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The Effect of Using a Digital Computer Game (SIMS) on Children's Incidental English Vocabulary Learning

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Abstract. Words are deemed to be the building blocks of any language and the significant role of vocabulary in expressing our thoughts is indisputable. This study was designed to investigate whether the use of digital computer games in the classroom could affect incidental vocabulary learning by children. A quasi-experimental design with the pretest-posttest-control sequence was used in this study. An announcement was made to one hundred and fifty female pre-intermediate English learners about holding classes on vocabulary enhancement at Khane-Zaban institute in Hamadan, Iran. Sixty students registered for the classes. Since they were all pre-intermediate learners, they were randomly assigned to two groups, the comparison group (traditional class, n=30) and the experimental group (SIMS class, n=30). Then Vocabulary Knowledge Scale (VKS) test, taken from Wesche and Paribakht's (1996) study, as the pretest was administered to both groups. After 20 sessions, VKS with different order, as the posttest was given to both groups. After the data collection, analysis of covariance (ANCOVA) was conducted. The results indicated that the experimental group outperformed the comparison group and that the implementation of games in the classroom could enhance the incidental vocabulary learning.

Keywords: Children Level, Digital Computer Game, Incidental Vocabulary Learning

1. INTRODUCTION

The role of vocabulary in learning a new language is by no means deniable. Words are deemed as the building blocks of any language and the significant role of vocabulary in expressing our thoughts is indisputable. In the annals of second language learning, vocabulary teaching and learning were rather neglected in the past (Richards & Renandya, 2002). As Moir and Nation (2008) assert, it was widely assumed that lexical instruction is not essential as it can happen by itself. Therefore, the teaching of vocabulary was not popular at the time (Nation, 1990). Recently, there has been a renewed interest in learning vocabulary and its role in learning a language (Griffiths, 2003, 2006) and vocabulary acquisition has turned into a salient component of any language learning experience (Meara, 1980). McCarthy (1990) believes "no matter how well the student learns grammar, no matter how successfully the sounds of L2 [second language] are mastered, without words to express a wider range of meanings, communication in an L2 just cannot happen in any meaningful way" (p.8).

Indeed, various techniques have been introduced and used for teaching vocabulary as a result of which researchers have started testing and evaluating the efficiency of these techniques (Finkbeiner & Nicol, 2003). In spite of major research and advancement, many issues regarding the way learners acquire vocabulary and the most appropriate way to teach words still remain unresolved (Meara, 1980).

Incidental vocabulary learning has, specifically, shown to be a controversial issue and a question of long debate with regard to its impacts on the process of vocabulary learning (Prichard, 2008). Some scholars articulated that a great portion of lexical items in First Language (L1) and Second Language (L2) is acquired incidentally (Hulstijn, 2003; Nagy &

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Anderson, 1984; Paribakht & Wesche, 1999). So there seems to be a need to provide opportunities for greater incidental vocabulary learning in the classroom using Computer Assisted Language Learning (CALL) (Aghlara & Hadidi, 2011).

Considering the importance of vocabulary in learning a second language using attractive ways to encourage students to learn more words seems to be necessary. Since, a great number of words might be acquired incidentally; computer games might be used as potential tools to provide more opportunities for learners to learn words while they are engaged in other activities. Creativity, innovation, and sense of competition in these games may give learners some sort of encouragement to incidentally acquire the words used in those games. In this kind of learning, they not only enjoy the games but also the users try to guess the meaning of words and memorize them. The present study aimed to investigate if using a digital game (SIMS) is effective in learning incidental vocabulary among Iranian EFL learners.

2. REVIEW OF THE RELATED LITERATURE

2.1 Vocabulary learning

Learning vocabulary seems to be the pre-requisite to learning the four main language skills. Vocabulary learning is a continuous task and is a key component of language learning. The work of scholars and practitioners shows that there has been a renewed interest in learning and teaching vocabulary in the past two decades (Maftoon, Hamidi & Sarem, 2012).

Two prominent approaches concerning vocabulary acquisition, namely *intentional* and *incidental* vocabulary learning have been propounded. Hatch and Brown (1995) introduce intentional learning as a type of learning "designed, planned for, or intended by the teacher or students" (p.368). Some mistakenly believe that the discrepancy between incidental and intentional learning is in the fact that the former involves no attention and noticing. But according to Schmidt (1994), attention and noticing are integral parts of both incidental and intentional learning. The difference between these two types of processes, Hulstijn (2003) argues, lies in the deliberate retention technique. To put it crudely, in intentional learning of vocabulary, learners are aware that they want to internalize the words and they may later be asked about the meaning of them; therefore, the degree of awareness is of paramount importance. The presents work; however, pays attention to the incidental learning of vocabulary.

2.2 Incidental vocabulary learning

Incidental vocabulary learning is defined as "learning that occurs when the mind is focused elsewhere, such as on understanding a text or using language for communicative purposes" (Decarrico, 2001, p. 289). Hatch and Brown (1995) believed that incidental learning is "a byproduct of doing or learning something else" (p. 368) and occurs while learners are engaging in using language as a communicative means, which brings about "a double benefit for time expended" (Schmitt, 2000, p. 120). The incidental learning of vocabulary seems to be very effective as it is believed that a large proportion of words are not taught explicitly to students, and when students go beyond a specific level of learning a language, vocabulary learning is mostly incidental (Nagy & Anderson, 1984). In the same line of research, Nation (2001) has postulated that the first two or three thousand top frequent words of language should be taught explicitly and beyond this level words will be learnt incidentally without the need for explicit instruction

In this study, the opportunity for incidental vocabulary learning has been provided by the implementation of a digital computer game called SIMS; while learners are engaged in this game and try to win the game, they come across the new words targeted in this study.

2.3 Computer Assisted Language Learning (CALL)

It deemed to be "an approach to language teaching and learning in which computer technology is used as an aid to the presentation, reinforcement and assessment of material to be learned, usually including a substantial interactive element" (Davies, 2010, p. 261). It contains a wide range of new technologies, especially multimedia and communication technology.

The advent and rapid development of computers and Internet have made foreign language teachers consider computer assisted language learning (CALL) as a component of language learning pedagogy. Because of the technological and conceptual modifications of the society, CALL has found its place in second language acquisition pedagogy (Saffarian & Gorjian, 2012). CALL has not turned out to be very predominant but nowadays there is an upward trend in infusing CALL in educational systems as opposed to the traditional approaches whose key goals were centered on acquiring knowledge. In todays' actual educational context and educational reforms, the core objectives are the formation of attitudes and intellectual capabilities, which paved the way for the assimilation of knowledge; of course the educational content is opted based on the context of each community. Cummins (2000) stated that "we should acknowledge the fundamental changes that IT is bringing to our societies and seek ways to use its power for transformative purposes" (p.539).

Using computers for language learning seems to be interesting but also positive and stimulating for many language teachers and learners (Ghasemi et al., 2011). As a matter of fact, using computer technology challenges students and encourages them to develop their own learning strategies and proceed at their own pace (Maftoon, Hamidi, & Sarem, 2012)

2.4 Digital computer game

Generally speaking, game is an activity whose purpose is fun and pleasure (Hornby, 1995). Juul (2003) defines games as a rule-based system which has a different and measureable outcome, various outcomes have different values, the player tries his best to influence the outcome, and the final results are not compulsory. Games can facilitate concentration on learning due to the fact that it can motivate learners and abate their anxiety and jittery (Amato, 1988).

Nowadays, there is an upward trend and ever-growing popularity in using computer-based video games in education (deHaan, Reed, & Kuwaha, 2010); nonetheless, the majority of research regarding games addresses their relation to general education (e.g., Squire, 2006) or their effect on the development of indigenous speakers' literacy (e.g., Gee, 2007; Steinkhueler, 2007). Kapp (2012) called this kind of using games for learning 'gamification' and defined it as "the careful and considered application of game thinking to solving problems and encouraging learning using all the elements of games that are appropriate" (p.12); therefore, Perrotta, Featherston, Aston, and Houghton (2013) declared that gamification deals with "how certain situations or processes (including learning) can be turned into playful experiences" (p.7).

SIMS is a kind of simulation computer game (Perrotta, Featherstone, Aston, & Houghton, 2013). It is a simulation of everyday life in virtual world. Players, while playing, could direct the regular practices of an imaginary family called Sims, assisting the members of that family in tasks including amusing guests, preparing food, searching and applying for jobs, caring about personal sanitation, designing the interior part of the house, etc.

3. METHODOLOGY

3.1 Participants

An announcement was made to 150 pre-intermediate English learners about holding classes on vocabulary enhancement at Khane-Zaban institute in Hamadan, Iran. The convenience sampling was used in this study. Sixty students registered for the classes. Since they were all pre-intermediate learners, according to oral placement test taken by institute based on the book *family and friends 1*, they were randomly assigned to two groups, a comparison group (n=30) and an experimental group (n=30).

All the participants were female and high school students, and aged 14-17. The participants' L1 background was Persian. When the data were collected, they were attending their classes three times a week and were studying the book *family and friends 1*, written by Naomi Simmons (2010). This book covers all four language skills (Speaking, Listening, Writing, and Reading). The participants attended the classes for 3 months.

3.2 Materials

The materials used in the present study include the following: the material used in this study was a book entitled *Family and Friends 1*. This book was chosen since there was a good match between the content of this book and the game SIMS. In both classes the vocabulary was almost the same and the learners use the same book (*Family and Friends 1*) during the period of treatment. The SIMS, one of the best-selling digital simulation games, was used in the experimental group to check its usefulness for vocabulary acquisition. Nowadays using simulations in the language classroom has received much attention since "the authentic language in a simulation is placed into a context in which it would actually be used" and also they provide opportunities for learners (Miller & Hegelheimer, 2006) "to have experiences and use language that may otherwise be difficult to do within the confines of the classroom" (p. 313). Computer simulations can also individualize the process of learning and combine both using computers and simulations in the classroom (Miller & Hegelheimer, 2006).

3.3 Instrument

The major instrument used in this study was a Vocabulary Knowledge Scale (VKS), as the pretest and the posttest. The Vocabulary Knowledge Test (VKS) developed by Wesche and Paribakht (1996) was used to check whether the participants knew the targeted vocabulary or not. VKS is "a scale combining self-report and performance items to elicit both self-perceived and demonstrated knowledge of specific words in written form." (Wesche & Paribakht,1996, p. 29). This test was comprised of 40 items, and was used to check the novelty of 40 words chosen from the computer simulation game (the SIMS) and to extract the participants' prior knowledge about those words. The following scoring procedure (Table 3.1), taken from Wesche and Paribakht (1996), was used.

Table 3.1. VKS Scoring Categories Meaning of Scores.

Self-Report Categories	Possible Scores	Meaning of Scores
I	0	The word is not familiar at all.
II	0	The word is familiar, but its meaning is not known.
III	1	A correct synonym or translation is given.
IV	1	The word is used with semantic appropriateness in a sentence.
V	1	The word is used with semantic appropriateness and grammatical accuracy in a sentence.

Based on Table 3.1, category I (i.e. *I don't remember having seen this before.*) and II (i.e. *I have seen this word before, but I don't know what it means.*) were rated 0 because these categories indicate that the participants did not know anything about the selected words. Correct response for category III (i.e. *I have seen this word before and I think it means ….*), category IV (i.e. *I know this word. It means ….*), and category V (i.e. *I can use this word in a sentence: ….*) meant 1 on the scoring matrix. Wesche and Paribakht (1996) used this score procedure for measuring *Number of Learnt Vocabulary* (NLV).

It is worth noting that apart from being used for measuring number of learnt vocabulary, VKS is also utilized for gauging the *Depth of Learnt Vocabulary* (DLV) but the scoring procedure is completely different. Since the focus is on the number of learnt vocabulary in this study, the above scoring procedure was adopted. The third, fourth, and fifth categories each received one score while category 1 and 2 received no points. Thus, due to the fact that 40 words were assessed in the test, the maximum number of learnt vocabulary (NLV) score could be 40 points for every student (40×1=40) and the minimum NLV score was 0 (40×0=0).

The same Vocabulary Knowledge Scale (VKS) was administered to the participants in both groups as the posttest in the end. The only difference between the pretest and posttest was the order of the items. It was done to diminish the practice effect (Dornyie, 2007). The translated version of the scale (in both pretest and posttest) was administered in order to ensure that there were no misunderstandings by the participants.

3.3 Procedure

First of all, 40 words were selected from the units of the book. The participants came across those words while playing different sections of the SIMS. These words included words pertaining to the names of different parts of the body, family members, furniture, and some parts of the house.

Afterwards, Paribakht and Wesche's (1993) Vocabulary Knowledge Scale (VKS) was utilized as the pretest in order to find out how much the participants knew about the chosen words. The words are presented below in Table 3.2.

Table 3.2. The Selected Words Used in the Study.

Grandmother	Grandfather	Cousin	Son	Nephew
Teen	Young	Adults	Elder	Child
Sleepwear	Pant	Skin	Socks	Hat
Swimwear	Eyebrow	Ears	Eyes	Mouth
Living room	Dining room	Bedroom	Bathroom	Kitchen
Downstairs	Lights	Stove	Refrigerator	Upstairs
Mirror	Shower	Blanket	Dresser	Toilet
Rug	Cabinet	Shelf	Pillow	Sofa

Then, the participants were randomly assigned to two groups: experimental and comparison groups. As mentioned before, at the time of data collection, the students were studying *Family and Friends 1*; hence, four units of this book pertaining to the topics of the sections in SIMS were selected to be taught in the classroom.

VKS, as the pretest, was given to both experimental and comparison groups in the first session. Then, in the second session, both groups were taught the same units of the book *family and friends 1* in the same way. In the comparison group, after the lesson, the teacher asked for the definition of some new words and attempted to extract the meaning from the participants.

She provided some examples for better understanding of the learners. In the experimental group, in each session, the teacher initially taught some sections of each chosen unit. Then 20 minutes was devoted to playing the game and teaching the words via images displayed in the game. The game was run via a projector so all the images could be seen clearly by all the participants.

To shed more light on the procedure performed in the experimental group, one of the sessions is explicated here. The topic of the unit was family members. In the book, there was a reading which implicitly directed the students' attention towards family members, and then the new words were explicitly presented to them. After that, the game was run, and the excited participants were asked to play the game. As the game started, it required participants to create their virtual characters, such as grandfather, grandmother, brothers, etc. Each of these virtual family members had his/her own characteristics, including, their gender, color of their hair, and their clothes. Since they themselves were engaged in creating the Sims (the characters), they had great motivation to use the words they had come across in the book. They could also experience the tangible meaning of the words through images.

In another section of the game, they were required to decide, find, and buy furniture for their unfurnished houses, which again forced them to use the vocabulary pertaining to furniture in the unit on this topic. After 20 sessions, a vocabulary test based on Vocabulary Knowledge Scale (VKS) (Paribakht & Wesche, 1993) was given to both comparison and experimental groups in order to check how many words they learnt throughout these sessions. It is worth noting that the pretest and posttest had the same content but the order of items was changed. The same scoring procedure was used for both the pretest and the posttest based on Wesche and Paribakht's (1996) table for interpreting the learners' answers.

4. RESULTS AND DISCUSSION

This section presents the output of SPSS regarding the normality distribution of the data, the descriptive statistics, and the results of analysis of covariance (ANCOVA).

4.1 Normality of the Obtained Data

Before conducting any parametric tests, as the outliers and extreme scores might affect the result of the study, it is essential to check the distribution of the data for normality. To check the normality of the obtained data, the Kolmogorov-Smirnov and Shapiro-Wilk tests of normality were checked along with box plots and histograms. First, the normality of the data in the pretest discussed.

In order to check the normality distribution of the data precisely, Kolmogorov-Smirnov and Shapiro-Wilk tests were run. The results can be seen in Table 4.1.

Table 4.1. Kolmogorov-Smirnov and Shapiro-Wilk's Tests of Normality for the Pretest Scores.

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
PreTest	Experiment	.167	30	.033	.937	30	.076
	Comparison	.131	30	.200*	.964	30	.401

As shown in Table 4.1, according to the results of One-Sample Kolmogorov-Smirnov Test, the scores in the pretest in the comparison group is normal since Z = 0.131, p = 0.200 and the level of significance is more than 0.05. The result for the experimental group indicates that the obtained data are not normal since Z = 0.167, $p < 0.05$ and the significance level is lower than 0.05. Therefore, in order to get assured, Shapiro-Wilk test was also checked. The results of

Shapiro-Wilk test indicates that the scores in the experimental group is normal since in this test the level of significance is higher than 0.05 (p =0.07). Because the accuracy and precision of Shapiro-Wilk test is more than One-Sample Kolmogorov-Smirnov test (Tabachnick & Fidell, 2007), the results of this test were considered to be the base of the data analysis.

To check the normality of the obtained data in the posttest, the Kolmogorov-Smirnov and Shapiro-Wilk tests of normality were checked for both groups.

Table 4.2. Kolmogorov-Smirnov and Shapiro-Wilk Tests of Normality for the posttest scores.

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
PostTest	Experiment	.131	30	.197	.960	30	.301
	Comparison	.130	30	.200*	.947	30	.142

As seen in Table 4.2, the results of Kolmogorov-Smirnov Test are not statistically significant, the levels of significance are more than 0.05, which shows the normality of distribution of the obtained data in the posttest. The results of Shapiro-Wilk test also provide a stronger evidence for this finding.

4.2 Testing the Hypothesis

This empirical study was designed to investigate the practical results of employing the digital computer game of Sims, (the independent variable) on vocabulary learning (the dependent variable) in the comparison group and the experimental group. The null hypothesis of this study was:

H0: The application of a digital game (SIMS) does not have any effect on incidental vocabulary acquisition.

Apart from the normality of the data, other required assumptions of ANCOVA, which is the appropriate analysis method for the design of the current study, were checked. Table 4.3 demonstrates Levene's Test of Equality of Error Variances in the comparison and experimental groups.

Table 4.3. The Equality of Error Variances in the Comparison and Experimental Groups

F	df1	df2	Sig.
.151	1	58	.699

As seen in Table 4.3, the assumption of equality of variances is confirmed since the level of significance is more than 0.05; therefore, ANCOVA can be utilized. Another assumption is the equality of the regression lines in both groups (Table 4.4).

Table 4.4. The Equality of the Regression Lines in the Comparison and Experimental Groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	870.593[a]	3	290.198	29.873	.000
Intercept	881.598	1	881.598	90.752	.000
Group	17.062	1	17.062	1.756	.190
PreTests	3.656	1	3.656	.376	.542
Group * PreTest	.623	1	.623	.064	.801
Error	544.007	56	9.714		
Total	60196.000	60			
Corrected Total	1414.600	59			

As observed in Table 4.4 above, the interaction between the pretest and the groups is not statistically significant. Since this assumption was also met, analysis of covariance (ANCOVA) could be run. Table 4.5 shows the descriptive statistics of the posttest scores of the comparison and experimental groups.

Table 4.5. Descriptive Statistics of the Scores in the Comparison and Experimental Groups

Group	Mean	Std. Deviation	N
Experiment	35.10	3.021	30
Comparison	27.50	3.127	30
Total	31.30	4.897	60

The mean of the experimental group and the comparison group are 35.10 and 27.50 respectively (Table 4.5). There is a difference between the mean of the two groups. In order to find out whether this difference is significant or not, analysis of covariance (ANCOVA) was run. The results of ANCOVA are presented in Table 4.6.

Table 4.6. The Results of Analysis of Covariance (ANCOVA) for the effect of computer games on vocabulary acquisition

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	869.970[a]	2	434.985	45.525	.000	.615
Intercept	881.108	1	881.108	92.215	.000	.618
PreTest	3.570	1	3.570	.374	.543	.007
Group	836.950	1	836.950	87.594	.000	.606
Error	544.630	57	9.555			
Total	60196.000	60				
Corrected Total	1414.600	59				

After omitting the effects of the pretest, ANCOVA measured the difference between the obtained mean of the comparison and experimental groups. Based on Table 6, the results indicate that this difference was statistically significant since $F=87.594$, $P<.000$, $X^2 = 0.606$. Accordingly, the null hypothesis is rejected, meaning that the experimental group outperformed the comparison group in vocabulary acquisition.

5. CONCLUSION

The present study sought to investigate whether using the digital game of SIMS had any significant effect on learning vocabulary among Iranian EFL students. The results of the statistical analysis (ANCOVA) indicated a significant difference between the mean of the comparison and experimental groups; therefore, the null hypothesis was rejected; in other words, using the Sims in the classroom exerted a significant influence on vocabulary learning. According to the findings, the participants of this study could learn new words and improve their vocabulary knowledge due to playing with this digital game. One explanation for it can be the association of written words with visual support. All the scenes, pictures, and tasks the participants had to do can be deemed as learning materials for incidental vocabulary learning. Yoshii and Flaitz (2002), exploring the relationship between text and picture annotation types, came to the same conclusion.

The results of this study substantiate the fact that games can be a good source of vocabulary and they can provide opportunities for learner to acquire them effectively. Their pertinent

environment with animated scenes and simulated characters can give comprehensible input and the constant exposure to different words can be deemed as a good trigger to facilitate the incidental vocabulary learning. Games as an alternative to the traditional ways, such as drilling, boost learners' motivation and excitement which, in turn, will bring about better vocabulary learning. They will also entice low risk-takers to involve in the activity because the atmosphere of the classroom is not teacher-centered and also there is no real time pressure on them.

The findings enlighten the fact that games can be an enjoyable stimulating tool to encourage and enhance vocabulary learning in the classroom. Thus, the formal atmosphere of the classroom can be altered for a while into both an entertaining and a learning environment. Material developers can hire some professional game designers to design games according to their purposes.

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