

Literature Review

# Digital Games and Second Language Learning among Tertiary-level EFL Learners: A Critical Review

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**Abstract:** Despite the increased interest in the possibilities of digital games in second language education, their use in higher education is a relatively uncharted territory. This review was carried out to examine how digital game-based language learning is used, and what its effects are on language learners at tertiary level in English as a Foreign Language (EFL) contexts. Twenty-seven studies were short-listed from academic literature and were analysed for research methodology, theoretical frameworks, research foci, game types and specifications, research results, and pedagogical implications. The research revealed six types of digital games, each with its own affordances that could enhance language learning. It was also found that these games increased vocabulary uptake and long-term lexical retention, enhanced L2 reading and listening comprehension, fostered writing ability and communicative competence, and increased motivation and willingness to communicate in the L2. Therefore, it may be deduced that digital games can be employed as a beneficial tool for the development of L2 competence and for the enrichment of the language learning experience. Suggestions for further research and educational implications have been provided.

**Keywords:** digital game-based language learning (DGBLL); review; game type; affordances; effect; learner's perception

## 1. Introduction

Given its commonplace in the technology-driven era, digital games – an all-inclusive concept referring to any gaming software or application operated on virtual platforms such as gaming consoles, personal computers and the Internet-based sites – have kindled enormous interest among scholars as well as practitioners in the field of second language acquisition on the basis that the values of such games are believed to transcend their original entertainment-focused significance (Connolly et al., 2012). Against the backdrop of such curiosity, digital games have currently been a fresh impetus for different innovative language teaching initiatives in several developed countries (Sykes, 2019), and they, simultaneously, have opened the uncharted terrain of scientific endeavor within the domain of second language education (Chang & Hwang, 2019).

Interestingly, regardless of the ongoing transforming landscape of L2 learning and teaching in digital era, English education in higher education in EFL contexts still gravitates toward the conventional classroom-bound pedagogical method that is deemed as teacher-centered, old-fashioned, ill-favored and demotivating (Sun & Rong, 2021; Zein et al., 2020), and hence it is suggested that English teaching and learning should undergo a paradigm shift to be aligned with the new approach that is characterized as student-centered, innovative, intriguing, engaging and meaningful (Garcia et al., 2021; Poláková & Klímová, 2019; Thao & Mai, 2020). Additionally, it is noticeable that digital games, especially online games, does not attract serious attention within the context of L2 learning and teaching in higher education, and this can be explicable on the basis that the current prevalent attitude of the public towards digital games has been emphatically negative for the reason that digital games are associated with various problematic behaviors among young people (Baturay & Toker, 2019; Kanat, 2019; Nguyen, 2020). Considering the conflux of such issues, it is highly important for the reconsideration of digital games and their educational ramifications within the context of higher education.

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Apart from that, in terms of theoretical development, different systemic reviews have been carried out to offer a holistic view of the field of digital game-based learning research, but their scopes and foci were so scattered that a picture of the application of digital games in EFL education at tertiary level is far from complete. Connolly et al. (2012) analyzing a significantly large number of studies (N=129) conducted in the period from 2004 to 2009 to arrive at the conclusion that game-based learning is beneficial to subject-specific knowledge acquisition. Hwang and Wu (2012) adopted the content analysis approach to critically review 137 studies in the hope of reflecting the current development of digital game-based learning as an emergent field. Boyle et al. (2016) also established the positive association between learning outcomes in the STEM fields and digital game-based learning via their meta-analysis research which was designed in line with the model proposed by Connolly et al. (2012) with some minor adjustment regarding age groups of learners and subject domains. Chiu et al. (2012) surveyed 14 studies to explore the effect of game-based learning on the outcome of learning English as a foreign language, and even though they agreed that digital games are effective tools for English language learning with medium effect size regardless of differences in learners' age range and English level, but noted that further investigation should be performed to determine the effectiveness of "drill and practice" digital games. Likewise, to fill the void in the current extensive development of theoretical contribution of digital game-based language learning, Jabbari and Eslami (2019) synthesized 30 studies for their content analysis which was aimed to shed light on the interdependence among the game mode designs of a specific game type (namely massively multiple player online games or MMOG), L2 learning affordances, and L2 learning outcomes. It was concluded that the learning environments provided by the games offer authentic contexts conducive to meaningful language interaction and communication, which in turn lay the foundation for the expansion of L2 lexical resources and the development of L2 language proficiency. However, it can be noted that studies selected for analysis feature various contexts of language learning (e.g. second language learning and foreign language learning), a wide range of age groups (e.g. primary and university students), and different target language levels (e.g. elementary, intermediate and advanced).

Considering the aforementioned review studies, it is noticeable that these reviews indiscriminately incorporated studies of vast educational contexts (e.g. both second language and foreign language, both K-12 education and higher education), featuring the inclusion of a large quantity of studies of divergent subject domains (e.g. science, technology, health, and English), focusing on studies that explore a specific game type, and thus yielding inconsistent findings. Consequently, it is suggested that an insight into the values of digital game-based language learning in higher education is elusive.

Being informed by the points stipulated in the above, this review, via adopting the perspective of digital game-based language learning that is conceptualized as second language learning constituted by the aid of digital games (Becker, 2017), is thus conducted to acquire a comprehensive depiction of the current development of the emerging research domain of digital game-based language learning in higher education in the settings of foreign language learning and teaching, and its possible relation to L2 acquisition and development of the corresponding university-level learners. Subsequently, appropriate implications can be delineated regarding recommendations for further research and suggestions for the implementation of digital game-based language learning in EFL higher education.

In the hope of achieving the general aim mentioned in the above, this study adopts the three research questions to frame the investigation. They are stated as in the following.

1. What are the types of digital games employed in the surveyed studies and their design features?
2. What are the effects of digital game-based language learning on the L2 learning and development of tertiary-level learners?
3. What are the perceptions of learners regarding the incorporation of digital games in L2 learning?

## 2. Materials and Methods

Although different scholars have offered their own conceptualizations of what digital games are, this review adopts Clark et al.'s (2016) definition of digital game. From their perspective, digital game is a generic term that is used to characterize any gaming software or application which (1) operates within the virtual platforms (i.e., gaming consoles, offline personal computers and online websites) and (2) is designed as an environment in which players

are expected to have fun while striving for specific goals under the provision of constraints and feedback. Following that, in this study, the term DGBLL is conceptualized as the formal or informal second language learning which is constituted by the implementation of an array of digital game types (Becker, 2017). In other words, there are two key terminologies employed to direct this study. They are digital game and digital game-based language learning or DGBLL, with the former being used to refer to any gaming tool run on virtual platform featuring some distinctive elements (e.g., fun, feedback, fictive goal or educational objective) and the latter alluding to the second language learning approach associated with the use of digital games.

After the principal terminologies were determined, an array of searches was conducted on the platforms of Google scholar, Curtin e-library, online database of Taylor & Francis, Elsevier, JSTOR, Cambridge, Oxford, Springer and John Benjamins. This resulted in the emergence of relevant key terms (e.g., “digital games for language learning”, “immersive online role-playing game”, “mobile or computer game”) which were also incorporated to optimize the search until a comprehensive set of articles were achieved. At this stage, considering the aim of this current study, any scholarly work involving the examination of digital game-based second learning in ESL settings and other population of learners (e.g., young learners, school learners) were opted out from the analysis process, and 45 primary empirical undertakings studying the implementation of digital games contextualized in the milieu of foreign language learning in higher education were selected.

The chosen studies then underwent the process of preliminary evaluation procedure which was underpinned by the set of criteria for inclusion and exclusion of studies. Specifically, to be selected for further analysis, a study need to possess the following attributes:

- Being reported in English
- Being published within the period between 2000 and 2021
- Originating from peer-reviewed sources
- Featuring particular digital games whose properties are in alignment with the definition used in this review
- Involving L2 learning facilitated by digital games playing
- Investigating empirical learning outcomes constituted by the application of specific digital game types

Subsequently, 27 studies were obtained for further analysis while 16 studies were excluded for the reason that nine of them investigated digital game-based language learning in the contexts K-12 education, four of them adopting survey design to determine perception and attitudes of teachers and students regarding the phenomenon of digital games-based learning in general without focusing on any specific type of digital games, three studies investigating the effects of the games-constructing process on the development of L2.

After that, 27 selected articles were read in depth and mapped out with a coding process which was governed by the research questions. The coding procedure was employed to delineate key information of the studies in terms of publication details (title, publication year, author's name, target language), research nature (research designs, instruments for data collection, scope of study), theoretical dimensions (e.g. Ecological Psychological Theory, Affective Filter Hypothesis, and Connectivity), digital game types (e.g. real-life simulation game, adventure game), research dependent variables (e.g. learning affordances, learning outcomes), as well as research results (effects, disadvantages, difficulties) and suggested implications

### 3. Results

#### 3.1 Year of publication

Except for studies of DeHaan (2005) and Neville et al. (2009), a large proportion of the surveyed studies investigating digital game-based language learning among university-level L2 learners were conducted between 2010-2020. This can be deduced that the exponential growth in the ubiquity of the digital technology has opened up the new interest in the line of DGBLL research in higher education.

#### 3.2 The target languages

The survey of the selected studies highlights that out of 27 scholarly works, 22 studies are focused on English as foreign language, which is followed by two studies (DeHaan, 2005; Hitosugi et al., 2014) concerning Japanese as Foreign Language and two other investigations (Berns et al., 2013; Neville et al., 2009) concentrating on German as Foreign Language.

Besides, only the study of Ibrahim (2019) examines digital game-based learning of Arabic as a foreign language.

### *3.3 Theoretical perspectives*

Although seven studies (Castillo-Cuesta, 2020; Lee, 2019; Müller et al., 2018; Parsayi & Soyooof, 2018; Taskiran, 2019; Vandercruysse et al., 2013) out of 27 studies were not explicit about their theoretical framework, 20 studies were identified with one of several theories in SLA or educational psychology, which are iterated as Interaction Hypothesis, Social-cultural Approach, Input Hypothesis, Ecological Psychological Theory, Affective Filter Hypothesis, and Connectivity.

Specifically, five studies (Akayoğlu & Seferoğlu, 2019; Berns et al., 2013; Berry, 2019; H. H.-J. Chen & Yang, 2013; Hitosugi et al., 2014; Peterson, 2012) were conducted on the basis of Interaction Hypothesis which puts forth that the acquisition of L2 is facilitated by the increased comprehension of L2 input which is constituted by the interactional modifications made by the interlocutors to sustain the communication (Long, 1996, as cited in Mackey et al., 2013).

Studies conducted by J. Chen (2016), Franciosi et al. (2016), Hitosugi et al. (2014), Liang (2012), Müller et al. (2018) and Neville et al. (2009) were informed by the account of the Social-cultural Approach premising that L2 development is an on-going cognitive process formed through the interactions the learners have with culture-bound contexts where assistance from experts are offered for internalization processing (Lantolf, 2000). Four other studies (H. Chen & Huang, 2010; Ibrahim, 2019; Newgarden & Zheng, 2016; Zheng et al., 2015) were driven by the modified version of the Social-cultural Approach, known as Ecological Psychological Theory; based on this theory, L2 learning is considered as a complex process which is incessantly morphed by the volatile chaotic interactional dynamics inherent in the L2 learning semiotic ecology (Van Lier, 2006).

In a different vein, four studies (H. Chen & Yang, 2013; DeHaan, 2005; Parsayi & Soyooof, 2018; Thorne et al., 2012) referred to Input Hypothesis proposed by Krashen (1992) as their theoretical starting point, postulating that L2 acquisition is enhanced by the immersion in the comprehensible contextualized input afforded by the virtual game environment. Two other studies conducted by Reinders and Wattana (2014, 2015) investigated digital game-based learning through the lens of Affective Filter Hypothesis that highlights the facilitative role of affective variables in the process of L2 acquisition (Krashen, 1982).

In contrast with other studies, Franciosi's (2017) research was informed by theoretical foundations derived from educational psychology dimension. In this research, Franciosi (2017) cited Connectivity theory proposed by Klimesch (1994) to reason that learning of L2 vocabulary is likely to be maximized by sustaining the complex system consisting of interconnected multi-sensory inputs.

### *3.4 Research methods*

The analysis of the surveyed research has pointed out that research regarding DGBLL falls into three research paradigms, namely Qualitative (N=10), Quantitative (N=10) and Mixed-methods (N=7). Within the Quantitative approach, the majority adopted Quasi-experimental design (N=9) (e.g. Berns et al., 2013; Berry, 2019; Lin, 2015) and experimental design (Vandercruysse et al., 2013). Concerning the Qualitative studies, case study was the predominant design (N=8) (e.g. DeHaan, 2005; Ibrahim, 2019; Liang, 2012) whereas only two studies were reported to be phenomenological study (Akayoğlu & Seferoğlu, 2019) and grounded theory (J. Chen, 2016). Considering the mixed-methods approach, one study (Thorne et al., 2012) was identified as exploratory study, whilst the remaining (e.g. Hitosugi et al., 2014; Lee, 2019; Neville et al., 2009) were designed on the basis of quasi-experimental research which employs both statistics and non-numerical data to shed light on the phenomenon of digital game-based language learning.

### *3.5 Instruments for data collection*

In tandem with the research designs adopted, different research tools were implemented for the process of data collection. Such tools are observed to be (a) questionnaire (N=14), (b) language-specific tests with stated rubrics (N=12), (c) interview (N=9), (d) transcribed chat log (N=7), (e) in-game video recording (N=6), (f) observation (N=6), (g) learner's written report (N=5), (h) journal writing (N=2), (i) field-notes (N=1), (j) think-out-loud protocol (N=1), and (k) built-in gaming statistic report (N=1). Among these instruments, questionnaire, language tests and interview were the most commonly used. Moreover, it is noticeable that half of the surveyed studies (N=14) employed multiple research tools for data triangulation (H. Chen & Yang, 2013; Peterson, 2012; Zheng et al., 2015).

### *3.6 Participants*

It is also worth considering sampling methods, sample size, as well as L2 level of participants. The two most frequently used sampling methods were convenience sampling (N=13) and purposeful sampling (N=12), which can be argued to be congruent with the research methods cited in the previous section. Regarding the sample size, it can be seen that a substantial proportion of studies involved small size of subjects with the number of participants varying from one to 213 (Mdn=21; M=49, SD=64). Specifically, out of 27 studies, 13 had less than 15 learners as their primary informants (e.g., Newgarden & Zheng, 2016; Parsayi & Soyooof, 2018; and Reinders & Wattana, 2015), and seven other empirical works involved about 15-40 learners (e.g., H. Chen & Yang, 2011; and Müller et al., 2018). Meanwhile, the remaining seven studies featured large participant size of more than 40 learners (e.g. Castillo-Cuesta, 2020; Franciosi et al., 2016; Taskiran, 2019).

In the respect of participants' L2 proficiency level, beginner level group was shown to be under-researched, with only four studies (Berns et al., 2013; J. Chen, 2016; Ibrahim, 2019; Newgarden & Zheng, 2016) focusing on this group. Following the elementary group, the advanced-level group was also underrepresented as just five studies (Akayoğlu & Seferoğlu, 2019; J. Chen, 2016; Ibrahim, 2019; Newgarden & Zheng, 2016; Thorne et al., 2012) were reported to investigate advanced learners of L2. In stark contrast, intermediate-level and upper-intermediate-level groups attracted the most attention as they were the main subjects of 20 studies (e.g. Berry, 2019; H. Chen & Huang, 2010; DeHaan, 2005).

### 3.7 Research focus

The reviewed studies gravitated toward divergent research foci. However, by and large, such foci can be subsumed under three overarching aims, namely (1) determining the digital game's affordances facilitating L2 learning (which is also known as the design features of digital games that can be tapped for L2 learning) (H. Chen & Huang, 2010; DeHaan, 2005; Liang, 2012; Newgarden & Zheng, 2016; Thorne et al., 2012; Zheng et al., 2015), (2) establishing the relationship between digital game-based language learning and learning outcomes (Akayoğlu & Seferoğlu, 2019; Berns et al., 2013; Castillo-Cuesta, 2020; H. Chen & Yang, 2013; J. Chen, 2016; Franciosi, 2017; Franciosi et al., 2016; Hitosugi et al., 2014; Ibrahim, 2019; Lee, 2019; Lin, 2015; Müller et al., 2018; Neville et al., 2009; Peterson, 2012; Vandercruysse et al., 2013), (3) exploring the affective aspect of digital game-based language learning (Reinders & Wattana, 2014, 2015; Taskiran, 2019), and (4) discerning L2 learners' perceptions regarding the implementation of digital game-based L2 learning in general as well as the effect of such implementation on their L2 development (Castillo-Cuesta, 2020; H. Chen & Huang, 2010; H. Chen & Yang, 2013, 2011; J. Chen, 2016; Hitosugi et al., 2014; Müller et al., 2018; Neville et al., 2009; Parsayi & Soyooof, 2018; Peterson, 2012; Vandercruysse et al., 2013).

### 3.8 Digital game types and their manifestations

On the basis of Chang and Hwang's (2019) recommendation for the classification of digital game genres and types, it is revealed that the majority of the digital games included in the surveyed studies are Commercial-Off-The-Shelf (CO'S), which is defined as digital games commercially created for the purpose of entertainment, (as in Akayoğlu & Seferoğlu, 2019; H. Chen & Yang, 2013; H. Chen & Huang, 2010; H. Chen & Yang, 2011; J. Chen, 2016; DeHaan, 2005; Franciosi, 2017; Franciosi et al., 2016; Hitosugi et al., 2014; Ibrahim, 2019; Lee, 2019; Liang, 2012; Newgarden & Zheng, 2016; Parsayi & Soyooof, 2018; Peterson, 2012; Reinders & Wattana, 2014, 2015; Thorne et al., 2012; Vandercruysse et al., 2013; Zheng et al., 2015), while a small portion of digital games featured in the studies are regarded as Serious Educational Digital Game (SEDG), which is characterized as digital games designed to cater to educational purposes, (see Berns et al., 2013; Berry, 2019; Castillo-Cuesta, 2020; Lin, 2015; Müller et al., 2018; Neville et al., 2009; Taskiran, 2019).

Besides the categorization by gaming purpose, based on the design specifications, the games investigated in the studies are further subcategorized as Real-life Simulation Game (Akayoğlu & Seferoğlu, 2019; Berns et al., 2013; Berry, 2019; J. Chen, 2016; DeHaan, 2005; Franciosi, 2017; Franciosi et al., 2016; Hitosugi et al., 2014; Ibrahim, 2019; Liang, 2012; Lin, 2015; Peterson, 2012), Massively Multiplayer Online Role-playing Game or MMORPG (Newgarden & Zheng, 2016; Reinders & Wattana, 2014, 2015; Thorne et al., 2012; Zheng et al., 2015), Adventure Game (H. Chen & Huang, 2010; H. Chen & Yang, 2013, 2011; Lee, 2019; Vandercruysse et al., 2013), Tutorial Game (Castillo-Cuesta, 2020; Müller et al., 2018), Augmented Reality Game (Taskiran, 2019), and Action Game (Parsayi & Soyooof, 2018).

#### 3.8.1 Real-life Simulation Game

This type of game lets participants be immersed in the fictitious environment which is developed as a virtual simulation of the real world. Participants in this game type are required to interact either with co-players or built-in virtual characters to accomplish particular game

missions that are replicated on real-life tasks, such as setting up and acting out a play (Aka-yoğlu & Seferoğlu, 2019; Liang, 2012), organizing a university campus tour (Peterson, 2012), leading a city tour (J. Chen, 2016), supervising a business of a retail store (Ibrahim, 2019), making decorations for the house (Berns et al., 2013), or steering the spaceship clear of obstacles (Berry, 2019).

To be more specific, also underpinned by the nature of a real-life simulation game, the game in the study of Lin (2015) asks learners to be in charge of sustaining the prosperity of the island via trading the produce they grow and harvest. This game type was also investigated in studies of Franciosi et al. (2016) and Franciosi (2017); while the former lets the gamers take the roles of members in a farming family to make different “decisions regarding the purchase of crop seed, tools, livestock, farm facilities, and local infrastructure” (Franciosi et al., 2016, p. 364) in order to maximize the profit for the family’s farm, the latter requires the learners to explore different multiple energy generation technologies before finalizing the optimal approach for incorporation in the construction of the new city, given the condition that the environmental issues are pressing and the city budget is declining. Likewise, DeHaan's (2005) game takes baseball match as its context in which learners learn about gaming techniques, follow the guidance of the fictional trainer and fulfill the assigned role. Differently, in their study, Hitosugi et al. (2014) explored the game in which learners undertake the role of an agent of the United Nation to complete six missions in the campaign against world hunger.

### 3.8.2 *Massively Multiplayer Online Role-playing Game (MMORPG)*

This game is known as an online fantasy-based gaming platform where participants impersonate imaginary characters appearing in the forms of customized avatars and make attempts to boost the ranks/power levels of these characters by means of garnering gaming experiences and abilities through fulfilling assigned individual missions, winning team combats, and gathering hidden tokens or treasures.

For instance, in studies of Newgarden and Zheng (2016), Zheng et al. (2015), and Thorne et al. (2012), the scholars observed the participants playing different sessions of World of Warcraft which require the participants to complete their individual game quests by killing orcs, trolls or monsters and cooperate with their guild members to conquer the enemy teams in league battle. Correspondingly, Reinders and Wattana (2014, 2015) conducted their research with learners playing Ragnarok, in which players take the roles of Norse-mythology-based characters that are ranked into different cults to fight in the arena combat to upgrade the character avatars’ attribute status.

### 3.8.3 *Adventure Game*

Adventure games are characterized as offline or online single-player games that have players embark on pre-planned journey to explore the narrative; different parts of the story will unfold as players complete the game missions, decode the puzzles, and beat the challenges.

H. Chen & Huang (2010) adopted two offline adventure games, named Sid Meier’s Pirates and Sam & Max, in their study. With Sid Meier’s Pirates, learner takes up the role of Sid Meier, who is the son of an enslaved family, to solve problems to release the captivated family members and to avenge against the cruel slave owner, while in Sam & Max, players are allowed to opt for either the role of Max (a rabbit) or Sam (a dog) in order to uncover the mysterious crime by traversing to various gaming stations, fighting against criminals and solving puzzles.

H. Chen and Yang (2013, 2011) indicated their interest in the game called Bone. In this game, players are expected to be in the role of a third person to assist a character named Fone Bone to escape the mysterious valley. Likewise, Vandercruysse (2013) conducted his research with the online adventure game, Divine Divinity. Participants are taken on a challenging journey to seek for the help of seven divine saviors in order to save Rivellon Kingdom from being succumbed to the invasion of evils.

Quite different from the aforementioned games which involve animated characters, Her Story, an offline adventure game adopted in the study of Lee (2019), features real people acting in a fiction-based non-linear storyline. To accomplish the game mission, which is to reveal the answer to the mysterious case of a missing man, a player, in the role of an investigator, has to shift through a disorganized collection of video clips recording police interrogating the suspects, and analyze the analysis based on the clues they have in order to unveil the mystery about the case.

### 3.8.4 *Tutorial Game*

This type of game is mainly designed to target specific objectives of L2 teaching and learning. This game features unsophisticated design, basic visual effects and some fundamental elements of entertainment games (e.g., rules, competition, and reward).

In the research of Müller et al. (2018), participants used *Idiomatico*, which is developed by a member of the research team, to learn English idioms through watching short animated clips, doing some small games (e.g., puzzles, hidden picture, popping words balloon, whacking the word moles) and completing trivia quiz.

Sharing the same interest in this type of game, Castillo-Cuesta (2020) establishes her study with the incorporation of the series of games developed via the platform of *Educaplay*; the games take the forms of “cloze activities, crossword puzzles, matching tasks, and unscramble sentences, which combined text, images, and audio” (Castillo-Cuesta, 2020, p. 121) and are played individually to help players learn different aspects of L2.

#### 3.8.5 *Augmented Reality Game*

Augmented Reality Game refers to the mobile game that “allows users to interact with synthetic objects, people, and settings that have been overlaid onto real-world environments, augmenting their experiences in these environments with computer-generated imagery and sounds” (Das et al., 2017, p. 1). This is illustrated by the game adopted in the study of Taskiran (2019). In the game, following the instruction given in the game, learners walk around the classroom, and utilize their smartphones to scan different sections of the room (e.g., on the walls, under the teacher’s table) for virtual treasures to complete the mission or for missing messages hidden in virtual space so as to decode the puzzles.

#### 3.8.6 *Action Game*

The last type of game identified in this review is Action Game. Although this game is quite similar to Adventure Game and Massively Multiplayer Online Role-playing Game (MMORPG), this game is distinctive from the two on the ground that it is run offline on computer’s operation system, played by individual gamer, featuring no storyline but involving a lot of actions such as platforming (jumping/running), hiding, shooting, fighting, and bombing.

In the study of Parsayi and Soyoof (2018), participants in a role of an assassin receive briefings from the “Agency” in order to know what they should do to complete the missions. For each mission, the player not only makes decisions about the weapon types, the clothes and some special equipment, but also determines the tricks that will be committed by the character (such as disguising, concealing, fuming, and distracting) so that he/she can accomplish the mission. The game is not based on any narrative, but the missions of the game are delivered in sequence from easy levels to harder ones. Each mission is timed and is considered as accomplished when the targets are killed. If player fails to achieve the mission, he/she has to repeat until completion.

### 3.9 *Effects of the application of digital games on L2 learning process and L2 learning outcomes*

#### 3.9.1 *Affordances supporting L2 learning*

Digital games can be considered as useful tools for L2 learning thanks to its affordances for L2 learning identified in the surveyed studies. Four prominent affordances are ascertained, viz. contextualized linguistic multimodal representation, interaction-and-collaboration-featuring design, interactivity, sheltered low-anxiety communication sphere.

Firstly, digital games provide rich contextualized L2 input which is multi-modally presented through the fusion of textual visual, aural and graphic cues. As in the study of DeHaan (2005), the learner was found to have himself familiarized with a variety of Kanji expressions used in baseball game which were repeatedly given in the instructions of the coach and an umpire as well as statistics report after each game in order to adjust his move. Likewise, driven by the aim of accomplishing the game missions, learners in studies of H. Chen and Huang (2010) and H. Chen and Yang (2013) were demonstrated to pay close attention to the message given in the authentic target language by the virtual characters in order to make immediate game-bound decisions. Besides, Newgarden and Zheng (2016), relying on data collected from recording the gaming session, agreed that gamers not only get in contact with the target language from the game contents, but also pick up new expressions generated by native-speaker co-players. Moreover, Zheng et al. (2015) also discovered that apart from the concrete words being presented abundantly in the game environment, abstract terms were interactively illustrated as “context and action are experienced before abstract words”. Similarly, Ibrahim’s (2019) finding highlights that the confluence of multimodal cues abundant in the virtual sphere acts as “meaning-making resources to determine the meaning of unfamiliar in-game discourse” (Zheng et al., 2015, p. 348). Thorne et al. (2012) took a step further to discern linguistic complexity featured in the digital game against different measures, namely “Readability Coleman-Liau Index (CLI), Lexical Sophistication (LS), Mean Segmental Type-Token Ratio (MSTTR), Developmental-Level scale (D-Level)” (Thorne et al., 2012, p. 288),

concluding that the target language featured in the game is highly sophisticated and diversified in terms of lexicons, moderately complex in terms of grammar and syntax, and "with direct and event-driven use-value to players" (Thorne et al., 2012, p. 298) in respect of pragmatic functions.

Secondly, the games, especially Multi-player Simulation Game and MMORPG, are designed as a platform that facilitates L2 interaction, collaborative learning and communication. The design of the two-game types require player to take up roles, form teams and carry out co-action to accomplish the common goal; this creates the condition in which learners of different gaming levels as well as diverse language proficiency team up, maintain interactions, suggest guidance and tips, offer explanation or interpretation of in-game L2-based discourse (J. Chen, 2016; Ibrahim, 2019; Liang, 2012; Newgarden & Zheng, 2016). Peterson (2012) also found that problems occurring in the game usher in "other-initiated correction, where a peer would take the lead in assisting their partner in correcting an erroneous utterance by providing feedback" (Peterson, 2012, p. 29). Going beyond confirming finding of Peterson (2012), Zheng et al.'s (2015) findings indicate that the learner actively relies on "his co-player to better understand meaning and form than would have been possible in a textbook" (Zheng et al., 2015, p. 786). As the interaction and collaboration are increased, negotiation of meaning is proportionally promoted. This is supported by Akayoğlu and Seferoğlu's (2019) finding which shows that learners employ different negotiation of meaning functions such as meaning affirmation, request modification, and understanding check to sustain the peer-to-peer communication.

Thirdly, the game system interactivity allows learners to have a sense of agency. In Simulation Game featured in studies of Liang (2012), learners are granted the right to choose the plot they want to act out, the way they assign the tasks among themselves, as well as the way they stage the play for the end projects. Instead of being forced to learn the planned lessons with specific target linguistic items, learners have autonomy over their decisions regarding what language items they deem as relevant and necessary for maintaining their gaming experiences, and what approach they consider as appropriate to discern meanings for the unfamiliar lexical items (Zheng et al., 2015). Besides, DeHaan (2005) also found that the learner in his study can exert his control over the pace of written language presented in the game instructions and feedback in order to ensure his understanding of the given contents. Ibrahim (2019) also agrees that the ability to adjust game pace and to navigate the game content in a non-sequential manner allows learners the opportunity to "explore the game world and take their time examining and analyzing in-game discourse and focus on personally meaningful FL learning outcomes" (Ibrahim, 2019, p. 349).

Fourthly, digital games pose as a safe low-anxiety environment for L2 learning. Peterson's (2012) finding demonstrates that learners get engaged in a constructive discourse in which they make use of small talk, politeness appropriator and humor-generating linguistic play and code-switching in order to maintain the positive learning environment, and thus the learners believe that they can practice the target language in a natural manner without worrying about being judged by teacher. Reinders and Wattana (2014, 2015) came up with a similar finding; through the analysis of data obtained from the questionnaire measuring Willingness to Communicate and Foreign Language Anxiety levels, Reinders and Wattana (2014) deduced that learning L2 through the implementation of digital game can reduce the apprehension toward L2 use. This finding is also confirmed in their subsequent study (Reinders & Wattana, 2015) when the informants make it explicit that the anonymity constituted by the avatar representation can make them feel comfortable with their L2 practice thanks to the absence of emotional tension derived from face-to-face communication. In line with findings from previous studies, Newgarden and Zheng's (2016) investigation reveals that avatar embodiment combined with meaningful game tasks featuring collaboration afford learners of low level of L2 proficiency chances to experiment with their L2.

### *3.9.2 Effects on L2 learning outcomes*

Aside from the affordances for L2 learning, the incorporation of digital games in L2 learning is shown to constitute the positive L2 learning outcomes in terms of acquisition and development of lexical aspect (Castillo-Cuesta, 2020; H. Chen & Yang, 2013; DeHaan, 2005; Franciosi, 2017; Franciosi et al., 2016; Hitosugi et al., 2014; Lin, 2015; Müller et al., 2018; Neville et al., 2009; Vandercruysse et al., 2013), grammar-syntactic dimension (Castillo-Cuesta, 2020), L2 skills (Berry, 2019; DeHaan, 2005; Lee, 2019; Neville et al., 2009), and communicative competence (Berns et al., 2013; Peterson, 2012).

In regard to the association between DGBLL and L2 vocabulary acquisition and development, results from several studies point out that learning with digital games is conducive to expanding lexical knowledge, sustaining vocabulary retention, and enhancing lexical transferability. To begin with, DeHaan (2005), via data obtained from pre-test and post-test in his single case study, stated that learning L2 with digital games helps the learner expand his lexical resource. H. Chen and Yang's (2013) finding is in accordance with DeHaan's (2005), but adds that note-taking while playing game makes no difference in vocabulary uptake. In the same vein, in their study concerning the incorporation of tutorial game in learning English idioms, based on the statistical data, Müller et al. (2018) concluded that digital game is effective in developing learners' knowledge of English idioms. Informed of the results from the previous studies, Franciosi (2017) inched forward to explore how digital game-based language learning affects the transferability of L2 vocabulary acquisition into L2 production. Thanks to the triangulation of data from pre-test, post-test and post-treatment writings, Franciosi (2017) contended that the dynamic interaction between learners and relevant contextualized input coupled with positive emotion mounted through engagement with the game contents can reinforce the registration of form-meaning interconnection in long-term memory, and this renders the words instantaneously available for retrieval in the process of L2 production. Congruent with the finding of Franciosi (2017), Castillo-Cuesta's (2020) affirms that the incorporation of digital game is facilitative not only to the acquisition of topic-specific vocabulary but also to the transfer of the acquired lexical items into production.

To further solidify the value of digital games for L2 vocabulary acquisition and development, findings from studies of Franciosi et al. (2016), Hitosugi et al. (2014), and Neville et al. (2009) highlight long-termed retention of L2 vocabulary sustained by the implementation of digital game-based L2 learning. Neville et al. (2009) compared the results of delayed vocabulary tests and concluded that learning through playing digital games helps learners remember L2 vocabulary longer than learning with print-based materials. Likewise, Hitosugi et al. (2014) confirm that the retention rate of new words obtained via committing to goal-oriented tasks in simulation game is significantly higher than that of new lexical items picked up in completing coursebook activities. Similarly, Franciosi et al. (2016) noticed that regardless of no significant difference in vocabulary gain between treatment group (learning L2 with the combination of simulation game and online vocabulary app) and control group (learning only with online vocabulary app), the former group's performance on the delayed post-tests was significantly better than the latter's.

Instead of considering the effect of digital games in their entirety on L2 vocabulary retention, studies of Lin (2015) and Vandercruysse et al. (2013) focus on the effect of specific design feature of the games. Vandercruysse et al. (2013), expecting to discern the effect of competition element featured in digital game on L2 vocabulary learning, pointed out that playing game increases the uptake of L2 vocabulary but competition attribute is not associated with the gain in L2 vocabulary knowledge. In another respect, Lin's (2015) findings reflect that the interactivity afforded by the simulation gives rise to L2 vocabulary recall, but highlight that the interactivity element can result in high cognitive load among learners of low L2 proficiency, and thereby interfering the rate of vocabulary learning.

In contrast with the positive effect digital game-based language learning has on L2 vocabulary acquisition and development, the relationship between digital game-based language learning and the development of other L2 aspects among the L2 university-level learners is far from conclusive, as a dearth of the studies were conducted to shed light on this matter.

Concerning L2 grammar acquisition, only one study of Castillo-Cuesta (2020), which features the language learning-focused tutorial game, makes it evident that learning L2 with digital game is conducive to the acquisition of grammatical aspects pertaining to modality and non-finite clauses.

As for listening skill, DeHaan (2005) put forth that listening to L2 input presented in virtual character's speech increases L2 listening comprehension of the learner, while Berry's (2019) study points out the positive relationship between digital game-based language learning and L2 listening performance.

In the respect of L2 reading skill, Neville et al.'s (2009) finding indicates that students playing the game scored higher than their peers learning with paper-based materials in reading cloze and reading comprehension tests, yet such discrepancy between two groups is not statistically significant.

Regarding L2 writing skill, Lee (2019) pointed out that the structuration of L2 writing instruction around adventure digital game is an effective way to induce learners' creativity and to improve L2 writing performance in terms of complexity and accuracy.

Lastly, in the matter of communicative competence, Peterson (2012) acknowledged that goal-oriented peer interactions pave way for the uptick in learners producing “utterances designed to signal interest, and the extensive use of positive politeness” (Peterson, 2012, p. 20) with the aim to sustain communal atmosphere, mutual understanding and constructive communication for the accomplishment of the game task. In line with that, Berns et al. (2013) discovered that interactions promoted in the game is linked with the decrease in L1 use, and the increase in L2 turn-takings as well as employment of utterances carrying diverse discourse functions, specifically, “greetings, feedback, clarification requests, confirmation checks, paraphrasing, self-correction, wh-question and exclamations” (Berns et al., 2013, p. 25) to avoid communication breakdown.

### *3.9.3 Effects on affective aspects of L2 learning*

Furthermore, a small group of the surveyed studies are concerned with the effect of digital game-based learning on L2 learning’s affective dimension, and statistical evidence reported in those studies corroborates the proposition that the incorporation of digital games in L2 learning increases motivation, willingness to communicate, and interest.

Reinders and Wattana (2014), in their investigation into the impact of playing MMORPG on willingness to communicate in L2 among 30 Thai university students, found that there is a similar upward trend in level of willingness to communicate in L2, and communicative confidence. Meanwhile, Vandercruysse et al. (2013), based on survey data, suggested that level of the increase in motivation toward L2 learning is attributed to engaging contents featured in the game as well as competition element. Driven by the similar aim, Taskiran (2019) adapted Motivation Inventory to measure the level of motivation of learners before and after the implementation of augmented reality game in classroom setting. Results indicate that post-intervention motivation level significantly increases with two subscales measuring interest level and learning value being registered as of high level. Although having different focus, Lee (2019) arrived at a similar finding. By relying on data collected from the pre and post questionnaire, the researcher discovered that after learning with adventure game, learners exhibit higher level of learning interest and intrinsic motivation.

### *3.10 Learners’ perceptions and attitudes toward digital game-based language learning*

Among 27 studies, 15 studies explore learners’ perception and attitude. The preponderant pattern observed across these studies is the positive opinion toward digital game-based language learning. On the one hand, the majority of learners indicate their preference for digital game-based second language learning as they deem the approach as enriching L2 learning experience thanks to the provision of (1) interesting/inspiring contents (H. Chen & Yang, 2013, 2011; Hitosugi et al., 2014; Ibrahim, 2019; Lee, 2019; Müller et al., 2018), (2) multimedia contents (Castillo-Cuesta, 2020; H. Chen & Huang, 2010; H. Chen & Yang, 2013; Ibrahim, 2019; Parsayi & Soyooof, 2018; Peterson, 2012; Reinders & Wattana, 2015; Taskiran, 2019), (3) con-textualized L2 input (H. Chen & Huang, 2010; H. Chen & Yang, 2013, 2011; J. Chen, 2016; Ibrahim, 2019; Parsayi & Soyooof, 2018; Reinders & Wattana, 2015), (4) meaningful/challenging tasks (H. Chen & Huang, 2010; H. Chen & Yang, 2013, 2011; J. Chen, 2016; Müller et al., 2018; Parsayi & Soyooof, 2018; Peterson, 2012; Reinders & Wattana, 2015; Taskiran, 2019), (5) meaningful communicative interaction (Bolliger et al., 2015; Peterson, 2012; Reinders & Wattana, 2015), (6) immediate feedback (Bolliger et al., 2015; Castillo-Cuesta, 2020; H. Chen & Huang, 2010), (7) identity anonymity (Reinders & Wattana, 2015), (8) cultural immersion (J. Chen, 2016).

On the other hand, a large proportion of learners in the studies believe that digital game-based language learning is effective in improving (1) acquisition of L2 grammatical aspect (Castillo-Cuesta, 2020), (2) acquisition of L2 vocabulary (Castillo-Cuesta, 2020; H. Chen & Yang, 2011; Hitosugi et al., 2014; Parsayi & Soyooof, 2018), (3) L2 skills (Berry, 2019; Castillo-Cuesta, 2020; H. Chen & Huang, 2010; H. Chen & Yang, 2011; J. Chen, 2016; Vandercruysse et al., 2013), (4) motivation toward L2 learning (H. Chen & Huang, 2010; Lee, 2019; Taskiran, 2019), (5) confidence in L2 communication (J. Chen, 2016; Reinders & Wattana, 2015), (6) willingness to communicate in L2 (Reinders & Wattana, 2015), and (7) communicative competence (Peterson, 2012).

Apart from the favorable attitude, an array of concerns pertaining to the implementation of digital games in L2 learning are also expressed by a few learners in 16 studies. First, unfamiliarity with gaming platform or game’s design specifications is believed to result in (1) apprehension toward L2 learning (Neville et al., 2009), (2) increased level of L2 speaking anxiety, and (3) big learning curve which impedes learning engagement, and consequently compromising the willingness to communicate with others in the target language (Reinders & Wattana, 2015). Second, the absence of clear learning goal is deemed as giving rise to the

feeling of uncertainty (H. Chen & Huang, 2010) and distraction from L2 learning (H. Chen & Yang, 2011). Third, being stuck in difficult game tasks are stated to waste learning time (H. Chen & Yang, 2013). Fourth, learning through playing games only is alleged to be insufficient to enhance L2 performance and L2 grammatical knowledge (H. Chen & Yang, 2011). Fifth, learners of low language proficiency find it challenging to discern the contents presented in the single-player adventure game (H. Chen & Yang, 2013). Sixth, L2 learning compounded with playing game is posited as multitasking which is directly linked to cognitive overload (Hitosugi et al., 2014). Seventh, the lack of face-to-face communication with paralinguistic cues is perceived to cause misunderstanding (J. Chen, 2016; Reinders & Wattana, 2015). Eighth, complicated interface design is supposed to limit L2 learning experience (H. Chen & Yang, 2011). Ninth, the visual effects and graphic design of tutorial games are unappealing to experienced gamers (Müller et al., 2018). Tenth, the absence of collaboration in single-player simulation game is opined to undermine the importance of peer feedback (Ibrahim, 2019). Eleventh, some constraints in the game designs (e.g., unavailability of built-in dictionary, lack of control over subtitle, virtual character's speech, message display) coupled with technical issues (e.g., internet connectivity, outdated hardware, software in-compatibility) are considered as disruptive to L2 learning process (H. Chen & Huang, 2010; J. Chen, 2016).

## 4. Future research and implication

### 4.1 Recommendation for further research

In terms of recommendations for further research, there are several issues future research should address. Considering (1) that nine studies in this review make no mention to the underlying theoretical framework, and (2) that a large proportion of research into digital game-based language learning is structured on separate theories clustering into four main groups (social-cultural approach, interaction hypothesis, input hypothesis, affective filter hypothesis), further research needs to adapt the confluence of the different theories or other emerging theories (e.g., Cognitive Theory of Multimedia Learning, Complexity Theory, or Extramural English Learning) as its theoretical framework in order to have a more comprehensive consideration of arrays of relevant factors that morph the complexity of digital game-based second language learning.

Besides, as can be seen that the two prominent approaches to digital game-based language learning research are quasi-experimental and case study, further investigations are better to strike a balance between quantitative and qualitative paradigm in order to ensure the generalizability of the results as well as an in-depth understanding of the phenomenon. In accordance with that, sampling methods and sample size should be of great consideration given the majority of the surveyed studies adopting convenience or purposeful sampling and a small size of participants. Therewithal, the employment of a combination of research tools are recommended, but such instruments should be further standardized and validated to ensure the rigor of the research. Additionally, given the length of most studies included in this review being less than three months, the absence of longitudinal research should be put into account. Moreover, as it is noticed that beginner-level and advanced-level groups are underrepresented in the reviewed studies, what potential digital game-based second language learning holds for these particular groups should be explored in future studies.

For digital games exist in various shapes and forms, rather than investigating the effect of each single type of game as a separate novel entity on L2 learning and L2 acquisition and development, future research should be established to shed light on what specific design feature of the games is associated with what particular effect on L2 learning and development. Furthermore, taking into account that a large proportion of studies reported the effects of digital game-based language learning on vocabulary acquisition and development while just a scant number of studies attempted to establish the relationship between digital game-based language learning with the development of other L2 aspects (e.g., L2 grammar, L2 skills, communicative competence), future research should bridge this gap. Lastly, teachers' cognition and the manifestation of actual classroom practice regarding digital game-based language learning are suggested to be the focal point of future empirical endeavors.

### 4.2 Pedagogical implication

Informed of the promising effects of digital games on L2 learning and L2 development, digital games should be further promoted in the field of second language education. As there are different types of digital games featured in this review, stakeholders (specifically teachers, educational program designers, and material developers) are advised to rely on Becker's

(2017), Clark et al.'s (2016) and Reinders's (2017) good game criteria, which can be listed as (1) rule-bound, (2) goal-oriented, (3) outcome-driven, (4) feedback-providing, (5) challenge-featuring, (6) interaction-conditioning, and (7) narrative-based, to choose the appropriate games which can accommodate both learners' needs and the requirements of educational programs.

Based on the findings, teachers can employ Multi-player Simulation Game, MMORPG, and Adventure Game as extra material, home assignment, classroom-bound learning tasks to help learners have chances to get ample exposure to contextualized authentic input, participate in interactive communication, and improve L2 competence. Likewise, DGBLL can be combined with other teaching methods (e.g., Task-based Language Teaching, Project-based Language Teaching or CLIL) in order to enrich learning experience of learners and thereby maximize the likelihood of L2 development. The ecology of digital games can also be tapped into to construct the language learning community in which learners can learn the target language meaningfully through being actively involved in the discourse revolving around digital games (e.g., writing game review, imparting gaming strategies, sharing gaming experiences, live-streaming game walkthrough).

Taking one step further, language educators, curriculum designers and ELT material developers can join hands to mobilize resources for building a gaming platform which incorporates both commercial games' design features and language learning objectives.

One significant caveat is that digital game-based language learning is not a magic bullet to resolve all problems confronting all L2 learners. Therefore, in all cases, teachers are required to listen attentively to students' voices in order to make an informed decision for their teaching practice.

## 5. Conclusions

Being cognizant of the under-representation of digital game-based language learning in higher education, the author conducted this study in the form of a systematic review to explore the current development of research regarding digital game-based language learning in other similar contexts. Driven by such an overarching aim, with key terms identified and three guiding research questions formed, 27 primary research reports were selected. Through the analysis process, different findings were obtained as the answers to the proposed research questions.

The abstracting process has discerned patterns regarding the underpinning theoretical frameworks and research designs of the selected studies. As for the theoretical foundation, Interaction Hypothesis, Social-cultural Approach, Input Hypothesis, Ecological Psychological Theory, Affective Filter Hypothesis, or Connectivity were identified as theoretical frameworks. Concerning the research design, details pertaining to the research method, data collection tool, research participant, and sampling technique have also been obtained. Firstly, the studies fall into three research paradigms, namely quantitative approach, qualitative approach, and mixed-methods approach, with the two prominent study designs being quasi-experimental and case study. Secondly, ten research instruments were identified, specifically, (a) questionnaire, (b) language-specific tests with stated rubrics, (c) interview, (d) transcribed chat log, (e) in-game video recording, (f) observation, (g) learner's written report, (h) journal writing, (i) field-notes, (j) think-out-loud protocol, and (k) built-in gaming statistic report; it can also be witnessed that there has been a growing trend in the number of empirical studies utilizing the combination of research tools for data triangulation. Lastly, a large proportion of the surveyed studies had small sample sizes, which were selected mainly on the basis of convenience technique and purposeful sampling technique, while 13 studies focused on intermediate and upper-intermediate level students, elementary and advanced groups were underrepresented in the surveyed studies.

Based on the synthesis and analysis of results from 27 studies, three big themes have taken shape. Regarding the game types and design specifications, the digital games investigated by the studies are classified into two main genres (i.e., Commercial-Off-The-Shelf and Serious Educational Digital Games) and 6 subcategories (i.e., Real-life Simulation Game, Massively Multiplayer Online Role-playing Game - MMORPG, Tutorial Game, Adventure Game, Augmented Reality Game, and Action Game) with their distinctive design features (e.g., multiple/single players, real-world replication, fantasy, avatar representation, narrative-based contents, blending of a virtual sphere and real world).

Concerning the impact of digital game-based second language learning, four affordances inherent in the game designs (i.e., contextualized linguistic multimodal representation, inter-

action-and-collaboration-featuring design, interactivity, sheltered low-anxiety communication sphere) are reported to facilitate L2 learning process; besides, it is evident that digital game-based second language learning is effective in enhancing L2 vocabulary knowledge, yet the positive association between learning through playing digital games and the improvement in other aspects of L2 acquisition (i.e., L2 grammar competence, L2 skills and communicative competence) should be interpreted with caution; additionally, digital game-based second language learning is conducive to increasing L2 learners' motivation, willingness to communicate in L2 and interest in L2 learning.

In respect of learners' perception about digital game-based language learning, while the majority of learners are shown to consider the approach as favorable and to attribute the improvement in L2 ability to digital game-based second language learning, the minority of learners cast doubt on the true value of the learning approach.

Considering the aforementioned findings, from the pedagogical perspective, it can be deduced that commercial digital games as beneficial tools should be exploited to foster L2 learning and L2 development of tertiary-level learners. From a theoretical stance, the field of research into digital game-based language learning is still in its developmental stage with many issues remaining unexplored, and thus what other potentials digital games hold for L2 learning and teaching should be comprehensively addressed by future research so that further insight into the approach can be obtained.

Even though different measures were applied to ensure the rigor of this review study, there still remain some limitations that need to be pinpointed. To begin, there was no independent coder to validate the coding process and thus some bias in terms of the classification of information was inevitable. Next, the manual process of abstracting, summarizing and synthesizing may result in the possibility that some information can be overlooked. Lastly, a small proportion of studies selected for review adopted a quantitative design while featuring a divergence of research foci, and this proved impossible for a meta-analysis study to be carried out.

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