

# The Effect of Length of Exposure to CALL Technology on Young Iranian EFL Learners' Grammar Gain

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## Abstract

In the twenty-first century, integration of technology into education is a force worthy of contemplation. Among all the possible technological tools that can be integrated into EFL classes, computers seem to have achieved a more dominant position. One of the outstanding features of computers is their potential to present educational games and to add fun to grammar learning. This study investigated the possible effects of the integration of CALL technology on young Iranian elementary EFL learners' grammar gain. Moreover, it examined the role of length of exposure to find an optimum balance for the proper amount of CALL integration to language activities. One control and two experimental groups, each consisted of 15 participants, were engaged. One of the experimental groups used CALL technology for twice as long as the other group. '*Family and Friends 2*' with its accompanying MultiRom was utilized in the experimental groups. This software presented computer-based grammar activities. All the participants tried their answers in separate immediate as well as delayed post-tests. The results of one way ANOVA demonstrated significant differences between control and experimental groups in the immediate post-test. The findings of the delayed post-test showed that a significant difference did exist between the control group and the second experimental group. Furthermore, the length of exposure was found to be influential. The results of this study provide some insights for teachers and administrators to review their curricula, approaches, and educational tools, and to consider the possibility of incorporating CALL technology into their teaching environments.

**Keywords:** computer-assisted language learning, computer-based activities, length of exposure, grammar teaching, grammar games

## 1. Introduction

### 1.1 The Importance of Technology and Computer Integration into Education

Apparently, technology has continued to have a remarkable status in the twenty-first century. It has established its supremacy over almost all aspects of human beings' life and hence it has redefined their living. The great changes in the way of living, communicating with each other, observing the world, and learning are all demonstrative of such a fact. Hence, it is not an exaggerated statement to claim that human beings are living in a world which is driven by technology. The recognition of technology as an unavoidable trend has led to the recent zeal for its integration in all fields of life, especially in education. Paulsen (2001) believes that since technology dictates its obligatory presence as a reality in modern life, it is no longer a question of whether to take advantage of it or not: the point is about how to harness it and guide learners in its use. Hence, asserting the realities about technology in this modern world is not the same as identifying how to benefit from it in the teaching contexts. Moreover, introducing new technologies without careful examination of their efficacy may cause some kinds of problems, one of which is cost (Warschauer, 1996). Consequently, it is worth evaluating whether it is sensible to invest money and energy in this area or not.

When someone mentions technology in the language classrooms, the first impulse is to think about computer technology, mostly because computers have so pervaded human beings' home and workplace contexts. The accessibility to individuals and their practical potentials have encouraged a shift in emphasis from computer technology itself to their application. As a response to this recognition, the notion of computer-assisted language learning (CALL) was introduced in the educational environments. Needless to say, in the recent years, computers have been regarded as the integral part of technology and they have played their crucial role in promoting

effective instruction. The important role of computers in education is referred to in Bush's (1997, p. 301) statements:

*It is effective for delivering instruction; it has unique pedagogical value; it enables teachers to better address students' need for individualization; it will help students better relate to life in the information age; it can potentially inform the foreign language education profession about the nature of language and how it is learned.*

Moreover, Warschauer and Healey (1998, p. 59) offered the following benefits of including a computer component in language instruction that support the above mentioned importance of CALL application:

- a) Multimodal practice with feedback
- b) Individualization in a large class
- c) Pair and small group work on projects, either collaboratively or competitively
- d) The fun factor
- e) Variety in the resources available and learning styles used
- f) Exploratory learning with large amounts of language data
- g) Real life skill-building in computer use.

### *1.2 Review of the Related Literature*

The literature is also demonstrative of the effectiveness of CALL application. Positive effects of the application of computer technology have been revealed in many studies and its supportive outcomes in classrooms have been reported (Appel & Gilabert, 2002; Chang, 2005; García & Arias, 2000; Jerrell & Freiermuth, 2005).

Among all the possible ways of incorporating computers into educational settings, utilization of this new technology for presenting educational games is ostensible. The power of games in improving learning is expressed in Aldrich's statements (2005). He introduces three essential elements of successful educational experiences: simulation elements, game elements, and pedagogy elements. Although language games are sometimes treated as time consumers or classroom techniques for fun, games have a particular role in any foreign language teaching program because they can contribute to foreign language learning, especially for young learners. Teaching young learners is a very demanding issue that needs consideration. These young learners are between the ages of about 5 years to 12 years (Rixon, 1999). Mumtaz (2001) also introduces computer games to be the most preferred leisure time activity for children. Prensky (2003) reported that young people's lack of interest in curricular contents is in contrast with their intrinsic motivation towards games. However, he further noted that curricular contents could be combined with the motivation of games into what is called Digital Game-Based Learning (DGBL). Quinn (2005, p. 11) in line with other researchers believes:

*Learning can, and should, be hard fun. The evidence is that learning is most effective if it attracts the attention and interest of the learner, is obviously relevant, requires action on the part of the learner, and is contextualized so that the learner understands how and when to apply it.*

The popularity of games as a new trend in teaching and learning foreign languages is widespread in many countries and lots of research has been conducted to examine the effect of games and gaming in language learning (Egenfeldt-Nielsen, 2005; Egenfeldt-Nielsen, Smith, & Tosca, 2008; Gee, 2003; Kirriemuir & McFarlane, 2004; Shaffer, 2006; Shaffer, Squire Halverson, & Gee, 2005).

While taking into account all the above mentioned merits for the application of computer games in EFL classes, this study particularly focuses on grammar as one of the main components of language. Yu (2008) addresses the disagreements among people regarding the definition of language; however, he states that all of the linguists do agree that sound, lexicon, and grammar are the components of language and these elements are influenced by each other. While they interact with each other, they constitute the whole language system, which means, they convey the content of the language. Sounds are produced and lexicon and grammar are used to achieve the desired function. Mulroy (2003, p. 118) highlights the importance of teaching grammar to anyone who wants to use language; moreover, he believes that:

*Sentences always have and always will consist of clauses with subjects and predicates and of words that fall into classes fairly well described as verbs, nouns, adjectives, adverbs, pronouns, prepositions, conjunctions, and interjections. Individuals who understand these concepts have a distinct advantage over others where the use of language is involved—and that means everywhere.*

These statements imply the crucial role of grammar in language learning. In this regard, games are proved to be influential. Learning language components through computer-aided instruction are becoming more prevalent due

to its effectiveness (Stockwell, 2007); moreover, Bekiri (2003, p. 1) asserts, "When a lesson includes a game, the game gives a chance to the teacher to help learners acquire new forms and lexis in an effective way". The games should be short enough in order not to distract young learners' attention. Furthermore, the central role of games in foreign language teaching and learning is more outstanding in teaching grammar to young learners (Bekiri, 2003; Hong, 2002; Nedomová, 2007). According to Nedomová (2007, p. 17), "young learners are not able to concentrate for more than 10-20 minutes and after that they start to be bored and tired." This state of losing interest and motivation is more noticeable in teaching grammar because it is too dependent on rules and memorization.

Arikan (2009, p. 90) articulated that contextuality is the present feature of all grammar teaching though with different degrees; however, he argues that:

*The teacher can contextualize the lesson through numerous methods including (but not limited to), using audio or visual materials, bringing in realia and props, storytelling, problem solving, giving examples, showing grammar usage, playing games, and teaching explicitly or implicitly.*

As it is stated in this statement, game application is one of the ways to contextualize grammar.

Regarding English grammar, Tongpoon (2001) studied the developmental effect of grammar CALL courseware on phrasal verbs of first year English majors. Using an achievement test, a questionnaire and an observation form, he found that these students developed positive attitudes towards CALL as their English performance substantially improved, after studying with the computerized lesson. The results also showed that the developed courseware was efficient in enhancing language learning.

Designing CALL materials which included self-access supplementary exercises, Intratrat (2003) evaluated the effectiveness of these CALL materials on how students dealt with English grammar. Students' scores on a pre-test and post-test were measured and compared. The results revealed that the post-test scores were significantly higher than those of the pre-test, showing students' development in proficiency performance.

### *1.3 Statement of the Problem*

In spite of the undeniable facts regarding technology, many language teaching programs still lag behind the appropriate integration of technology into their education. Researchers have explored problems that emerged in the application of technology in the language classrooms (Torgerson & Elbourne, 2002). The negative issues pointed out in these studies are chiefly financial issues that prevent the widespread use of technology, parents' fear and uncertainties about the unreasonable amount of its use, low technical support dedicated to technology use, shortage of time allocation, and finally teachers' lack of confidence due to their few skills on the new technologies.

However, taking into account the rapid development of technology and the growing enthusiasm in its integration to educational settings in general and EFL classes in particular, it must be admitted that it is the time to restructure language learning and teaching settings. The emergence of the new technologies must be followed by thinking about the pedagogical reasons for using them rather than by just sticking to the 'wow' factor and expressing the appealing aspects of them. Asserting the realities about technology in this modern world is not the same as identifying how to benefit from it in the teaching contexts. Therefore, introducing new technologies without careful examination of their efficacy may cause some kinds of problems, one of which is cost (Warschauer, 1996). Consequently, it is worth evaluating whether it is sensible to invest money and energy in this area or not.

Among all the possible technologies to be integrated into EFL classes, one of the most popular ones is computer technology. Computer-assisted language learning can show the way toward the enhancement of dull lessons, especially in elementary young learners' EFL classes, into attention-grabbing and motivating learning experiences. According to Mumtaz (2001), computer games have become the mostly favored leisure time activity for children. Computer games with attractive visual presentations accompanied by enjoyable sound and music suit well in fostering young learners' eagerness to learn a new language. Dealing with a new technology can catch the attention of young learners and involve them in the process of active learning.

This recognition has led educational authorities in many countries of the world to attempt the integration of CALL technology into their EFL classes. In spite of the undeniable role of technology in recent years, to be realistic about the application of CALL, it has been warmly welcomed in the educational systems of developed countries; however, most teachers in developing countries still apply 'chalk and talk approach' to their EFL classes. This makes EFL classes tedious and out of date in these countries. Tolerating such boring classes will be difficult for young learners, whose attention span is short.

This undeniable fact is also observable in Iranian EFL classes. The application of CALL is not yet commonplace in Iranian EFL classes due to a large number of reasons such as insufficient number of PCs, scarcity of trained instructors, lack of computer literacy for instructional purposes, and lack of administrative support. This insight of the present reality of CALL in Iranian context demonstrates the very beginning stages of its application in Iranian institutions. However, it may not be ignored that computers like other teaching tools would not assure to bring any advantage to students unless the practical use of computers in a particular context is investigated in detail and put into practice accordingly (Kern & Warschauer, 2000).

It should be admitted that CALL is not widely applied in the Iranian context. Accordingly, its application will surely be a new experience for all learners in general and young learners in particular. Taking into account the unfamiliarity of the learners, the effects of length of exposure seems to be of prior importance; however, this variable has not been examined in other similar studies. It is therefore necessary to explore whether Iranian elementary students learn grammar of a foreign language more effectively through computer-based games and whether the length of exposure plays a significant role.

#### *1.4 Research Questions and Hypotheses*

Q1: Does the integration of CALL technology have any significant effect on young Iranian elementary EFL learners' grammar gain?

Q2: Does the length of exposure to CALL technology have any significant effect on young Iranian elementary EFL learners' grammar gain?

Q3: Does the integration of CALL technology have any significant long-term effect on young Iranian elementary EFL learners' grammar gain?

Q4: Does the length of exposure to CALL technology have any significant long-term effect on young Iranian elementary EFL learners' grammar gain?

Accordingly, the following hypotheses were formulated to be tested at the probability level of 0.05:

H1: The integration of CALL technology does not have any significant effect on young Iranian elementary EFL learners' grammar gain.

H2: The length of exposure to CALL technology does not have any significant effect on young Iranian elementary EFL learners' grammar gain.

H3: The integration of CALL technology does not have any significant long-term effect on young Iranian elementary EFL learners' grammar gain.

H4: The length of exposure to CALL technology does not have any significant long-term effect on young Iranian elementary EFL learners' grammar gain.

## **2. Method**

### *2.1 Participants*

To answer the research questions three intact classes were chosen to take part in the study. A total number of 49 female elementary EFL learners within the age range of 11 to 13 constituted the members of these classes. They were learning English at AVA Talk English language school, Urmia, Iran. All these participants' level was FLC 7 (First Language Course), which is a classification being used for young teenager learners in the above mentioned language school. In order to homogenize the participants and to gauge their level of general proficiency, Cambridge Young Learners English Test was utilized. The analysis of the obtained data from the proficiency test revealed the mean score of 60.82, 62, and 62.44 for the first, second, and third groups, respectively and four of the participant got low scores in comparison to others and consequently, they were excluded from the study as outliers. The rest of the participants enjoyed similar proficiency and the results demonstrated that they were all beginners. Taking into account these results, they were eligible to serve as the participants of the study. Afterward, to deal with nonrandomization of the participants, a semi-randomization procedure was used and these three intact classes were randomly assigned to two experimental groups and one control group each consisting of 15 participants.

### *2.2 Instruments*

#### *2.2.1 Cambridge Young Learners English Test*

To guarantee participants' homogeneity in terms of their language proficiency (in particular grammatical proficiency) as well as to check their initial language proficiency, Cambridge Young Learners English Test was employed. This test has been designed to evaluate the English level of primary learners aged 7 to 12, with an

approach to make testing fun. The edition which was employed in this study was updated in 2007 and contained three Flyers papers from the University of Cambridge ESOL Examinations for the ages of 9 to 12. This test covered all four skills. Section one included five listening parts, with an overall number of 25 questions, each part consisting of five questions. Section two was devoted to reading and writing which had 35 questions being presented in seven parts; however, it should be noted that its writing section could be scored objectively. The last section examined learners' speaking ability through the utilization of 'find the difference, information exchange, and tell the story' tasks.

To check the reliability of the test, first 30 learners who were similar to the target group took the test and the KR-21 method was applied and the results revealed a high degree of the reliability of the test, e.g. 0.76.

### 2.2.2 Achievement Test

The second data elicitation tool was a teacher-made achievement test. This test was used as a post-test, which aimed to measure the degree of the participants' grammatical gain after the treatment sessions. The test had a total number of 14 grammar questions. This achievement test required filling the blanks or providing the complete answers on the part of the learners. Since the answers to be provided for each of the items were such that almost everybody would agree on a particular response, their way of scoring was objective.

Two of the teachers involved in teaching "*Family and Friends 2*" book took into account the content of the lessons and specific purpose of the test and then constructed it. Moreover, all the items were reviewed by another teacher to diagnose any ignored mistakes and improve the quality of the test. Relying on the table of specifications, the content representativeness and validity of the test were evaluated and it was confirmed that the test had satisfactory level of content validity.

After this reviewing stage and solving the unnoticed problems, the test was piloted on the same level participants in the institute and faulty items removed. The developed test was administered to 30 learners whose characteristics were similar to those of the target group in terms of age range, gender, and level of language proficiency. In order to ensure the level of easiness of the test, item facility was calculated for each of the items in grammar and vocabulary section. This step revealed no problems in the test. In the next step, item discrimination was focused on. All the items in the test enjoyed a good index of item discrimination.

Content validity as the degree of the correspondence between the test content and the content of the materials to be tested was also addressed. To achieve the desired content validity, two experts familiar with the book reviewed the test. They stated that the test served its purpose in terms of its content.

The reliability of the test was also checked using KR-21 method. The estimated reliability was 0.68 which was indicative of a good degree of reliability for the test.

### 2.2.3 'Family and Friends 2'

This book, written by Naomi Simmons and published by Cambridge University Press, was the main instrument of this study. The publisher provides a student MultiRom that contains computer-based activities, which are relevant to the grammar items presented in each unit. This software utilizes a combination of colorful images and sounds that enhanced the quality of the activities. The activities were game like. In the grammar part, if the students could match the correct question with its answer, the sentence was marked green; if the correct answer was not chosen, it was marked red; their performance on these activities were checked by the software and remarks such as 'Congratulations' or 'Try Again' were provided. These remarks could be considered as a kind of immediate feedback provided by software. This book was the material used for classroom teaching in all groups. However, the control group only received the book without its accompanying software. The student MultiRom was utilized in the experimental groups in a bit different ways as explained in the next section.

### 2.3 Procedure

This study strived to investigate the possible effects of using CALL technology with different lengths of exposure on improving young learners' grammar gain. To do so, the following procedures were followed:

The first step in conducting the present research was the administration of Cambridge Young Learners' English test as the homogenizing tool. It was administered to 49 elementary young EFL learners who constituted three intact classes. It must be mentioned that due to the learners' short attention span and in order to obtain valid data, the proficiency test was administered in three sessions: reading and writing in a single session, listening and speaking in two different sessions. In order to ensure the reliability of the test scores for the speaking part, another teacher was asked to provide her own scores for each participant and hence the inter-rater reliability was checked. The correlation between the two sets of scores was high enough, i.e. 0.81. While examining the

participants overall performance on the proficiency test, since four of the learners got very low scores, they were regarded as outliers and their performance was not taken into account in the analysis of the final data. After ensuring homogeneity of the learners in terms of their general proficiency, those three intact classes were randomly assigned to one control and two experimental groups with 16 participants in the control group and 15 participants in each of the experimental ones.

During the treatment, the control group was taught using the traditional book-based approach, without the utilization of the software. However, in order to make sure that the control group was exposed to the same grammar as those in the experimental groups, this group received paper-based activities whose content was more or less similar to the content used in the computer software. The activities were printed out and the participants in the control group tried their answers on these post-teaching activities immediately after the teaching phase, it should be stated that these activities were done in groups of four. The experimental groups were taught with the help of the computer software during 12 sessions of treatment. The only difference between the two experimental groups was the length of exposure. One group used this technology twice as long as the other group; the length of exposure in the first experimental group was a quarter and in the second experimental group, it was half an hour. After the presentation phase of grammar, participants made groups of four to do the activities related to the grammar that had been covered in each unit. They were supposed to do the activities one by one and after trying their answers on the activities, they had to check their performance and if they were not successful in providing the correct answers, the same activity was repeated for them until they could answer correctly. It must be noted that none of the participants in the control or experimental groups had access to this MultiRom at home.

The final step in the process of conducting the research was the administration of the achievement test. For comparing the performance of all groups to examine the possible effects of the use of CALL technology after the treatment sessions, an achievement test as a post-test with the aim of eliciting participants' grammar gain was employed.

In order to measure longer-term effects of the utilization of CALL technology and to get a wider snapshot of treatment effects, a delayed post-test in addition to the immediate post-test was administered two weeks later.

In the scoring stage, each item in the test received one score, and the overall score was 14.

#### *2.4 Data Analysis*

The elicited data was analyzed using the SPSS (Statistical Package for Social Sciences) software. In order to understand whether CALL application was more effective than traditional teaching, that is, to answer question 1, one way ANOVA was utilized. To answer questions on the effects of length of exposure of CALL on grammar gain of the learners, a separate independent *t*-test was used. The same data analysis procedures were followed to evaluate the long-term effects of CALL technology using delayed post-test scores.

### **3. Results**

#### *3.1 The Results of Proficiency Test*

To ensure the homogeneity of the participants in all three intact classes, Cambridge Young Learners English Test was utilized. To compare the performance of the participants in the intact classes, a one way ANOVA was run.

Table 1. Descriptives for Pre-test Proficiency Test

	N	Mean	Std. Deviation	Std. Error
first class	17	60.82	7.88	1.91
second class	16	62.00	5.31	1.32
third class	16	62.44	5.16	1.29
Total	49	61.73	6.19	.88

The Table 1 presents the descriptives for these intact classes.

Table 2. Test of Homogeneity of Variances for Pre-test

Levene Statistic	df1	df2	Sig.
.99	2	46	.37

To check the homogeneity of variances, the significance value is checked and since it is 0.37 which is greater than 0.05, the assumption is not violated (Table 2).

Table 3. ANOVA for Pre-test Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.14	2	11.57	.29	.74
Within Groups	1818.40	46	39.53		
Total	1841.55	48			

Since the assumption of the homogeneity of variances is not violated, in the next step, it is checked that whether there is any significant difference between the present groups or not. As Table 3 demonstrates, there is no significant difference at the  $p < .05$  level in pre-test scores for the three intact classes:  $F(2, 46) = .29$ ,  $p = .74$ . This result demonstrates that groups are of equal language proficiency at the beginning of the study. Hence, their performance on the final achievement test is comparable.

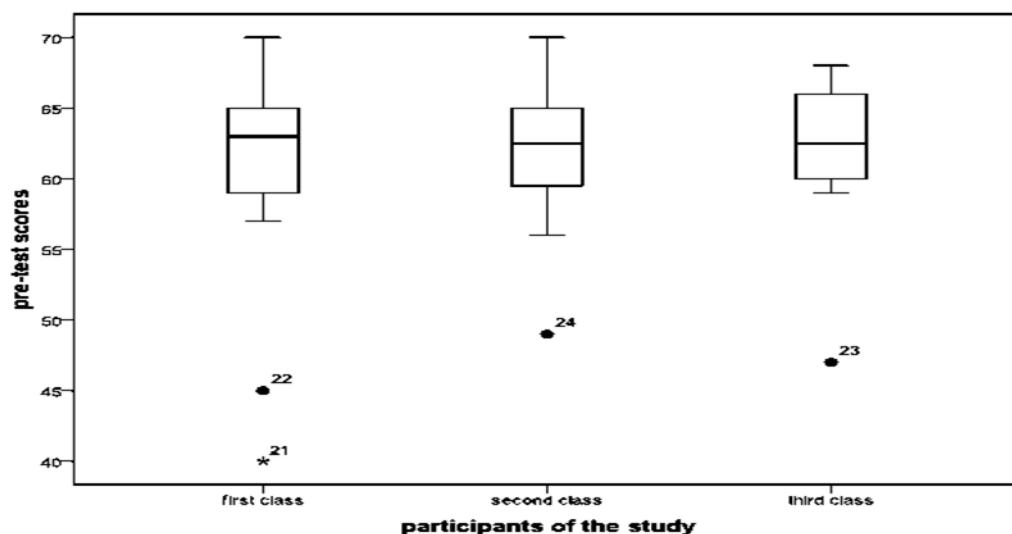


Figure 1. Box plot for Pre-test

However, the box plot shows that four of the participants got low scores in comparison to others. These participants were excluded from the study as outliers (Figure 1).

### 3.2 CALL Technology and Grammar Gain in Immediate Post-test

In order to understand whether CALL application was more effective than traditional teaching with regard to grammar gain, one way ANOVA was utilized to facilitate the comparison of the means of three groups. It is worth reminding that the length of exposure in the first experimental group was a quarter and in the second experimental group, it was half an hour.

Table 4. Descriptives for Grammar Post-test

	N	Mean	Std. Deviation	Std. Error
control	15	9.73	1.48	.38
experimental1	15	11.60	1.18	.30
experimental2	15	11.93	1.58	.40
Total	45	11.09	1.70	.25

Table 4 demonstrates the mean, standard deviation, and number of participants for each group.

Table 5. Test of Homogeneity of Variances for Grammar Post-test

Levene Statistic	df1	df2	Sig.
1.58	2	42	.21

At first, the assumption of the homogeneity of the variance is checked and as it is shown in Table 5, the significance value is .21 which is greater than .05, so this assumption is not violated.

Table 6. ANOVA results for Grammar Post-test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.17	2	21.08	10.36	.00
Within Groups	85.46	42	2.03		
Total	127.64	44			

After ensuring about the homogeneity of variances, in order to determine whether there is any significant difference between the present groups, the significance value in Table 6 is examined and as it is shown in this table, there is significant difference at the  $p < .05$  level in grammar post-test scores for the three groups:  $F(2, 42) = 10.36$ ,  $p = .0$ . This implies that there is a significant difference somewhere among the mean scores on the dependent variable; however, this table does not show where this difference is.

Table 7. Multiple Comparisons for Grammar Post-test

(I) groups	(J) groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
control	experimental1	-1.86*	.52	.00	-3.13	-.60
	experimental2	-2.20*	.52	.00	-3.47	-.93
experimental1	control	1.86*	.52	.00	.60	3.13
	experimental2	-.33	.52	.79	-1.60	.93
experimental2	control	2.20*	.52	.00	.93	3.47
	experimental1	.33	.52	.79	-.93	1.60

As it was stated, Table 6 does not exactly reveal where the differences among the groups occur. Hence, post-hoc Tukey HSD test is presented to reveal the location of differences (see Table 7).

As it is obvious in the above table, the asterisks are demonstrative of a significant difference between the two groups being compared. The mean difference for the groups is compared at  $p < .05$ .

Post-hoc comparisons indicated that the mean score for control group ( $M = 9.73$ ,  $SD = 1.48$ ) was significantly different from first experimental group ( $M = 11.60$ ,  $SD = 1.18$ ). Furthermore, the mean score for control group ( $M = 9.73$ ,  $SD = 1.48$ ) was significantly different from second experimental group ( $M = 11.93$ ,  $SD = 1.58$ ). However, first experimental group ( $M = 11.60$ ,  $SD = 1.18$ ) did not differ significantly from second experimental group ( $M = 11.93$ ,  $SD = 1.58$ ).

In conclusion, it can be stated that the integration of CALL technology has significant effect on young Iranian elementary EFL learners' grammar gain. However, the length of exposure to CALL technology does not have any significant effect on young Iranian elementary EFL learners' grammar gain.

### 3.3 Longer-term Effects of CALL Technology on Grammar Gain

Another objective of the present study was to reveal the longer-term effects of CALL technology as far as grammar gain was concerned. The same statistics were utilized to evaluate CALL's longer-term effects.

Table 9. Descriptives for Grammar Delayed Post-test

	N	Mean	Std. Deviation	Std. Error
control	15	9.40	1.54	.40
experimental1	15	9.87	1.24	.32
experimental2	15	11.67	1.58	.41

Table 9 shows the mean scores for each of the groups.

Table 10. Test of Homogeneity of Variances for Grammar Delayed Post-test

Levene Statistic	df1	df2	Sig.
1.11	2	42	.33

It is Figured out that the assumption of homogeneity of variances is not violated because the significance value is .33, which is greater than .05 (see Table 10).

Table 11. ANOVA for Grammar Delayed Post-test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	42.97	2	21.48	9.95	.00
Within Groups	90.66	42	2.15		
Total	133.64	44			

Consequently, another one way ANOVA was employed to show if the differences between the groups were significant or not. The results demonstrate that there is significant difference at the  $p < .05$  level in grammar delayed post-test scores for the three groups:  $F(2, 42) = 9.95, p = .0$ . (see Table 11).

Table 12. Multiple Comparisons for Grammar Delayed Post-test

(I) groups	(J) groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
control	experimental1	-.46	.53	.66	-1.77	.84
	experimental2	-2.26*	.53	.00	-3.57	-.96
experimental1	control	.46	.53	.66	-.84	1.77
	experimental2	-1.80*	.53	.00	-3.10	-.50
experimental2	control	2.26*	.53	.00	.96	3.57
	experimental1	1.80*	.53	.00	.50	3.10

The above table just reveals the presence of the significant difference among groups; however, to determine which groups were significantly different from others, anther post hoc comparisons using the Tukey HSD test was run. Post-hoc comparisons indicated that control group ( $M = 9.40, SD = 1.54$ ) did not differ significantly from first experimental group ( $M = 9.87, SD = 1.24$ ). However, the mean score for control group ( $M = 9.40, SD = 1.54$ ) was significantly different from the second experimental group ( $M = 11.67, SD = 1.58$ ). Furthermore, the first experimental grope ( $M = 9.87, SD = 1.24$ ) was significantly different from the second experimental group ( $M = 11.67, SD = 1.58$ ). The mean difference for the groups is compared at  $p < .05$  (see Table 12).

Generally speaking, it can be concluded from the results that regardless of length of exposure to CALL technology, this technology improved elementary learners' grammar gain. Focus on the length of exposure to this technology in particular showed that although in the immediate post-test no significant difference was detected, in a delayed post-test the second experimental group with longer exposure to this technology performed better than the first one. This implies that maximizing the length of exposure to the technology may be influential in young learners' grammar gain.

#### 4. Discussion

The obtained positive results which were found in this study are in line with Intratrat's (2003) claim on the effectiveness of CALL materials in improving learners' grammar gain. In his study, the results revealed that the post-test scores were significantly higher than those of the pre-test, showing learners' development in proficiency performance. The findings of the present study also support the findings of Tongpoon's (2001) study regarding the effect of grammar CALL courseware on phrasal verbs of first year English major students. It was found that learners' language learning was enhanced after the utilization of computers in their classes. Similarly, Collentine (2000) argues that the application of technology in teaching and learning grammar is effective. Furthermore, Nutta (1998) reported similar findings; he applied a computer-based instruction to examine the effectiveness of computer-based grammar instruction in comparison to traditional teacher-directed grammar instruction and found that in all levels of English proficiency, the computer-based students scored significantly higher on open ended grammar tests covering the structures in question than the teacher-directed students. Likewise, Frigaard (2002) studied the performance of high school students participating in a computer lab on grammar in Spanish. The results indicated that the computer lab was a helpful device and more beneficial for some of the students.

As Bekiri (2003), Hong (2002), and Nedomová (2007) put it rightly, these positive results about the effectiveness of the application of CALL technology in grammar teaching affirm the fact that games play a central role in teaching grammar to young learners. Kebritchi (2008) utters one of the most important positive effects of games as longer remembrance of the concepts presented in the games. Nedomová (2007) states the reasons for this fact and relates it to young learners' low attention span. He notes that since grammar refers to the application of rules, it may lead to the increase of interest and motivation on the part of learners; and as Warschauer and Healey (1998) stated one of the benefits of including a computer component in language instruction is the presence of fun factor. Wangenheim and Shull (2009) argue that game-based learning is a powerful instructional approach. In the implementation of educational games, the learning process becomes easier, more interesting, and more effective because the learner is an active participant and hence at the center of learning. Similarly, Egbert (2010) considered it as a central element to involve learners over extended periods in demanding activities, such as learning a language. Previous research has demonstrated that intrinsic motivation is increased in learners through the implementation of computer games (Ballou, 2009; Batson & Feinberg, 2006; Clark, 2007; Gee, 2003; Johnson, 2006; Liu & Chu, 2010; Mitchell & Savill-Smith, 2004; Papastergiou, 2009; Prensky, 2001; Robertson & Howells, 2008; Squire & Jenkins, 2002).

As Arikan (2009) articulated, using audio or visual materials, giving examples, showing grammar usage, and playing games can help contextualize grammar learning and the contextuality leads to better understanding of grammatical points. Similarly, Rouse (2005) and Song and Zhang (2008) reported that computer games provide immediate and enough feedback that makes it relevant to the immediate situations and makes it highly contextualized. Furthermore, providing immediate feedback is also influential. According to Baki (2002), computer-aided instruction allows learners to observe their performance, get feedback, and consequently control their language learning; it also employs graphics, sounds, animations, and figures in the presentation of lessons or related activities. The immediate feedback provided in the application of computer games is one of the major advantages mentioned for their implementation.

#### 5. Conclusions

The results of the present research show optimistic implications about the potential of computer application in the Iranian context. Furthermore, the findings suggest the appropriate amount of time that is needed to be devoted in young learners' classes. As the results suggest, the increase in the time allocation will lead to the increase in learners' grammar gain.

Aside from the great role of these computer-based games on learners' augmented grammar gain, the outstanding feature of these games should not be ignored by teachers. Needless to say, repetition, drill, and practice are of high importance in young learners' classes. Teachers can take advantage of this feature of computer activities. Since computers are machines that do not get tired and they can present the activities as many times as needed, they would be a great help for teachers to provide enough exercise in the class.

The other important point worth noticing about computers is their capacity for providing immediate feedback on learners' performance. It is believed that improper error correction may hinder learning process especially in young learners' classes that is why peer- or self-correction is recommended. The kind of feedback provided by computer software is given in the absence of the teacher, so students can learn from their mistakes in a stress-free atmosphere. As a result, learners will improve their confidence as well as their learning in such an atmosphere.

The results of this study, further, can be an invitation for administrators to think about providing more novel

educational tools, and at the same time consider the possibility of incorporating technology, especially CALL technology, into their teaching environments. As such new technologies are added to the classes, they will bring the sense of acceptance and desire for learners.

Another implication can be for game designers. Computer as a mechanical device is like a double edged sword that can be used well or badly. Without careful selection and design of appropriate computer-based activities, counter product of CALL application should be expected. Too easy or too difficult activities will discourage teachers and learners from applying them in their classes. Despite minor drawbacks, the promising findings reported here should call the teachers' and administrators' attention to take into consideration the integration of CALL technology into EFL classes more seriously.

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