Still pictures</td>
<td>-1.525*</td>
</tr>
<tr>
<td></td>
<td>M-based dictionary</td>
<td>-1.213*</td>
</tr>
<tr>
<td>Dynamic video</td>
<td>Control</td>
<td>1.938*</td>
</tr>
<tr>
<td></td>
<td>Still pictures</td>
<td>0.412</td>
</tr>
<tr>
<td></td>
<td>M-based dictionary</td>
<td>0.724</td>
</tr>
<tr>
<td>Still pictures</td>
<td>Control</td>
<td>1.525*</td>
</tr>
<tr>
<td></td>
<td>Dynamic video</td>
<td>-0.412</td>
</tr>
<tr>
<td></td>
<td>M-based dictionary</td>
<td>0.312</td>
</tr>
<tr>
<td>M-based dictionary</td>
<td>Control</td>
<td>1.213*</td>
</tr>
<tr>
<td></td>
<td>Dynamic video</td>
<td>-0.724</td>
</tr>
<tr>
<td></td>
<td>Still pictures</td>
<td>-0.312</td>
</tr>
</tbody>
</table>

As shown in Table 7, the mean score of control group had significant difference with the mean scores of dynamic picture annotations group, still picture annotations group, and the M-based dictionary group. The mean score of the control group was also lower than the mean score of the aforementioned strategies. Therefore, it can be claimed that these strategies (dynamic picture annotations, still picture annotations, and M-based dictionary) had an impact on vocabulary learning. Yet, the difference between the performances of the three experimental groups on the post-test did not reach significance level.
In sum, in comparison with the control group, all aforementioned vocabulary learning strategies were influential in learning and retention of new target words. Since the Sig. ratio in all of them were statistically significant. However, among those strategies, using mobile phone-based dictionary was more effective than the others. Given that, according to the comparison of the mean scores of the groups in both pre-test and post-test, the divergence between the performance of the subjects whom mobile phone-based dictionary was assigned, in both pre and post-tests, was superior than the participants in other groups. Therefore, it confirmed the success of mobile phone-based dictionary usage.

Discussion:
The objective of the study was to examine the effectiveness of vocabulary learning via multimedia annotations (still picture annotations and dynamic picture annotations) and a mobile phone-based dictionary on vocabulary learning. The results suggested that learners who used mobile phone-based dictionary achieved higher scores than those who used multimedia annotations. A look at the data revealed that the mobile-based dictionary had impact on Iranians EFL learners’ vocabulary learning.

The findings of the present study were in line with the findings of (Tick, A., 2009), who have posited mobile phone technology may lead to positive effects in learning environments because of its widespread use and functions such as mobility, reachability, localization, and personalization. The introduction of mobile communication into classrooms has elevated student motivation and promoted teaching efficiency.

The findings also echo those of the study conducted by (Davies, G., 2002), showing that vocabulary learning via mobile phones can be more effective than massed vocabulary learning through the paper medium. He believes that this success may be due to the students’ easy access to the mobile device, which results in their repeated exposures to and frequent practice of the vocabulary items on a daily basis.

According to (Levy, M.M., C. Kennedy, 2005), mobile phones have positively contributed to the field of learning in many different ways. First, mobile learning helps learners to improve their literacy and numeracy skills and to recognize their existing abilities. Second, it can be used to encourage both independent and collaborative learning experiences. Also, it helps learners to identify areas where they need assistance and support. Mobile phones are language assistant because they provide instructions or references to support language learners in conversing with native speakers in real-life situations (Underwood, J., 1984; Kukulska-Hulme, A., et al., 2005). Although mobile phones are widespread everywhere and are popular among students for communication with each other, it must be kept in mind that the use of technology alone is insufficient to ensure success in learning. Other important factors are to be considered includes the technological readiness, and the attitude and acceptance by the end-users (Tick, A., 2009).

Conclusion:
Advanced technology and increased availability of mobile technologies have altered and expanded the field of education. Thus, mobile technologies have started to make their presence felt in the field of second/foreign language education. Mobile learning for language learning has reached a stage where it is starting to move out of the classroom and into the real world (Traxler, J., 2007).

The findings of this study demonstrated that using mobile-based dictionary in enhancing vocabulary knowledge is very effective. Therefore, the method used in this study can be of great help in improving the quality of vocabulary teaching-learning processes in different language teaching/learning contexts.

What should also be kept in mind is that that MALL has the potential of revolutionizing the language learning field in general, and L2 vocabulary learning in particular by students’ use of mobile devices as personal learning tools and consequently the success of mobile learning depends largely on whether mobile technologies are accepted and seen as capable supporting tools by both the students and the teachers.

In designing MALL courseware or materials, this finding could be taken into consideration when making decisions about presenting information in different modes. This could also inform language teachers and administrators in making decisions about the most effective MALL programs to enhance L2 vocabulary learning. Finally, we hope mobile learning is not only limited to students but benefits all people who would like to carry out language learning in the future.

REFERENCES
Grabowski, B.L., 2006. Journal of Educational Multimedia and Hypermedia.