A Multiplayer Online Role-Playing Game for Incidental Vocabulary Learning

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Abstract: Incidental vocabulary learning is regarded as one of the main sources of learner-centered vocabulary acquisition in authentic situations. In the past decades, extensive reading has been the main focus in incidental learning research. Recent studies have examined how information technology media can assist learners in acquiring vocabulary incidentally. More specifically, the affordances of MORPGs, such as vivid 3D simulation scenarios and players' interactions and communications, may be applied to construct an incidental language learning environment. This study is based on Krashen's Input Hypothesis to implement task-based learning in an MORPG that was suited for learners' background. An experiment was conducted for 26 sixth-grade students. Twelve target words were selected from the content text of the game to assess learners' vocabulary learning. The results from this study demonstrate that learners, especially the low academic achievers and less game experienced students, acquired the target vocabulary incidentally after being exposed to the MORPG language learning environment.

Keywords: digital game-based learning, incidental vocabulary learning, MORPGs

1. Introduction

Vocabulary ability plays a fundamental role for language learners. There are many ways for learning vocabulary. Among them, incidental vocabulary learning is the main source that learners can acquire vocabulary in relevant context and language examples at their own learning paces. Some research indicated that incidental vocabulary learning is an effective method for understanding vocabulary [1-4]. In order to achieve vocabulary learning, Krashen proposed Input Hypothesis suggesting that second language learners should have enough comprehensible input. Comprehensible input refers to learning content slightly higher than students' ability (i+1), which could help learners proceed incidental vocabulary learning [5]. For the past decades, reading has been the majority source for incidental vocabulary learning. Recently, some studies are using multimedia, CALL programs, and computer games to construct incidental learning environments [6-8]. One of the examples is the Multiplayer Online Role-Playing Games (MORPGs), which has gained much attention for its amazing features. MORPGs are claimed to be beneficial for language learning as they can provide authentic context, such as vivid 3D simulation scenarios, players' interaction and communication, and meaningful game tasks [9-10]. In such an environment, learners need to understand the narrative of game scripts and to communicate with other players. Therefore, they may learn vocabulary incidentally from the texts or conversations in MORPGs. Many studies have used MORPGs for helping learners to learn vocabulary in relaxed atmosphere [11-12]. The MORPGs are popular entertainment in new generation. Though MORPGs had the potential of benefitting vocabulary learning, and the game players were exposed to many conversations or texts incidentally, there were few studies conducted to investigate incidental vocabulary learning in MORPGs. To this end, this study

aims to implement a task-based learning process in an MORPG that was suited to learners' background, with comprehensible input suggested by Krashen's Input Hypothesis, and evaluated the effectiveness of learners' incidental vocabulary learning in the MORPGs.

2. Related works

2.1 Incidental vocabulary learning

Incidental vocabulary learning occurs in learners' reading that does not provoke learners to notice the meaning of unknown words and has no specific purposes [13]. It is a learner-centered pedagogy that learners are exposed to the relevant reading context and many language examples at their own learning pace. Many studies indicate that incidental vocabulary learning is an effective method for understanding vocabulary [3, 4, 13, 14]. The situations in which incidental learning occurs are usually unlike the normal instruction with significant learning purposes. Therefore, the learning effectiveness is shown in a gradual progress. In general, incidental vocabulary learning should consider the pre-knowledge of learners. Reading materials that instructors provide for learners should fit learners' capacity [15]. Though the number of encounters may affect the words learned incidentally, the quality of the context may have a greater effect on gaining the meaning of words [16]. The Input Hypothesis indicated that second language learners could acquire vocabulary incidentally by reading proper materials. In order to construct comprehensible input contexts, the level of reading materials should be slightly higher than the learners' ability [2, 5, 15]. Huckin and Coady reviewed the incidental vocabulary learning research and argued that incidental learning was not entirely incidental [17]. In addition to the situations in relation to learners' background; instructors have to provide appropriate guidance, such as learning tasks, material presentation, and glossing method. Hulstijn, Hollander, and Greidanus used marginal glosses and the dictionary to help L2 advanced learners' reading. They found though both were available, marginal glosses were better for incidental learning, and the frequency of word occurrence had positive effectiveness [18]. Kost et al. investigated the effects of three gloss types, finding combination of text and pictures gloss was better than text gloss and pictures gloss [19]. Yoshii and Flaitz involved text and images into Web allowing learners to read English text online. They found that online learning material which was designed based on duel-code theory could help learners with incidental vocabulary learning [20]. Kuppens suggested that watching second language TV programs and playing related computer games had positive influence in incidental vocabulary acquisition [5].

Previous studies indicated that the context would affect learners' understand of word meaning during incidental learning. Providing glosses such as situational pictures, animations and other appropriate cues may assist learners to understand the word meaning. Incidental learning may occur during extensive reading, but the form of reading can be various. In order to make reading material and situations interesting, researchers have sought for other resources such as video, CALL programs, and games to enrich incidental learning context. For example, Lin investigated how news video in a CALL program could foster L2 comprehension and incidental learning and found that both low and high proficiency learners showed significant progress [8].

2.2 MORPGs for language learning

In recent years, MORPGs have become popular among young people. Many researchers have indicated that MORPGs could be applied to improve communication skills and were

beneficial for learners' language acquisition. The characteristics of MORPGs such as vivid 3D images can be used for situational simulation which allows learners to immerse in virtual reality situations. In those situations, learners must try to understand all the scenarios and narratives of MORPGs. MORPGs provide beneficial environments for second language acquisition that promote learners' motivation to learn. Learners are satisfied with the vocabulary learning effectiveness in the situation [10, 21, 22]. The main characteristics of MORPGs are communication, high-quality 3D graphic interfaces, and customizable character avatars that may support language acquisition [22]. Designing vocabulary learning tools should provide application opportunities for learners in different contexts to access target vocabulary [23]. MORPGs provide a virtual reality situation and opportunities for player interaction in a vocabulary learning environment. This study addresses the issue of how to help digitally native generation to learn language when they are immersed in an MORPG for incidental vocabulary learning.

Huckin and Coady reviewed the empirical research of incidental vocabulary learning and indicated there were some unsolved issues, such as the actual mechanism, the kinds of texts, and input modification [17]. Studies that applied MORPGs to vocabulary learning showed positive effectiveness. The vivid 3D simulation scenarios, players' interaction and communication, and game tasks can provide a vigorous learning mechanism and display learning material in edutainment. MORPGs thus may have the potential to construct an incidental vocabulary learning environment, but relative research is rare.

In order to construct an incidental vocabulary learning environment in an MORPG, this study was based on the Input Hypothesis to design game scripts adapted from a Chinese legend, with consideration of learners' English proficiency and culture background. An experiment was conducted to evaluate the effects of incidental vocabulary learning in the MORPG. The aims of this study are: 1. the effects of implementing incidental vocabulary learning in an MORPG environment, and 2. the influences of the learners' background (English academic performance, gender, and game experience) and the texts of narratives (word occurrence frequency) on incidental vocabulary learning in an MORPG environment.

3. Methods

3.1 Participants

The participants were 26 sixth-grade elementary school students, 13 boys and 13 girls participating in this study. All the participants had 3.5 years English lesson experience for 80-minute English classes per week, and had the basic computer skills to operate a digital game. The 26 participants were from the same class.

3.2 Instruments

3.2.1 Tests

The tests used in this study included an English vocabulary pre-tests, a post-test, a delay post-test, and a game experience questionnaire. English words can be divided into content words and function words. Function words are grammar words, while content words primarily express lexical meanings, including nouns, verbs, and adjectives that convey the real information of a statement [24]. This study selected twelve content words as the target words from the MORPG game script. They included four nouns (weather, tangerine, pineapple, and monster), four verbs (taste, find, buy, and kill), and four adjectives (cloudy, sunny, snowy, and east). These target words were never listed in

participants' English textbooks they had used. In order to reduce the pre-test effect, some non-target words were added to the pre-test [13, 19]. The post-test and delay post-test have twelve questions, assessing only the target word. The test used Paribakht and Bingham's Vocabulary Knowledge Scale (VKS) five scales to measure participants' incidental vocabulary acquisition [25]. It can be used with any set of words to evaluate the depth of vocabulary knowledge [24]. The five scales from score of 1 to 5 were "I have never seen this word.", "I have seen this word before, but I don't know what it means.", "I have seen this word before, and I think it means _.", "I know this word. It means _.", and "I can use this word in a sentence: _". The questionnaire was used to investigate the game experiences of participants.

3.2.2 The MORPG

Because the participants of this study were children, the game, Rainbow Bubble (see Figure 1), adopted for this study was a lively and non-violent 3D MORPG. The character design of avatars and the narratives of game scripts are the main elements in MORPG. It is expected that the design of the learning content in narratives and tasks can enhance or arouse learners' intrinsic motivation [10,22]. In Rainbow Bubble, learners can create their own avatars to represent themselves and then to interact with Non-Playing Characters (NPCs) who are set by game designers and will assign tasks or provide problem-solving support for learners in the MORPG.

Figure 1: Screenshot from the MORPG

The pedagogical strategy adopted in MORPG was task-based. Learning content was present in game narratives and tasks. When learners finish a task, they will acquire both experience value and money for upgrading and buying equipment, which can strengthen their battle power and are beneficial to solve the learning tasks. All the game scripts and scenarios were designed in relation to participant English proficiency and their culture background which were slightly higher than the student's ability [2, 5]. In the game, a year monster of a Chinese legend would appear in Chinese New Year. To complete the main task defeat the monster players must rely on special magic which can be obtained from several magic books. In order to collect all the magic books, students must finish both series tasks and tests. During the game, the MORPG provided searching tools and word cards to support language learning, and students can help each other either by talking in classroom or discussing online. The searching tool was like a dictionary listing the vocabulary. The word cards would pop-up incidentally during the tasks, hoping to make learners have deeper

impression of what they had learned. The magical book contained target words and example sentences for students to look up and review.

3.3 Procedure

The procedure of this study consists of three steps. In the first step, participants completed the pre-test and a game experience questionnaire in approximately 30 minutes. To reduce the effect of the pre-test, the pre-test was carried out one week before playing the MORPG [13, 19]. The second step was the participants playing the designed MORPG game for 40 minutes. Students did not know what vocabulary they were learning, but they were encouraged to finish each task at their best. Finally, the immediate post-test was completed in approximately 20 minutes, and the delay post-test, same as post-test, was carried out twelve weeks later.

3.4 Data analysis

The study was a quasi-experimental design which used a single experimental group. The data were collected from the pre-test, immediate post-test, delay post-test, questionnaire and students' academic score in English course of the first semester of sixth grade. In addition to descriptive statistics analysis, the study used the t-test to evaluate the differences of the scores between the pre-test, post-test, and delay post-test.

4. Results and discussions

4.1 Incident vocabulary learning effectiveness in the MORPG

The results show a significant difference between the scores of pre-test and post-test (t=-2.393, p=0.025*). The mean score was progressed 3.31 (see Table 1). This result indicates that the MORPG learning environment has a positive impact on incidental vocabulary learning. Comparing different types of target words, it is found that acquisition of nouns has improved significantly in post-test (p=0.004**) and is higher than the verb and adjective acquisition. This may be because nouns are more concrete [13]. We further divided the participants into high and low achievers by their English academic scores. The results reveal that both groups had improved in post-test. Moreover, the low achievers progressed more than high achievers in the post-test and there was a significant difference between low achievers' pre-test and post-test results. In terms of types of words, it is found that for high achievers all types of words show no significant difference between the pre-test and post-test, but for low achievers there are significant differences in both nouns and verbs (see Tables 2 and 3). These results may be due to that low achievers rely more on the visual aids while learning the words. For example, learners can learn nouns more easily with the support of 3D images and understand the meaning of the verbs more clearly as they are associated with the instructions of game tasks. Previous studies indicated that the text-based learning materials with visual support could help incidental vocabulary learning [19,20]. In an MORPG, the narratives, tasks, and scenes could just be used as learning material to construct an incidental vocabulary learning environment.

In order to examine the retaining effect, the study implemented a delay post-test after 12 weeks. There is a significant difference between the scores of the pre-test and delay post-test (t=-4.235, p=.000**); moreover, both high (t=-3.187, p=.008*) and low achievers (t=-3.207, p=.008*) had significant improvement in the delay post-test. The gain score was 4.038, which was higher than the difference between pre-test and post-test. This might be

due to the fact that learners had participated in other learning activities that probably enhanced their performance within the 12 weeks.

Table 1: Paired samples t-test analysis for all students' VKS

Vocabulary	Pre-Test		Post Test			
	Mean	SD	Mean	SD	t	p
Total	31.69	16.292	35.00	15.895	-2.393*	.025
Nouns	11.19	6.487	12.81	6.020	-3.176**	.004
Verbs	10.12	6.179	10.92	5.642	-1.382	.179
Adjectives	10.38	4.309	11.27	5.096	-1.381	.179

Table 2: Paired samples t-test analysis for high achievers' VKS

Vocabulary	Pre-Test		Post Test			
	Mean	SD	Mean	SD	t	p
Total	44.54	11.759	46.92	11.019	-.985	.344
Nouns	16.31	4.662	17.77	2.743	-1.814	.095
Verbs	15.08	4.663	15.08	4.627	.000	1.000
Adjectives	13.15	3.648	14.08	4.924	-.772	.455

Table 3: Paired samples t-test analysis for low achievers' VKS

Vocabulary	Pre-Test		Post Test			
	Mean	SD	Mean	SD	t	p
Total	18.85	7.559	23.08	9.844	-3.029**	.010
Nouns	6.08	3.040	7.85	3.826	-2.714*	.019
Verbs	5.15	2.115	6.77	2.743	-3.313**	.006
Adjectives	7.62	2.959	8.46	3.573	-1.599	.136

4.2 Influences of learners' background and word occurrence frequency

The study further explored the influences of learner gender and game experience on incidental vocabulary learning in an MORPG environment. The results show that there was a significant difference between pre-test and post-test for female learners' performance (t=-2.771, p=.017*) (see Table 4). The gain score of female learners was 5, which was higher than male learners' 1.615. As regards to the gaming experience, we discussed this from two aspects. One was the number of game types that learners had played; the other was the hours the learners played per week. The results show that learners with low game experience (either in game type or play time) showed a significant difference between their pre-test and post-test performance (see Table 4). Besides, their gain scores were higher than those of the high game experience learners. It may be because low game experience learners noticed more details of scenarios or narratives of the MORPG, while those with more game experience might find the task solution from other cues and ignore the details. It can also be noted that the female learners had less game experience than male learners in term of either game types (t=2.729, p=.012*) or playing hours (t=2.702, p=.012*). Further studies on the relation between game experience and gender should be considered with more participants involved to analyze the variables.

The frequency of word occurrence may influence the effectiveness of incidental vocabulary learning [18]. However, in this study, there is no significant relation found between the frequency of word occurrence and the gain score in the MORPG. Such a phenomenon may be associated with the context where words occur [16] and the short game time.

Table 4: The gain score of VKS between pre-test and post-test

Pre-test – Post test	Mean	SD	t	p
Male	-1.615	7.411	-.786	.447
Female	-5.000	6.506	-2.771*	.017
Game types >=3	-1.091	8.006	-.452	.661
Game types <3	-4.933	6.017	-3.175**	.007
Playing hours/week > 9	-1.846	8.133	-.818	.429
Playing hours/week <=9	-4.769	5.718	-3.007*	.011

5. Conclusion

The results of this study showed that there was a significant difference between pre-test and post-test for learners' vocabulary abilities, which reveals that learners' vocabulary abilities have improved after they used the MORPG language learning environment. Learners were not only immersed in high-quality 3D virtual reality scenes and enjoyed in interesting game tasks, but also acquired vocabulary incidentally. These findings are in line with those of past studies, which showed that MORPGs can be applied to construct a language learning environment [10, 21, 22]. The target words were the investigation indicator for determining whether vocabulary could be learned when they were embedded in the narratives of the game scripts. These learning contents were based on Krashen's Input Hypothesis to implement a task-based learning. The task-based narrative MORPG has positive effects on incidental vocabulary learning. Furthermore, no significant correlation was found between gain scores and students' academic scores. To explore the performance of learners with different English proficiency, it is found that the low achievers significantly improved in the post-test, while the high achievers did not. It is necessary to provide more mechanisms for advanced learners in future design of the MORPG language learning environment.

This study also examined the effects of other factors for incidental vocabulary learning in MORPGs, such as frequency of word occurrence, different types of words, gender, and game experience for incidental vocabulary learning in MORPG environment. There was no significant difference between the frequency of word occurrence and gain score. Incidental language learning does not have explicit learning purposes as normal instruction does and thus the learning effectiveness is gradual [15]. There is a need to provide more narration in the game scripts and allow learners to play MORPGs longer in future study. In the experiment, the post-test score of nouns was significantly better than the pre-test, which might be due to the fact that the nouns used in the game were more concrete and were the basic elements of the message [13].

In this study participants' game experience varied, for instance, female learners had less game experience, in term of the playing duration and the types of game they had played. The VKS results of female learners and less game experienced learners showed significant progress, while male learners and learners with more game experience did not. The interaction between different genders and difference game experiences need further analysis if more participants are involved in the future.

As a preliminary attempt, this study integrated learning content into an MORPG game, using a familiar Chinese legend as the background story. There are still some issues of MORPGs design to be considered in the future studies, such as how to present learning material, to encourage interactions between learners, to consider other game elements, and what the role of teachers in MORPGs is. Considering the effect of incidental vocabulary learning is gradual, in the next stage, we should increase the time and participants to provide additional evidence to verify the results in this study, and thus explore more aspects of incidental vocabulary learning in MORPGs.

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