Digital games, foreign language and vocabulary development

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RESUMO
Diversas pesquisas (Prensky, 2001; Gee, 2005; Squire, 2006; Chik, 2014) no ensino e aprendizagem de línguas indicam que os jogos digitais podem ajudar os alunos do inglês como língua estrangeira. Os jogos digitais podem fornecer estratégias muito eficazes para auxiliar no aprendizado do vocabulário, como o uso de repetição, aprendizagem contextual e imagens e sons, incentivando os jogadores a continuar jogando para cumprir missões com motivação (deHann, 2010; Godwin-Jones, 2014; Vahdat & Behbahani, 2013; Yudintseva, 2015). Os jogos digitais também podem desenvolver habilidades cognitivas nos aprendizes, como as habilidades de atenção e concentração. Desta forma, este artigo faz uma revisão teórica sobre aprendizagem de língua estrangeira e aprendizagem de vocabulário em língua estrangeira através de jogos digitais, trazendo alguns exemplos de como os jogos digitais The Sims, Civilization III, Runaway: A Road Adventure podem favorecer o aprendizado de vocabulário de inglês como língua estrangeira.
Palavras-chave: Jogos Digitais, Aquisição de Vocabulário, Inglês como Língua Estrangeira.

ABSTRACT
Several studies (Prensky, 2001; Gee, 2005; Squire, 2006; Chik, 2014) in teaching and language learning indicate that digital games may assist learners of English as a foreign language. Digital games can provide very effective strategies to assist vocabulary learning, such as the use of repetition, context-situated learning, and
images and sounds, encouraging players to continue playing for missions and levels in a motivated pace (deHann et al, 2010; Godwin-Jones, 2014; Vahdat & Behbahani, 2013; Yudintseva, 2015). Digital games can also develop cognitive abilities in learners’, such as attention and concentration skills. Thus, this article provides a theoretical review on foreign language learning and vocabulary development through digital games, as well as some examples of how digital games such as The Sims, Civilization III and Runaway: A Road Adventure can assist vocabulary learning of English as a foreign language.

Keywords: Digital Games, Vocabulary Development, English as a Foreign Language.

Introduction
Since their origin, digital games have been conquering new spaces and new audiences in people’s leisure time, be that for their motivational aspect, their prompt feedback, or their interactional and multimodal appeal (SAVI; ULBRICHT, 2008; BOYLE et. al, 2012). Digital games can be characterized by several aspects, such as objectives, characters, narrative, rules, restrictions, interaction, challenge, competition, rewards and feedback (PRENSKY, 2001; WANGENHEIM; WANGENHEIM, 2012) that contribute to learning and development of cognitive processes of players. Therefore, they can be seen as attractive and interactive environments that capture players’ attention offering challenges with an increasing level of skills.

Several studies cite digital games as learning tools of several scholar areas and content subjects, including, among others, the learning of a foreign language (GEE, 2005; PRENSKY, 2001; SQUIRE, 2006; CHIK, 2011; GEE; HAYES, 2011; REINDERS, 2012; and SYKES; REINHARDT, 2013). Since vocabulary is one of the main building blocks of language learning (VAHDAT; BEHBAHANI, 2013; AZEVEDO et. al, 2017), this article aims to discuss the characteristics of digital games and their contributions to foreign language learning and, specifically to vocabulary development. It has a theoretical character, aiming to discuss the contributions of digital games and how they can assist vocabulary learning in learners of English as a
foreign language (hereafter FL). Moreover, some examples of digital games and how they can impact vocabulary learning will be presented.

**Foreign language learning and vocabulary development**

In this section, foreign language learning studies are presented and discussed concerning vocabulary development.

Many hypotheses have been proposed to explain the process of FL learning. In the early years of research in the area, Krashen (1982) proposed the Monitor Hypothesis. Krashen’s (1982) Monitor Hypothesis was composed of five main hypotheses, which are: 1) acquisition versus learning hypothesis: acquisition being unconscious with exposure to the target language, and learning conscious process that takes place through study of form and grammatical rules; 2) comprehensible input hypothesis: when the input is a little more advanced than the learner is able to comprehend; 3) monitor hypothesis: with two separate systems of language in our minds – the acquired system responsible for fluency while the learned system responsible for correcting (or “monitoring”) the discourse; 4) natural order hypothesis: stating that languages are learned in defined sequences that are not necessarily from the easiest to the hardest; and 5) affective filter hypothesis: the emotional barrier that prevents students from acquiring language.

Besides Krashen’s theory, the debate on FL learning carried on. Extending this idea to comprehensible output, Swain (1985) proposed the Output Hypothesis, arguing that communicative competence would be developed especially through the process of negotiation of meaning triggered by communicative breakdowns caused by malformed outputs. In other words, learners would have opportunities to meaningful FL learning when they would express themselves or make themselves understandable to their interlocutor. Long (1985; 1996), in turn, proposed the Interaction hypothesis which states, in a nutshell, that acquisition is facilitated when learners must negotiate meaning because of a communicative breakdown. This would lead to interactional adjustments in speech and increase salience over the rearranged form. Then, adding to the debate on FL learning, Schmidt (1990, 1995) proposed the Noticing Hypothesis, pointing out that noticing the possible gap in the
interlanguage is a key factor in language learning, allowing for the conversion of input into intake, that is, ultimately, learners must attend to something to learn it.

Concerning specifically vocabulary development, Krashen (1989) claimed that “vocabulary and spelling are acquired in fundamentally the same way as the rest of language is acquired” (p. 440), that is, subconsciously by natural exposure to the language, when the conscious focus is on the message, not on the form. However, some studies have shown that mere exposure may not be enough. Furthermore, Sökmen (1997) provided evidence that implicit vocabulary instruction alone would not necessarily lead to learning and stressed the ineffectiveness of just using implicit vocabulary instruction. More recently, Yudintseva (2015) declared the need for multiple exposures to a word in different contexts, while Yilmaz (2015) argued that contextualized vocabulary learning through reading is effective, but reading plus instructions is superior. As the author contended, in digital games, for instance, instruction (thus, reading) is coupled with contextualized vocabulary exposition, and this would lead to more vocabulary knowledge for the players (YILMAZ, 2015).

Nevertheless, Rieder (2003) stated that this distinction - among incidental and intentional learning - is not always clear. Several scholars in the area use both pairs of concepts interchangeably. As a way to differentiate these concepts, Hulstijn (2001, p.14) stated that “incidental vocabulary learning refers to the learning of vocabulary as the byproduct of any activity not explicitly geared to vocabulary learning, with intentional vocabulary learning referring to any activity aiming at committing lexical information to memory”. The author also mentioned that this concept should not be confused with implicit and explicit learning, highlighting the existence of a difference between these concepts (HULSTIJN, 2001).

According to Reber (1989), implicit learning is an unconscious process in which the environment provides stimulus to learning without using direct learning strategies, whereas explicit learning happens in contexts where learning strategies are used consciously. Such strategies may include explanations from the teachers, language exercises and/or activities, and so forth. On the other hand, Rieder (2003) argued that these concepts are neither interchangeable nor mutually exclusive, insofar as one may have the intention to learn new vocabulary (intentional learning)
while using tools that promote implicit learning such as texts, music and even digital games.

When it comes to vocabulary development, committing information to the long-term memory (LTM), as a virtually unlimited memory used for storage, is important (TUMOLO, 1999). Consistent with his natural approach, Krashen (1982) claimed that “vocabulary naturally acquired is more persistent and more likely to be remembered than is vocabulary that is explicitly learned through memorization or dictionary use” (p. 80). However, Stevick (1982) has found that the commitment of the new information to LTM depends on the amount of work the learner’s mind does on the new input, that is, whether the new input makes it to the LTM is “pretty much a matter of frequency and intensity” (p. 30), that is, how many times and how hard the input is worked upon. Concerning frequency, Stevick (1982) argued for a regular revision of the new item distributed over a period of time. Concerning intensity, the author argued for emotional depth at which the new item touches the learner and the consequent cognitive breadth of the associations that the material finds in the learner’s mind (STEVICK, 1982).

Moreover, according to Schmidt (1994), that are three concepts that relate to vocabulary development: attention, awareness, and noticing. Attention is defined by Schmidt (1994, 2010) as a set of subsystems that control information processing such as alertness, orientation, detection of stimulus, facilitation, and inhibition. It is also defined as “necessary and sufficient condition of long-term storage” (SCHMIDT, 2001, p. 16). Apart of the debate about whether learning without attention is possible or not, there is apparently no doubt that more attention leads to more learning and therefore enhancing students’ attention is an important task to teachers aiming at vocabulary development.

Awareness, as defined by Al-Hejin (2004, p. 2) is “learner’s knowledge or subjective experience that he/she is detecting a stimulus”, a concept which can be confused with attention - mainly because one cannot be aware something one did not attend to. However, while attention refers to the psychological systems that control information detection and processing, awareness refers to the individual and subjective perception of the stimulus. There is much debate in the area of FL learning
concerning the role of awareness. On one side, some argue that awareness is necessary for learning (SCHMIDT, 1994, 2010; HAMA; LEOW, 2010). But if this is true, how to explain incidental learning? To answer this question, Schmidt (2010) proposed the distinction between awareness and understanding. While awareness is limited to the surface level (to the utterances), understanding would be in a deeper level, in the level of underlying rules and principles (AL-HEJIN, 2004). On the other side, some scholars argued that learning a language without awareness is possible, especially in naturalistic settings (AL-HEJIN, 2004; WILLIAMS, 2005).

The last concept, which is very tied to awareness, is noticing. According to Schmidt (1995), "the noticing hypothesis states that what learners notice in the input is what becomes intake for learning" (p. 20). The author also stated that noticing is necessary for FL learning (while understanding is not necessary but a “facilitator”) for intermediating the processing and storing of input in memory. In consonance, Al-Hejin (2004) claimed that noticing is the detection of a stimulus plus awareness, which makes the processes stronger. In addition, Schmidt (1990) stated that several factors impact on noticing, such as: a) expectation of the input; b) frequency (the more something appears, the bigger is the chance of being noticed); c) perceptual salience (the more prominent something is, the bigger is the chance of being noticed); d) skill level of the individual; and e) tasks demands. The aforementioned factors, moreover, may play an important role in vocabulary development, especially in context-poor environments, since they may enhance the process of encoding into long-term memory as proposed by Schmidt (1995, 2010) in the noticing hypothesis.

In sum, FL learning has been debated and studied for many years, involving many researchers and scholars, especially after the late 1970s and early 1980s, who have proposed hypotheses in attempts to best explain FL learning, sometimes having conflicting nature, sometimes having complementary one. Vocabulary development can be said to follow suit, and since it involves necessarily commitment of input to LTM, especially in a context-poor environment as in the case of foreign languages in Brazil, frequency and intensity may play a very important role.

Next section will focus on how digital games may enhance learning as an educational resource for language development and, specifically, its vocabulary.
Digital games as an educational resource

This section presents a discussion regarding the contribution of digital games to learning in general as well as the contribution to foreign language learning, more specifically, its vocabulary.

Digital games consist of environments involving human interaction with a user interface to generate visual feedback on a video device such as a television screen, a game console or a computer monitor, known as platforms. The game controller varies across platforms, although common controllers include the mouse, keyboard, joystick, touchscreen of mobile devices and buttons.

When designed for educational settings, digital games can be named serious games, having, as its primary goal, the promotion of learning of some specific (scholar) knowledge, while maintaining the entertainment and the fun aspects as a secondary goal. According to Gros (2013), these games endure as motivational, helping students to develop an array of abilities and skills, starting to be treated as important educational materials. The author still mentions that serious games can bring about a series of advantages to learning environments, such as a) the motivational effect as learning facilitator; b) development of cognitive abilities, mainly attention and concentration enhancement; c) interaction and social life developed and lived among with other players and also new identities; d) development and improvement of motor coordination; among others.

Moran (2013) mentioned that educational technologies are growing in number and frequency and they have been making changes not only at family homes but in the scholar system as well. Hence, abilities, experiences and previous knowledge of the students become important sources to be explored and included in pedagogic and didactic choices by teachers. In this context, digital games can be mentioned as a learning innovative tool that allow for active and meaningful learning in context, involving aspects such as objectives, narratives, characters, rewards and feedback, in addition to competition and interaction among players, enhancing, thus, opportunities to experience and visualize concepts, developing gamers’ creativity and interest (BONWELL; EISON, 1991; DEMPSEY et. al, 1996).
Besides being present in our daily lives and being played in our free time, digital games can bring pleasure into learning (GEE, 2005; SQUIRE, 2006; PRENSKY, 2007). Gee (2005) mentioned that good digital games represent good learning, allowing learners to feel like active agents, not just passive recipients, enabling players to learn through different personal learning styles, besides learning new skills, strategies, and consolidating ideas and concepts best when they see how they fit into a context. The author also mentioned that good digital games, to enhance learning through the process of learning, convey some learning principles, which are: new identities; interaction between players and games and among players themselves; production and agency; opportunities of risk-taking and customization; well-ordered problems that can be leveled according to abilities and skills acquired; challenge and consolidation of skills; “just-in-time” and “on-demand” help; situated meanings; levels of difficulty “pleasantly frustrating”; system thinking where players are encouraged to explore, think laterally and rethink goals; performance and abilities before competence; among others (GEE, 2005). These principles are most likely to be present in digital games and may trigger to enhance the learning of all subjects, multiple intelligences, and cognitive processes.

In a similar vein, Squire (2006) stated that a core characteristic of digital games is that they are organized around doing and being, where one learns through performance. Many contemporary digital games literally put players inside the game, allowing them to create new identities and live in a new virtual environment. According to the author, digital games and their use are mediated by social structures, where players can share strategies, download FAQs and participate in online forums, being characterized as a social experience (SQUIRE, 2006), a way to connect and interact with other players. The author also claimed that digital games provide learners with the experience of being competent and independent problem solvers, enabling them to develop simulated identities and learn, allowing them to develop coherent ways of thinking that they can bring to new situations (SQUIRE, 2006). In addition to that, like Gee (2005), Squire (2006) mentioned that the focus of digital games is on experience that enables players to develop situated understandings, to learn through failure and to develop identities as problem solvers.
Another aspect present in gaming is motivation. Players feel motivated to keep playing for long periods without getting tired of the game - and this would lead to more learning opportunities. Prensky (2001) mentioned that motivation is a combination of fun and participation plus entertainment and learning. In consonance, Gee (2005) contended that motivation in gamers arise basically from the principle that they can create and live a new identity in a new environment. Squire (2006) complemented this and declared that what motivates gamers to play even after a long day of work and study is the fact that they are agents in a new world, living a new life and a new identity virtually, inside the game. Although researchers in the area seem to have not agreed in only one definition of motivation, there are some motivational aspects and elements that coincide in many studies about digital games and learning, as asserted by Lorenset (2016): goal orientation, interaction, feedback and narrative; combination of effort, willpower and positive and favorable conditions to reach language learning; combination of fun and participation; freedom to feel like agents in a new world, living a new life and a new identity virtually; autonomy, competence and affinity; among others. Therefore, it seems safe to suggest that digital gaming enhance motivation to learn languages.

In the next section, digital games and English vocabulary learning research relations will be established.

**Digital games and vocabulary development**

Many studies point to the use of digital games for vocabulary development. This section presents previous studies that investigated digital games and vocabulary development as part of the learning of English as a FL.

In their research with Vietnamese students learning vocabulary, Huyen and Nga (2003) observed game sessions, as well as interviewed students and teachers in a post-class questionnaire. As a result, the authors found that all students agreed that digital games helped them in vocabulary learning and that they are one of the most effective ways to learn new vocabulary items incidentally. Digital games, according to the authors, facilitated vocabulary development through relaxation and
fun environments, involving friendly competition and enhancing students’ use of English in a flexible, contextualized and communicative way.

Dehaan et al. (2010), in turn, investigated the effect of interactivity on vocabulary acquisition and cognitive load through physical interactivity of a foreign language music digital game. The authors explored whether interactivity (in terms of text, audio, and animation) of digital games had a negative or a positive effect on learning. The results of this investigation showed that watchers recalled more vocabulary items with higher scores, and interactivity was not conducive to learning, although bringing learning to more motivational and fun levels.

Similarly, Saffarian and Gorjian (2012) investigated the effect of computer-based digital games for vocabulary development among young children. In their study, a pre-test and a post-test were administered. The pre-test was administered to check participants’ proficiency level of English, while the post-test was divided into three parts: 1) a multiple-choice test about specific facts, terms, and definitions; 2) a matching test to check students’ ability to associate terms from a list of appropriate contexts; and 3) an application test of demonstration of their understanding on the topic. The results showed that computer-based digital games facilitated students’ learning performance, such as factual knowledge, problem-solving strategies, and higher-level cognitive thinking processes, besides vocabulary acquisition, being extremely beneficial for learning.

Besides the studies previously mentioned, several research mention that multimedia resources, such as digital games, may present information in different modes, increasingly offering opportunities for vocabulary development by being repetitive, providing instantaneous feedback and offering students a contextualized environment where they can play and learn at their own pace (Schmitt, 2000; Sagarra; Zapata, 2008; Hanrahan, 2005; Hirschel; Fritz, 2013; Ebrahimi; Zamanian, 2013). As a matter of example, Ebrahimi and Zamanian (2013) stated that the use of computer digital games may present potentialities of offering information in different modes, such as aural, video and visual; besides having influenced positively more (grammatically) correct language use (Ebrahimi; Zamanian, 2013).
Likewise, Gee (2005) mentioned that digital games can create a deep understanding of vocabulary by connecting game actions, goals and images to learners' personal experience, which, in turn, benefit learning processes. On the other hand, as previously mentioned, Squire (2006) emphasized that the motivating effect of the digital game takes place through learning by experimenting - not only by watching passively as it happens when watching television or movies, for instance. Many contemporary digital games literally put the player within virtual contexts: with the proper tools, the player can create a new virtual life and live in another reality. Digital games, thus, have the ability to get players to be actively game playing for long hours trying to achieve results, complete missions or improve themselves. This would, in turn, create opportunities for learning to take place with more motivation.

All in all, it may be possible to state that vocabulary development based on the idea of intentionally designed games may profit for FL learning, especially concerning the acquisition rate, the various modes of presenting, the planned frequency of exposure, and the intensity that may be involved in the game playing.

**Digital games and vocabulary development: examples**

In this section, examples of digital games and how they can assist foreign language learning are presented. Digital games such as *The Sims*, *Civilization III* and *Runaway: A Road Adventure* are mentioned as to illustrate how vocabulary learning can be developed.

In the digital game *The Sims*, players can create new identities and have the objective of taking care of his/her characters and their daily life needs, such as hygiene, work and study, fun, physiological needs, and social life. *The Sims* is a good example of an entertainment digital game especially used for vocabulary learning, since it provides gamers with familiar and very much used vocabulary of actions done daily, such as cooking, cleaning, building, eating and shopping. Images1 1 and 2 below illustrate tasks from *The Sims*.

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1 Images 1 and 2 are part of the personal repertoire of the authors, taken while digital game playing The Sims FreePlay version in 2016.
Menezes and Schlemmer (2014) noticed that gamers were motivated to play *The Sims* because of their involvement in the daily real-life context that the game portrays. In a similar study, Menezes (2013) identified that this game promoted the possibility of vocabulary use, because, in addition to being motivated and committed, players lead with personality and physical characteristics, workplaces and housing, among many others, in a contextualized setting.

Yudintseva (2015) stated that while playing *The Sims*, players interacted with peers to help each other, and the verbal and written repetitions facilitated vocabulary learning. Thus, used in scholar environments or in extra-class activities, *The Sims* is a game that can represent a stimulating manner to enlarge and contextualize vocabulary learning by providing players with repetition of words in context. Results from this research conclude that imagery, repetitions, contextual clues, and interaction were stated as positive vocabulary learning strategies.

Similarly, in *Civilization III*, players have to build a whole new world - an empire beginning in 4,000 BC and continuing until modern times. Images 3 and 4 below illustrate the maps of the game being played.
As the images² show, the player must build and improve cities, train military and non-military units, expand terrain and landscapes, research technologies, make war or peace with neighboring civilizations, among other tasks. The players must use strategy skills in order to balance a good infrastructure, resources, technological advancement, city management, culture, and military power to succeed. Yudintseva (2015) found that gamers can learn geography and history while they play Civilization III with necessary and appropriate resources for that new society.

In the game Runaway: A Road Adventure, the main character is on a trip from New York to California, but decides to interrupt his plans to make a quick stop on his way to borrow a book at a bookstore. On the way, he sees an escaping girl blacking out, and decides to take her to the hospital. By discovering that she had witnessed a Mafia murder, he saves her from the killers, but now he also must run away to save himself. Image 5 and image 6, below, illustrate some of the game’s tasks.

According to Yudintseva (2015), adventure games like Runaway: A Road Adventure enrich gamers with detailed scenarios and good quality graphics, as can be observed in the images³ above. By gaming this digital game, players learned that the possibilities to connect words with images facilitated vocabulary acquisition, since they happen in context, and the relation among images and word acquisition occur in contextualized settings.

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³ Images retrieved from https://store.steampowered.com/app/7210/Runaway_A_Road_Adventure/, accessed on July, 2019.
This section illustrated how digital games for entertainment can create learning opportunities, being educational and allowing for learning to happen in contextualized settings with vocabulary repetition, motivational worlds and use of the FL.

**Final remarks**

This article aimed at reviewing studies on digital games and vocabulary learning in FL learning contexts, providing some examples on how digital games can favor vocabulary development in a FL. It has been shown that digital technologies have immense potential to support learning, and digital games, specially, may work as an effective educational tool. Digital games may represent the first contact children have with electronic devices (GROS, 2003), so they can influence learners since a very young age, allowing for individual differences and interests and learning styles. As previous research aforementioned stated, digital games can: a) create effective situations for general learning (CHIK, 2014); b) be a key element to facilitate second language (SYLVÉN; SUNDQVIST, 2012); c) foster learner autonomy development (CHIK, 2011; 2014); and d) provide safe environments of learning and interaction among players (RAMA et. al, 2012).

Furthermore, digital games can promote countless benefits for foreign language learning. Several studies here presented showed that digital games can provide great opportunities for incidental development of lexical content, especially because they offer contextualized input and most times present new vocabulary multimodally and in context, digital games can foster the learning of a foreign language, such as English, assisted with interaction with other players; repetition; contextualized virtual environments among others. All digital games aspects mentioned can be taken to real-life experiences, helping players and learners to keep the attention when and where necessary. Digital games are so realistic that can be seen as a test of real life, bringing interaction, risk-taking, problem-solving, meaning negotiation and community experiences, helping the player to use and apply different learning strategies as well as various linguistic resources developed by the game to their lives.
Studies on the necessary conditions to digital games become more used in formal education settings (regular schools, language institutes), as well as teachers and students perceptions on these games as pedagogical tools are a path to future research to follow.

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