

Multimedia Games and Vocabulary Learning

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Abstract—Vocabulary has been established as the primary way towards learning a new language (Carter, 2001). With the advent of the computer technology, various degrees of change has been felt in different areas of education. As for language learning, this intervention has been very palpable. This study is an attempt to look at the reported effect of multimedia games on language learning in the related literature. To this end, first, concepts of incidental and intentional vocabulary learning are introduced. In the next step, some aspects of vocabulary (learning) are dealt with concisely and finally multimedia games and their effect on vocabulary learning are briefly discussed.

Index Terms—multimedia games, vocabulary, incidental learning, intentional learning

I. INTRODUCTION

Knowledge of vocabulary plays an important role in learning L2 skills. Frequent studies have been conducted by different researchers comparing the effect of different vocabulary presentation strategies (Huckin, Haynes & Coady, 1993; Hatch & Brown, 1995; Coady & Huckin, 1997; Atkins, 1998; Read, 2000; Nation, 2001). In the following sections, first, some preliminary notions are introduced and then the effect of multimedia games on vocabulary learning is discussed briefly.

II. INCIDENTAL LEARNING VERSUS INTENTIONAL LEARNING

Different lines of investigation focusing on incidental and intentional learning have appeared in psychology since the beginning of the twentieth century (Eysenck, 1982; McLaughlin, 1965; postman, 1964). As a result, hundreds of experiments have been conducted in this regard (Smith, 1998). In the following two sections, the notions of incidental and intentional learning are introduced and some related studies are reviewed.

A. Incidental Learning

According to Kerka (2000), incidental learning is unintentional or unplanned learning which involves no deliberate intention to learn or to analyze language, an explanation which might include implicit learning in the psychological sense. Huckin and Coady (1999) defined incidental vocabulary acquisition as learning new words through some communicative activities while focus is on meaning, such as interaction, reading or listening. According to this definition, learning takes place through 'multiple exposures to a word in different contexts' (Huckin & Coady, 1999, p. 185). Foreign language learners' mechanism for learning new words has generally been assumed to be much like small children as they acquire the vocabulary of their L1 through picking up most of their new words and expressions incidentally (Nation & Waring 1997). As a result, the best way of improving vocabulary learning is considered to be through inferring word meanings from the meanings of constituent morphemes and from contexts. In cases of not being able to infer the meaning, students have often been supposed to simply tolerate the vagueness and wait for richer contexts to clarify the meaning for them. The non-recurrence of an un-guessed word has simply meant that the word is too infrequent to be worth learning anyway.

Schmidt (1994) considered incidental learning as referring to learning to learn one thing not as a primary object or without an intention to learn. Laufer (2005) rejected any focus on forms in vocabulary instruction and, in other words, rejected explicit (or targeted or genuine) form-focused vocabulary teaching:

[...] on encountering an unfamiliar word, the learner notices it as a word s/he does not know, decides to infer its meaning from context by using a variety of linguistic and non-linguistic clues, has a good chance of making a correct guess, and may consequently retain partial or precise meaning of the word. If the word is not remembered after the learner's first exposure to it, or if only partial information about the word has been acquired, additional encounters with the same word will increase the probability of retaining it and expanding its knowledge. Even if very few words are retained after one communicative activity or text, the cumulative gains over time may be quite remarkable if the learner reads regularly (p. 226).

It was believed that explicit vocabulary teaching was a waste of time because 'few words are retained from those which are "learned" or "taught" by direct instruction' (Harris & Snow, 2004, p. 55), and that 'most L2 vocabulary is learned incidentally, much of it from oral input' (R. Ellis, 1994, p. 24).

B. *Intentional Learning*

Intentional learning is often defined in contrast with incidental learning. According to Hulstijn (2001), intentional vocabulary learning is an activity which is intended for committing lexical information (sound, spelling, meaning, and grammar rules) to memory. Wesche and Paribakht (1998) define intentional vocabulary learning as learning new words while the learner intends to do so, such as when a learner completes activities in a workbook or studies a list of target words while they intend to learn a set of new target words. Intentional and incidental learning are set apart considering the use of instructions that might make explicit the existence of a later retention test (Eysenck 1982). Nevertheless, a great deal of vocabulary learning may be a combination of both incidental and intentional learning (Kennedy, 2003).

III. SIGNIFICANCE OF VOCABULARY

The significance of vocabulary acquisition in learning another language is illustrated by Wilkins (1972) as "Without grammar, little can be conveyed, without vocabulary, nothing can be conveyed" (p. 111). Formerly, lexical aspects were subordinated and undervalued to the study of grammatical structures (Nation, 1998). However, today, vocabulary is considered as the primary way towards learning a new language (Carter, 2001).

Many second language professionals regard vocabulary as the first and foremost challenge L2 learners face as they engage in reading texts or listening in the target language (Folse et al., 2005; Grabe & Stoller, 1997; Hulstijn, 2001; Nation, 1990, 2001; Read, 2004). Lewis (2000) considered acquiring a sufficiently large vocabulary the most important task language learners are supposed to deal with. Decarrico (2001) claims that "vocabulary learning is central to first and second language acquisition and specialists now emphasize the need for a systematic and principled approach to vocabulary by both teachers and learners" (p. 285). As a result, vocabulary learning is often perceived to be "of critical importance to the typical language learner" (Zimmerman, 2001, p. 5). Schmitt (2008) also considers vocabulary as "an essential part of mastering a second language" (p. 329).

IV. DIFFERENT ASPECTS OF VOCABULARY KNOWLEDGE

Vocabulary knowledge is considered to have two primary dimensions, that is, depth and breadth (Qian, 1999). Depth of vocabulary knowledge consists of such types of knowledge as pronunciation, stylistic features, spelling, antonymy, synonymy, hyponymy and collocational meaning (Nation, 1990; Read, 2000; Richards, 1976). According to Qian (1999) depth of vocabulary knowledge can include components such as frequency, spelling, register, collocational properties, pronunciation, and syntactic, morphological, and meaning. Qian argues that these components are interconnected both structurally and functionally. Breadth of vocabulary, on the other hand, pertains to the number of words that language learners have partial or complete knowledge of (Nation, 2001).

Chapelle (1998) believed that a vocabulary definition should consist of four aspects: (a) knowledge of word properties, (b) vocabulary size, (c) processes of lexical access, and (d) lexicon organization. Henriksen (1999) also suggested three vocabulary dimensions: (a) a "depth of knowledge" dimension, (b) a "receptive-productive" dimension, and (c) a "partial-precise knowledge" dimension. Qian's (2002), considering the collective strength of earlier models of vocabulary knowledge, proposed a framework for vocabulary knowledge which consisted of four inherently connected dimensions: (a) automaticity of receptive-productive knowledge, (b) lexical organization, (c) depth of vocabulary knowledge, and (d) vocabulary size.

V. STUDIES ON INCIDENTAL VOCABULARY ACQUISITION

Over the last two decades, a large number of empirical studies have been conducted on vocabulary acquisition or learning based on different themes: the relationship between language proficiency and vocabulary knowledge, particularly with regard to reading (Hazenbergh & Hulstijn, 1996; Hu & Nation, 2000); the construct of vocabulary knowledge, e.g. the distinction between various sorts of vocabulary knowledge; vocabulary learning and word frequency, e.g. the benefit and/or cost of learning specialized, infrequent and frequent words (Coxhead, 2000; Nation 2001); productive and receptive knowledge, and between use and knowledge (Henriksen, 1999; Read & Chapelle, 2001); interactive tasks (Ellis, Tanaka & Yamazaki, 1994); intentional versus incidental learning (Ellis & He 1999; Horst, Cobb & Meara, 1998; Kelly, 1986); vocabulary development patterns over time (Laufer 1998; Palmberg, 1987); the effect of tasks on learning, e.g. task induced involvement (Laufer & Hulstijn, 2001); implicit versus explicit learning (N. Ellis, 1994); vocabulary knowledge testing: depth and size, productive and receptive (Bogaards, 2000; Laufer & Nation, 1995, 1999; Read, 1993, 2000); the use of different types of dictionaries, electronic and paper (Bogaards, 1991; Chun & Plass, 1996; Knight 1994); learners' strategies for comprehending and learning new words (Cohen & Apeh, 1981; Sanaoui, 1995); and learning new meanings of already known words versus learning new words (Bogaards, 2001).

Prince (1996) compared L2 word learning in one or two sentences and L1 and L2 paired-associate learning, trying to compare the benefits and drawbacks of incidental vocabulary learning from context and intentional learning through translated words into L1 equivalents. The results of the study were in favor of paired-associate learning in terms of quantity but the learners' ability in supplying the words in appropriate sentences declined. Laufer and Shmueli (1997) made a comparison between four learning conditions: (a) learning all the words, provided with L2 or L1 glosses in the

left margin, in a long text, and (b) learning all the target words in an “elaborated” text with the same glosses as in (a), (c) learning an L2 word with L2 and L1 glosses and the target word embedded in a sentence (d) learning an L2 word with L2 or L1 glosses. The target words in the elaborated text were provided with a short definition just after each word. The results revealed that conditions (c) and (d) lead to meaningfully higher scores than (a) and (b).

Webb (2007) compared two different kinds of learning: a) paired-associate learning b) context learning, including an L1 equivalent, an artificial target word, and an example sentence. He tried to make use of the different aspects of participants’ knowledge of vocabulary obtained through these two conditions through conducting 10 different productive and receptive tests. The results of ten tests between the two conditions did not indicate any significant difference. The results also proved that the only aspect of vocabulary knowledge obtained by participants was the meaning of words from context. However, list learning or paired-associate can be effective techniques for learning a large number of words in a short period of time (Fitzpatrick, Al-Qarni, Meara, 2008; Milton, 2009).

Another way of teaching new words is through accompanying them with other words in teaching. It is widely accepted that a large number of formulaic sequences acting as a single unit in English do exist in our lexicon repertoire and that “they make up a large proportion of any discourse” (Schmitt & Carter, 2004, 1). These combinations have been named in various ways, such as exemplars, collocations, chunks, lexical units or multiword units. Wray (2002) called them formulaic sequences and defined them as “a sequence, continuous or discontinuous, of words or other elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar” (p. 9). Since the 1990s, the significance of these collocations or formulaic sequences has been highlighted by many vocabulary researchers and their integration into second language courses has been emphasized (Lewis, 1993, 2000; McCarthy, 1990; Nattinger & DeCarrico, 1992; Simpson-Vlach & Ellis, 2010; Sinclair, 1991). Mastery of formulaic sequences, according to some studies, can not only be used in distinguishing native speakers from non-native speakers (Durrant & Schmitt, 2009; Siyanova & Schmitt, 2007) but also lower level from higher level second language learners (Hsu, 2007). It has been widely accepted in the applied field of language teaching that most of L2 vocabulary acquisition takes place as a by-product of reading and listening while focusing on meaning instead of form (e.g. Jenkins, Stein & Wysocki, 1984; Nagy & Anderson, 1984; Nagy, Herman & Anderson, 1985). Many factors have been shown to affect vocabulary acquisition such as inferencing and/or glossing (Cobb & Horst, 2001; Hulstijn, 1992), new word density (Holley, 1973), reading purpose (Swanborn & Gloppe, 2002) and new word frequency (Rott, 1999).

Cognitive psychologists believe that the more elaborate the processing of new lexical information, the better the retention (e.g. Eysenck, 1982). In other words, retention improves as a result of attention to pronunciation, orthography, the words meanings, grammatical category along with the association made between other words and the word. This idea has been found applicable to both intentional and incidental learning (Paribakht & Wesche, 1999; Huckin & Coady, 1999). For instance, the results of a study conducted by Joe (1995) on vocabulary development of an adult learner in a read and retell task showed that task requirements considerably increased incidental vocabulary learning. Newton (1995) also reported similar results in his examination of the relationship in a task-based interaction study.

Several factors have been identified as effecting the extent of incidental word learning in reading such as reading skill, readers’ age, students’ knowledge of topic and their acquaintance with the represented concepts through the new words, a number of text and word properties and inferencing (Swanborn & de Gloppe, 1999). Swanborn and de Gloppe (2002) believed that unknown word meanings are acquired even though the readers do not intend to learn the unknown vocabulary. Close associations have also been made between lexical inferencing and incidental vocabulary learning (Huckin & Coady, 1999). Wesche and Paribakht (1998) also argue that much if not most L1 and L2 lexical development seems to take place while learners attempt to comprehend.

The acquisition of the meaning of new words as an extensive reading by-product has been studied in terms of issues such as procedures and resources employed in inferencing. The obtained results of the studies dealing with the issue demonstrated that sentence contexts as well as definitions contributed to vocabulary learning. The results of the study by Nist and Olejnik (1995) support this claim since it demonstrates that as learners encounter a word in context and after that go through its definition, their performance on multiple-choice questions could improve.

Depending merely on extensive reading – particularly in L2 context – has been shown to lead to low degrees of vocabulary acquisition, showing the insufficiency of this approach towards second language learners (Rosszell, 2007; Waring & Takaki, 2003; Zahar, Cobb & Spada, 2001). The results of the study by Saragi, Nation, and Meister’s (1978) showed that a minimum of 10 exposures in a text were required for L1 learners who were learning pseudo-words periodically to acquire words. The results of a study by Nagy, Herman, and Anderson (1985) demonstrated that the probability of acquiring a word as a result of exposure to context just once is between .10 and .15 and, according to a follow-up study, it can be lowered as much as .05. Nation (1990) surveyed this and other studies and showed that in order for full acquisition to occur 5 to 16 exposures were required. On the other hand, some researchers have argued that incidental vocabulary learning can occur through two exposures (e.g. Rott, 1999). The results of the study conducted by Nagy, Herman and Anderson (1985) showed that the rate of vocabulary learning 15 minutes after reading was 1 in 10. The rate reported by Nagy, Anderson, Herman (1987) in their study of vocabulary learning six days after reading was 1 in 20. The results of a meta-analysis of 20 studies conducted on native speaker participants

demonstrated an average probability of 15%, supporting the idea that more incidental learning can occur as a result of smaller proportions of unknown words (Swanborn & de Groot, 1999).

Glossing, as an input modification strategy, has also been considered as very effective for incidental word acquisition. For instance, it has been shown that reading passages accompanied by vocabulary glosses contribute to new word incidental learning (Jacobs, 1994; Ko, 1995; Hulstijn, Hollander, & Greidanus, 1996). It has also been demonstrated that multiple-choice glosses in comparison to presenting the meaning or providing words with no glosses lead to higher vocabulary scores (Hulstijn, 1992). And finally, Yoshii (2006) made a comparison between incidental vocabulary learning with L1 and L2 glosses. The obtained results of the investigation indicated that no meaningful difference existed between the use of native or target language glosses in terms of vocabulary acquisition.

Incidental vocabulary learning has also been dealt with regarding text familiarity as an influential factor. It has been shown that incidental learning of nonsense words can be facilitated through cultural background knowledge and topic familiarity (Pulido, 2004, 2007). A number of studies have been conducted where the participants read authentic texts (Ferris, 1988; Dupuy & Krashen, 1993). The result of a study conducted by Zahar et al. (2001) indicated that, on average, ESL students in Canada could learn the meaning of 22% of unknown words or 2.16 out of 10.34 words. A similar study conducted by Daskalovska (2010) also indicated that the EFL secondary school students learned the meaning of 25.16% of the words.

Some studies have tried to look at the acquisition of other dimensions of word knowledge than meaning (Pellicer-Sánchez & Schmitt, 2010; Tavakoli & Gerami, 2012). The results of a case study conducted by Pigada and Schmitt (2006) in order to see the effect of reading extensively indicated an improvement in the spelling, meaning and grammatical characteristics knowledge. Webb (2007) also studied the effect of frequency on the acquisition of grammatical functions, form, meaning, orthography, association and syntax. The results of the investigation indicated that all aspects improved with an increase in the number of presentations.

VI. MULTIMEDIA GAMES AND VOCABULARY DEVELOPMENT

According to Nation (1990), in order to acquire vocabulary, students are to be challenged and focus their attention through new strategies. It is believed that games stimulate students and provide them with opportunity to play an active role in their own learning (Claxton, 2008). Due to the ever-increasing variations of video games, the investigation of the relationship between the media and language acquisition has been problematic. Many genres of commercial (Wolf, 2001) and educational (i.e. "serious") games (Sawyer & Smith, 2008) have been recognized. The games can be different in such aspects as theme, intended audience, human-computer interface, graphical fidelity, hardware, and interaction between players.

One aspect of multimedia games is increasing motivation and fostering a deeper processing of vocabulary. The results of some studies have indicated that active participation in vocabulary games will lead to learning reinforcement (Baltra, 1990; Carrier, 1991; deHaan, 2005; Hubbard, 1991; Li & Topolewski, 2002; Bell, 2005). The result of the study conducted by Yip and Kwan (2006) demonstrated that learning vocabulary through multimedia games led to a change in the attitude of learners towards language learning. Naderi (2002) investigated the effect of 20 language games on English learning improvement. The results of the study indicated the effectiveness of games in learning English in middle schools. Segers and Verhoeven (2003) conducted a study on 67 native and immigrant children in order to investigate vocabulary training through computers. The participants were in the first and second years of kindergarten in the Netherlands. They played computer vocabulary games twice a week over 15 weeks. Each session took a period of 15 minutes. As a control group, 97 kindergartners went through the regular curriculum. The results of the curriculum-independent test conducted revealed the positive effect of computer training on vocabulary learning.

Marzano and Brown (2007) engaged in over 60 studies conducted in order to investigate the effect of using games in the classroom on students' accomplishment. The results of the study indicated a 20 percentile increase in students' achievement. A number of studies have revealed that games can have positive effect on achievement, interest, task learning engagement and problem solving (Kim, Park, & Baek, 2009; Tuzun et al., 2008; Wideman, et al. 2007; Oyen & Bebek, 1996; Robertson & Howell, 2008). The results of a study conducted on language learning of young learners through computer games in Turkey by Turgut and Irgin (2009) revealed that the performance of young learners involved in playing online games was better in language skills, especially vocabulary skill.

Another related aspect is that, in the context of a game, vocabulary skill can be acquired without pressure (Kohl, 1981). Besides, games can provide language learners with a platform for practicing skills (Kohl, 1981). DeHaan (2005) conducted a study on Japanese (as a foreign language) students who played a baseball video game for a month period. In spite of anecdotal positive learning outcomes, the participant reported that he could not completely focus on the game and that he was distracted by listening to and reading the Japanese, a result in line with Brett's (2001) findings and Kalyuga, Chandler and Sweller's (1999) suggestions.

VII. CONCLUSION

As the review of the related literature indicates, the studies on the effect of multimedia games on second language acquisition/learning are restricted. Considering the bewildering advancement rate of technology in various fields,

including multimedia games, further research considering the effect of various facets of this technological development on different aspects of vocabulary acquisition/learning seems very promising.

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