

The Impact of a Hidden Object Game on English Vocabulary Learning and Motivation

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Abstract

This paper investigates the impact of the classroom uses of a digital hidden object game in which students should match visual objects with their English vocabulary equivalents. The essential features of this game are similar to conventional classroom uses of pictures to help learn new English words, so this study investigates whether playing a hidden object game fosters English vocabulary learning and learning motivation. The 57 subjects studying at a junior high school (i.e. seventh-graders) in Taiwan were carefully assigned to form an experimental (N=28) and control group (N=29) and the only teaching variable between the two groups was controlled by the treatment with or without a hidden object game in class. It is revealed that compared with control group, the students in the hidden object game group significantly outperformed regarding vocabulary recognition. However, even though the experimental group also showed relatively higher learning motivation, there was no significant difference between two modes.

Keywords: Digital game-based language learning, English vocabulary learning, Learning motivation

1 Introduction

Substantial research findings show a thirty-year consensus that vocabulary competence can be one indicator of the success of second or foreign language learning [1-5]. Among numerous teaching strategies, learning English vocabulary via textbooks in class has long been regarded as a common but tedious approach for junior school students in Taiwan who are in the beginning level. In contrast, there is also a tendency to accept that playing computer games can be helpful to motivate students learn L2 or foreign language [6].

Applying computer games on language education is referred to as digital game-based language learning (DGBLL). Computer games offer a virtual environment for learners to immerse themselves in a rich L2 context such as vocabulary and narrative so that learners may transfer knowledge from game environment to L2 development incidentally. For instance, famous massively multiplayer online role-playing games (MMORPG) such as *the Sims* or *Warcraft*, has been proved the effectiveness on English learning when the players read the game stories, narration and even chat with online players who are native of the target language [7-10]. However,

some concerns are still discovered regarding adopting *the Sims* or *Warcraft* for English learning. Firstly, they were designed for native English speakers and contain a large number of rare and technical English words such that EFL learners in beginning level are hard to comprehend. Secondly, completing a mission in *the Sims* or *Warcraft* spends longer such that learners might be addicted.

In contrast, some small, simple but free casual games may be alternative for incidental DGBLL. For example, hidden object games are small and simple, and some of them are even free. They generally support multiple platforms such as desktop/laptop computers and even smart phones. While playing a hidden object game, a player must find out visual objects in a scene from an English wordlist. The gameplay of hidden object games is similar to retain new English vocabulary with aid of pictures, and also complies with Mayer's principles of multimedia learning, stating that "humans learn best when corresponding words and visuals are presented together" [11]. However, there are rare studies exploring the benefits of hidden object game for DGBLL. Therefore, the present study aimed to examine the impact of hidden object game on English vocabulary learning and motivation. A famous free casual hidden object game, *Criminal Case*, was selected in the experiment. The participants of the present study were EFL seven-graders in Taiwan. The effectiveness of the hidden object game was examined by comparing with a typical method, learning vocabulary with pictures. In addition, learning motivation was also measured for two methods.

2 Games on Vocabulary Acquisition

When applying DGBLL, a recent proclaim is to consider the source of the games to be 'game-based' or 'game-enhanced' nature [6]. Game-based L2 learning involves using purposefully educational games [12-14] while game-enhanced L2 learning involves working with commercial computer games. Since there are normally copyright reasons for caution in the use of game-based instruments in L2 pedagogy, game-enhanced learning is perhaps easier to be implemented in classroom settings as long as educational purposes are well defined and ethical issues are properly controlled.

The purpose of game-enhanced language learning is to focus on applying commercial games in the learning environment and seeking an opportunity of increasing educational potential. For L2 learning, Ranalli used *the Sims*

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which is a popular commercial digital game to investigate that it could significantly improve vocabulary knowledge [7]. This game offers a virtual environment for learners to create their own virtual characters to walk around and interact with each other. Through the rich L2 context and the chances of interaction with other peers playing, vocabulary knowledge could potentially be transferred from the game's virtual environment to a social one. Peterson investigated the use of a massively multiplayer online role-playing game (MMORPG) in language education to support features such as character role-play, real-time communication, teamwork, and competition with other online players [8]. Learners could have opportunities to interact and text-chat with native speakers via the Internet. Intrinsic motivation to continue to play is increased by the need to complete missions of the game. The analysis found that through MMORPG intermediate and advanced level, English language learners could have a valuable opportunity for vocabulary acquisition and the development of communicative competence. Scholz and Schulze also applied a widely popular commercial MMORPG, *World of Warcraft*, to examine learners' disposition towards DGBLL at the end of the study period to determine how it evolved from learners' initial positioning towards language learning [9]. Ebrahimzadeh monitored another famous commercial MMORPG, *Warcraft III: The Frozen Throne*, in a language class: learners who were playing this game could enhance their efficacy towards vocabulary acquisition compared to those learning via traditional paper-and-pencil intensive reading [10].

Although MMORPG games are able to provide diverse contexts in mission descriptions and stories, and the chance to communicate with native speakers via Internet, for junior high school students in Taiwan who are learning the beginning level of English, the context of these advanced computer games is still difficult. In contrast, Cobb and Host used a simple computer game, *Nintendo My Word Coach*, with 11- and 12-year-old children who were learning L2 vocabulary [15]. However, to play this game with a class, one must purchase several Nintendo video game consoles to install this game for a reasonable number of players. In other words, deployment in many regular EFL classrooms is not easy. Therefore, our current study selected a ready-made but popular game that was appropriate to vocabulary learning purposes.

3 Hidden Object Games

A hidden object game consists of several scenes (i.e., missions) and each scene is presented by diverse disordered hidden visual objects. A player must find all hidden objects by clicking on them corresponding to the objects' names shown in a wordlist (see Figure 1). For instance, if there is a 'butterfly' in the wordlist, a player must recognize the appropriate visual object somewhere in the scene and click on it to get score for it. Regarding an EFL learner/player, he has to recognize words and the corresponding pictures hidden in the scene as quick as possible in order to complete a mission and even to obtain higher score. The way to play a hidden object game for EFL learners/players is similar to the procedure of learning and retaining new English words via the aid of the corresponding pictures.



Figure 1. A Screenshot of *Criminal Case* Game

The adoption of hidden object games for learning English vocabulary offers the following potentials: firstly, the game features such as scoring and multi-player competition would motivate players to stay in vocabulary retention procedure longer. The score of a mission is referred to the word recognition accuracy and higher score is able to win greater prize. This feature might motivate a player to improve the proficiency of vocabulary retention. Secondly, many hidden object games are free and casual games. The common characteristics of casual games are simple user interfaces, easy to understand, and play during work break or public transportation. Therefore, teenagers aren't addicted to hidden object games comparing to the large commercial games like the Sims or Warcraft. Finally, there aren't a lot of multimedia context such as mission instructions and narrations to distract attention on recognition and retention of learning.

Criminal Case is a hidden object game that was selected in this research because of two reasons. First, the target words in this game covers approximately 70% for beginning level and 30% for intermediate level. Regarding seventh graders who enrolled in this research in Taiwan, the difficulty of the words in this game were appropriate. In addition, the words in this game represent widely used stuffs that appear in daily livings. Thus, the instructor who conducted experiment of this research also strongly recommended the words in this game to the participants. Second, it is free of charge so that all students in this research can play it via computers and even mobile devices such as smart phones. Any player with their own Facebook account can access and play this game via Facebook homepage. Figure 1 shows a snapshot of this game.

The words in this game are basically nouns. Although this is a pedagogical limitation, linguistically speaking, nouns as one of the major categories of content words, represent a large portion in our mental lexicon. In addition, the acquisition of English nouns is always important for teenagers in Taiwan who are English beginners.

4 Method

This research is quasi-experimental. Effectiveness of English vocabulary learning via a hidden object game was measured by comparing with English word + picture mode that is a typical but widely adopted in seven-grade English

classes in Taiwan. There are two research questions in this study:

- What is the difference in learning achievement between the two groups that were learning with the hidden object game and the English word + picture mode respectively?
- How do the two modes affect students' learning motivation?

4.1 Participants and Experimental Procedure

Two seventh-grade classes that contain 28 and 29 students respectively enrolled in the experiment. All students first took a pre-test to assess the prior vocabulary degree. The details of the design of pre-test are discussed with other experimental instruments in the later session. The overall 30 questions in the pre-test were in the format of word recognition and English-Chinese equivalence. The total scores of the pre-test were 100. There was no significant difference between the two classes according to an independent t-test; the mean scores were 50.53 and 50.2 respectively and $p = .953$. Therefore, one class was randomly labelled as the experimental group (EG) (N = 28) while the other one was the control group (CG) (N = 29).

Subsequently, the students of two groups were taught by the same teacher for 6 weeks to learn English vocabulary. As each learning week lasted no longer than 2 hours per week, the whole treatment did not exceed 12 hours. Finally, both groups completed a post-test to find out the vocabulary learning achievement and a survey to investigate learning motivation level of two different learning modes.

4.2 Material and Learning Procedure

313 English words appeared in the Criminal Case game were used in the experiment. Regarding the English word + picture mode used in the control group, all 313 English words were displayed with corresponding pictures that are in format of Microsoft PowerPoint slides (see Figure 2). The learning of both groups took place in the computer lab. In the first week, students were introduced to the game mode and English word + picture mode respectively. From the second week, there were two sessions per week. In the first session, students in both groups performed 'self-learning' activity. The students in experimental group performed incidental vocabulary acquisition by playing the game. The students in control group firstly learned the vocabulary formatted as shown in Figure 2 approximately 30-45 minutes, and then students took an exercise. The questions in an exercise contained a set of words and pictures. The students were asked to match words and the corresponding pictures correctly. The purpose of the exercise was to stimulate the students to memorize the English words. In the second session of both groups, the teacher helped students learn more information and knowledge of the words that appeared in the former session, including the meanings and correct pronunciations.

In general, computer games might provide a lot of narrative context like stories, mission objectives, and conversations between characters. Therefore, some might argue that such additional English information in Criminal Case caused the materials between two groups were not equivalent. In fact, as mentioned, hidden object game is casual and simple and thus it is not necessary to read game narrations

or mission objectives to complete missions. First, every scene as shown in Figure 1 contained no additional narrative context. Second, in order to prevent unnecessary time consuming during the self-learning session, the students in the experimental group were asked to skip narrations and characters' conversations before playing a scene. Finally, questions in the post-test were relevant to the 313 words that only appeared in the wordlists of missions.





Picture	English	Picture	English
	apple core		bacon
	bar code		barrel

Figure 2. A Sample of Learning Material for the English Word + Picture Mode

4.3 Instruments

4.3.1 Pre-test and Post-test

The pre-test and post-test in this experiment contained the same questions. The total score was 100, comprising 3 major parts. All questions were multiple choice items, and in each part, there were 10 questions. The question items were therefore selected from among 313 target words that were collected in the game and also used with the control group. The test of Part 1 required students to match pictures with their corresponding words. For Part 2 and 3, students should choose a Chinese translation of each English word, and vice versa, which in the school context, is a suitable way to check whether the students have acquired the meanings of the target words.

4.3.2 Measurement of motivation

The instrument used for learning motivation survey was based on the Motivated Strategies for Learning Questionnaire (MSLQ) originated and proposed by Pintrich et al [16]. A total of 10 items from two relevant MSLQ subscales were used: 6 items for Task Value and 4 items for Self-Efficacy for learning were adopted. The Task Value scale was applied to measure the degree of students' beliefs that learning English vocabulary through two learning approaches was interesting and worthy, and the Self-Efficacy scale was to assess the students' confidence level in the learning process.

The questionnaire employed a 5-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). In the numerical analysis of the data, the scale of 'strongly agree' was given five points and 'strongly disagree' one point. Therefore, the higher the scores of the results, the higher the motivation level our students may have.

5 Results

5.1 Vocabulary Learning Outcome

The first research question was intended to explore the difference in the word learning achievements of both groups who learned with different modes. The independent sampled t-test was adopted and the 2-tailed test value was reported by using SPSS because we did not presuppose that there was only one positive direction of the learning outcome.

Table 1 revealed a significant difference at the 0.05 level in the post-test scores, indicating that the experimental group (M = 69.786, SD = 18.768) outperformed the control group (M = 56.724, SD = 23.970), where $p = .026$, so according to this post-test result we can conclude that the experimental group had a better achievement after playing the hidden object game.

Table 1. The statistical post-test analysis between groups

Group	N	Mean	S.D	<i>t</i>	<i>df</i>	<i>p</i> (two-tailed)
EG	28	69.786	18.768	2.285	55	.026*
CG	29	56.724	23.970			

* $p < .05$

5.2 Motivation

The calculated Cronbach’s alpha reliability for the motivation survey of the experimental group and control group were .929 and .832 respectively, indicating that the instrument of the motivation survey in this research was highly reliable. Independent sampled t-test results shown in Table 2 revealed the descriptive statistics for learning motivation including the two subscales, Task Value and Self-Efficacy. Regarding learning motivation, the both means, 3.954 and 3.710, for the experimental group and control group respectively exceeded 3.5, indicating that both groups of participants were motivated, and there was no significant difference between both groups, where $t = 1.323$ and $p = .191$. Regarding the subscale, Task Value, the mean values of both groups were 4.012 and 3.776, and no significant difference between both groups could be measured. Both mean values exceeded 3.5 and thus this result implied that both groups agreed that two learning approaches could be useful to them to help learn target words. Regarding another subscale, Self-Efficacy, the t-test result also revealed that no significant difference between two groups and the two mean values also exceeded 3.5. It implied that the students in both groups were confident to learn vocabulary via both approaches.

Table 2. Descriptive statistics of Motivation

Measure	Group				<i>t</i>	<i>p</i> (two-tailed)
	EG		CG			
	M	SD	M	SD		
Motivation	3.954	0.729	3.710	0.659	1.323	0.191
Task Value	4.012	0.730	3.776	0.656	1.288	0.203
Self-Efficacy	3.866	0.780	3.612	0.795	1.217	0.229

Table 3 showed the descriptive statistics for every items of the subscale, Task Value. The mean values of all items in the control group were all below 4, but the mean values of three items in the experimental group were higher than or equal to 4.03. Regarding item 5, however, the mean value of the experimental group was lower than the mean value of the control group, where the mean values were 3.929 and 3.964. This item 5 showed that the students in control group agreed learning vocabulary with pictures presented by Microsoft PowerPoint slides was apparently more familiarly linked to EFL vocabulary learning.

Table 3. Descriptive statistics of the Task Value subscale

Item	EG		CG	
	M	SD	M	SD
1. I am very interested in learning the extracurricular English vocabulary through this way.	4.036	1.017	3.536	1.021
2. I like to learn vocabulary content through this way very much.	4.071	0.842	3.75	1.231
3. It is important for me to complete extracurricular vocabulary activities through this way.	3.929	0.884	3.75	0.797
4. Understanding the extracurricular vocabulary content so as to complete classroom activities is very important to me.	4.143	0.833	3.964	0.884
5. I think I will be able to apply the extracurricular vocabulary learned in this class to the regular English class.	3.929	0.923	3.964	0.923
6. I think learning English vocabulary through this way is very useful for me.	3.964	0.865	3.786	0.988

Table 4 presents the descriptive statistics for the Self-Efficacy subscale. All questions in both groups had a mean value above 3, indicating that the both groups were confident to learn English vocabulary with these methods. The mean values of all items in the experimental group were higher than the ones in the control group.

Table 4. Descriptive statistics of the Self-efficacy subscale

Item	EG		CG	
	M	SD	M	SD
1. I’m certain I can understand the difficult vocabulary through this way.	3.679	1.104	3.607	1.208
2. I’m confident I can understand the basic vocabulary content through this way.	4.357	0.766	4.107	0.673
3. I believe I will receive an excellent vocabulary grade through this way.	3.643	0.972	3.393	1.150
4. I’m certain I can master the vocabulary through this way.	3.786	0.860	3.321	1.198

6 Discussion

The results of the post-test in this experiment revealed that the participants in the experimental group significantly had better vocabulary recognition than those in the control group. Moreover, from our results obtained from the learning motivation survey, it may be argued that the students in both groups were well motivated so that there was no significant difference between two learning approaches.

However, closer examination shows that the experimental group had a lower mean value of item 5 in Task Value scale, indicating that students might wonder whether the game is applicable to the regular English class. The Criminal Case is a commercial game rather than a purpose-designed educational game for school learning. The students might not perceive a strong association between this computer game and English vocabulary learning. Reinhardt and Sykes argued that in terms of such commercial off-the-shelf games, learners may view them as an unorthodox approach for L2 education despite their fun and entertainment qualities [17]. This finding echoes what some scholars claim that compared to 'western' educational styles, our Taiwan participants may be accustomed to a more serious teaching manner or culture of learning in schools and likely have rooted beliefs that books and teachers are more serious, orthodox or bona fide sources of knowledge [18]. Therefore, it is highly possible that these subjects may have regarded games as a 'side dish', to be played only for a reward, break or refreshment after diligent hard work in class. Although this study did not attempt to explore culture as a factor in game-based learning, this point can be taken into account in the future study.

However, our results can support the positive argument for using games in class regarding their usefulness to arouse and sustain learners' intrinsic motivation [19]. In Item 8, about self-efficacy, the highest mean value was obtained to show that the participants in the experimental group were able to learn this extracurricular vocabulary confidently when playing the game by themselves. Such results, potentially related to autonomous learning, align with Mayer and Johnson's discussion of the benefits of integrating digital games into learning, including appropriate challenges and tasks that enable students to build self-efficacy and persistent learning [20].

In fact, it is encouraging that competition could be triggered by the game. Their learning performances could be increased because they wanted to get rapid familiarity with the vocabulary so that they could click the corresponding objects as quickly as they could to compete with others. Prensky listed some essential features of a digital game, including challenge, competition, and cooperation [21]. Therefore, with the feature of competition, our students' motivation can be more easily triggered and sustained which lead to successful learning.

Finally, the vivid visual presentation in the Criminal Case game is another key to learning success which should not be taken for granted [22]. When students are immersed even briefly in a visually stimulating virtual environment and engaged iteratively in playing and learning English vocabulary, this successful learning of content matches the Input-Process-Outcome Game Model proposed by Garris et al, which starts from the input of the game features (fantasy, goals, sensory stimuli, challenge, mystery, and control) and then leads to repeated judgment-behavior-feedback cycles

[23]. In the end, our students' learning outcomes are indeed increased.

7 Conclusion

In this study, the participants were two comparable groups of seventh graders in Taiwan. The study demonstrated some positive outcomes of vocabulary learning via the use of the digital hidden object game compared to learning vocabulary with pictures mode. It found that playing this hidden object game helped learners easily recognize and maintain vocabulary as well as to motivate them.

Learning through this hidden object game seems more advantageous than learning words with pictures which is a commonly-seen instructional method in class to introduce or review vocabulary in seventh-grade levels. However, there are limitations in this research. First, the study did not investigate students' production of vocabulary such as pronunciation, speaking, and writing, which are vital communication skills. Therefore, we suggest the instructors who will adopt a hidden object game in the English class to provide pronunciation or more information of the words learned from the game.

Second, the vocabulary types in this research were only limited to nouns, which happened to be used in the hidden object game. Moreover, some lexical items such as 'bar code' and 'acid puddle' in the game are not priorities for these students to learn because they may not be common in their everyday life. Finally, the total number of participants and duration of the experiment can be increased to make the evidence stronger.

while the mean value of the motivation questionnaire had a relatively high rating, it would have been interesting to understand in depth the reasons why the comparison of the two groups did not show statistical significance. This raises a question: in such a learning setting where English is normally learned for examination purposes, is it possible that the computer game was not considered sufficiently serious or useful to merit the effort normally required to learn the words needed for formal tests or exams? More understanding about the complexity of learners' motivation may be helpful to promote a more consolidated use of online games in formal EFL classes easily.

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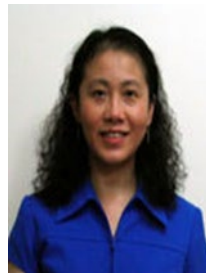
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