Chapter 2

A Critical Review of Research on Gamification and Second Language Acquisition

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Introduction

The use of digital games in education has become increasingly popular over the last decade as a means of fostering learner motivation and engagement (Johnson et al. 2014). Moreover, a growing amount of research has been undertaken on games and game principles in second language learning in particular where they have become an increasingly integral part of the language learning process since the advent of more communicative approaches. This chapter provides a critical review of the research on games during the period 2014 to 2020 to examine the current state of work on gamification, games design and second language learning (L2 learning). To do this it investigates the theoretical perspectives that inform current research in the field; discusses gaming as a motivational tool in L2 Learning; identifies the affordances and challenges of gaming in general and in 3D Virtual Learning Environments for L2 learning and teaching in particular; and explores the limitations of existing research.

Background

It is important to identify at the outset that frequently used categories and concepts in the field of game-based learning are not always clearly defined or used consistently. Several authors, for example, use the terms gamification and game-based learning synonymously to describe the same concept (Epper, Derryberry, and Jackson 2012; Callaghan et al. 2013). The most frequently occurring terms in the research include game-inspired design, gamification, game-based learning, serious games, and simulations, and it is important at the outset to distinguish between them:

1. Game-inspired design focuses on the use of ideas and dynamics to better support learning and intrinsic motivation (Kiryakova, Angelova, and Yordanova 2014);

2. The term 'gamification' was coined initially by Pelling (2011) and is associated with the use of points, levels, leaderboards and badges (Hamari, Koivisto, and Sarsa 2014; Seaborn and Fels 2015);

3. Game-based learning (GBL) focuses on the use of digital or non-digital games in the classroom to enhance the learning and teaching experience (Van Eck 2006);

4. Serious games aim to use gaming technologies for educational and training purposes (Kiryakova, Angelova, and Yordanova 2014);

5. Simulations focus on user training in a simulated real-world setting but do not always have rules or require competition between participants (Wiggins 2016);

Research suggests that integrating game mechanics into the classroom may increase students' intrinsic motivation to learn as well as their engagement and learning outcomes (Clark et al. 2011; McGonigal 2011; Hanus and Fox 2015). A gamified curriculum offers students the possibility to obtain a visual display of their progress while having the freedom to explore multiple identities and experiences and to fail without the fear of penalty when learning (Klopfer, Osterweil, and Salen 2009; Lee and Hamer 2011; Kapp, 2012).

Games have been researched across all levels of education but most emphasis has been placed on the primary and secondary education contexts to date (Lim and Ong 2012; Dib and Adamo-Villani 2013; Su and Cheng 2015; Wiggins 2016). In these contexts, as in further and higher education, however, several barriers have been identified, including lack of support for teachers willing to integrate games into the curriculum, the logistics of game-school integration (Klopfer, Osterweil, and Salen 2009) and, as Lee and Hammer (2011: 4) pointed out, the challenge of a gamified curriculum that 'might absorb resources, or teach students that they should learn only when provided with external rewards'. It is therefore crucial to

understand the foundation of games design in order to effectively integrate games into second language curricula.

Since the end of the last century, second language acquisition has experienced an important shift, moving from a cognitive orientation to a more social one, from closed classroom settings to more open and naturalistic ones, and from L2 learning to L2 use (Firth and Wagner 1997; Block 2003; Johnson 2008). Within computer-assisted language learning (CALL) and second language acquisition (SLA) contexts, gamification has been the subject of extensive research as it potentially offers opportunities for L2 learners and teachers to enhance their language learning/teaching and, at the same time, acquire and foster their digital literacy skills. Gamification offers L2 learners the opportunity to interact among peers as implied by a social game. In addition, motivation may increase in gamified instructional environments where learner performance is recognized by a reward system (Buckingham 2014). When gaming badges are implemented in SLA, for example, they serve not only as a motivational tool for students who can be involved in more competitive tasks but also as a type of formative assessment (Glover 2013; Flores 2015). In this sense, L2 teachers have the flexibility to plan the language learning experience and related tasks while rethinking their practices in accordance with the similarities they may find in games and learning.

Methodology

In a review of the literature on gamification, Caponetto, Earp and Ott (2014) focused on the period 2011-2013, demonstrating how the number of works published in the field grew exponentially from 206 in 2011 to 1,620 in 2013. Koivisto and Hamari (2014) confirmed this trend with their analysis of search hits for gamification which showed a fivefold increase over the same period. Moreover, de Sousa Borges et al. (2014) conducted a systematic mapping process to provide an overview on gamification by analysing 357 papers on the subject. Recently, Ofosu-Ampong (2020) examined gamification literature since 2011, identifying and

analyzing 32 published papers. The review presented here aims to continue these investigations by researching the number of studies on gamification, education and language learning during the period 2014 to 2020.

Searches for the terms *gamification and education* were conducted and visualized (see Figure 2.1) and confirmed the trend already suggested by the studies above of a constantly increasing interest in the subject over the last five years. Based on searches involving the following keywords (game design, gamification, games, education, motivation, learning, language learning, language teaching and language education) with the databases Google Scholar, ERIC (Cambridge Scientific Abstracts), JSTOR Education, SAGE Full-Text Collection, SCOPUS and Web of Science, relevant books, chapters and articles were selected.

Figure 2.1: 'Number of scientific works published annually (from 2014 to 8 months into 2020)'

[Insert Figure 2.1 here]

For this study the works were organized in several tables and analysed accordingly: the distribution of empirical research in books and related chapters (Table 2.1); empirical research in journals (Table 2.2); non-empirical research (Table 2.3); reports and funded projects (Table 2.4); and dissertation studies (Table 2.5).

[Insert Tables 2.1-2.5 here]

Table 2.1. Empirical Research in Books and Related Chapters

No.	Book	No. of Chapters	Item(s)
1	Shernoff and Czikszentmihalyi (2014)	1	Crisp (2014)
2	Werbach and Hunter (2015)		
3	Kapp (2016)		
4	Benson and Voller (2014)		

5	Chou (2015)

Table 2.2. Empirical Research in Journals

No.	Journal Title	No. of Articles	Item(s)
1	*Computers in Human Behavior*	8	Koivisto and Hamari (2014); Seaborn and Fels (2015); da Rocha Seixas, Gomes, and de Melo Filho (2016); Kuo and Chuang (2016); Hamari (2017); Landers and Armstrong (2017); Mekler et al. (2017); Sailer et al. (2017).
2	*Computers & Education*	2	Barzilai and Blau (2014); de-Marcos, Garcia-Lopez, and Garcia-Cabot (2016).
3	*Procedia. Social and Behavioral Science*	1	Martí-Parreño, Seguí-Mas, and Seguí-Mas (2016).
4	*Journal of e-Learning and Knowledge Society*	1	Galbis-Córdova, Martí-Parreño, and Currás-Pérez (2017).
5	*Research in Learning Technology*	2	Barr (2017); Young and Nichols (2017).
6	*Transaction on Learning and Technologies*	1	Ibáñez, Di-Serio, and Delgado-Kloos (2014).
7	*Proceedings*	1	Ramirez et al. (2014).
8	*Psychological Bulletin*	1	Cerasoli, Nicklin and Ford (2014).
9	*Language Learning & Technology*	2	Chik (2014); Reinhardt (2014).
10	*Interactive Learning Environments*	1	Hung, Sun, and Yu (2015).
11	*IEEE Transactions on Affective Computing*	1	Sabourin and Lester (2014).
12	*Sustainability*	1	Parra-González, López Belmonte, Segura-Robles, & Fuentes Cabrera, (2020).

Table 2.3. Non-Empirical Research

No.	Category	Item(s)
15	Conceptual Discussion	Articles: de Sousa Borges et al. (2014); Caponetto et al. (2014); Hamari (2014); Kiryakova, Angelova, and Yordanova, (2014); Dicheva et al. (2015); Erenli (2015); Flores (2015); Kim and Lee (2015); Mora et al. (2015); Muntean and Nardini, (2015); Ortiz, Chiluiza, and Valcke (2016); Majuri, Koivisto, and Hamari (2018); Subhash and Cudney (2018); Sykes (2018); Ofosu-Ampong (2020)
		Book chapters: Reinhardt and Thorne (2016).

Table 2.4. Reports and Funded Projects

No.	Reports	Funded Projects
1	Johnson et al. (2014)	Persico et al. (2017)

Table 2.5. Dissertation Studies

No.	Type of Items(s)
5	Masters Dissertation: Arabul Yayla (2015); Jackson (2016); Reeves (2016); Birsen (2017); Nordengen and Brinch (2018).
4	PhD Thesis: Martinez (2014); Fis Erumit (2016); Boendermaker (2017); Exton (2017).

Arising from the preliminary background analysis of the broader educational research, three main research questions were identified to guide the study:

1. Which aspects of gamification are dominant in the research on L2 learning and teaching?

2. In what ways is gamification used as a motivational tool for L2 learning and teaching?

3. What are the affordances and challenges of games in 3D Virtual Learning Environments for L2 learning and teaching?

Findings and Discussion

Gamification was initially coined by Pelling to refer to the application of game-like accelerated user interface design principles to make electronic transactions both enjoyable and fast (Pelling 2011). Later on, the term was applied more widely to situations where game design elements were implemented in non-game settings in order to change user behaviour. Some researchers have referred to the concept of placing a 'game layer' over everything (Priebatsch 2010), however, the majority of researchers seem to agree on the definition of gamification as the use of game elements and mechanics in non-game situations in order to support and motivate users to perform tasks (Deterding et al. 2011; Werbach and Hunter 2012; Johnson et al. 2013; Hamari, Koivisto, and Sarsa 2014; Flores 2015; Seaborn and Fels 2015). Because of its extensive use and integration in fields other than the education, as Reinhardt and Thorne (2016) suggest, various scholars and game designers have criticized gamification as a simplification of the game medium created by marketers and big business for the purpose of easy profit. However, many advocates of the term have highlighted in both their theoretical and empirical studies that gamification should not be considered as an easy addition to learning which makes it enjoyable and fun; rather it should be investigated as a core educational approach that has the potential to improve learning performance (Ibáñez, Di-Serio, and Delgado-Kloos 2014; de-Marcos, Garcia-Lopez, and Garcia-Cabot 2016; Galbis-Córdova, Martí-Parreño, and Currás-Pérez 2017; Ofosu-Ampong, 2020; Parra-González, López Belmonte, Segura-Robles, & Fuentes Cabrera 2020), to attract, motivate, engage and

retain users (Ibáñez, Di-Serio, and Delgado-Kloos 2014; da Rocha Seixas et al. 2016, Kuo and Chuang 2016; Landers and Armstrong 2017; Mekler et al. 2017) and to improve the user experience of interactive systems in terms of design (Seaborn and Fels 2015). As stated by Reinhardt and Thorne (2016: 423) 'much of the debate surrounding gamification revolves around terminology and the problematic definition of game, which is sometimes as much in the disposition of the players as in the rules that define it'.

Werbach and Hunter (2015) differentiate between three types of gamification: internal, external and behaviour-change. Internal gamification targets employees, external gamification focuses on customers' engagement, while behaviour-change gamification aims to explore habit formation. Educational gamification systems fall into this third category. Several researchers have suggested applying game mechanics and game elements, core features of gamification, to learning. De-Marcos et al. (2014), for example, have stated that using games in education has several advantages and game design mechanics have been successful in the educational field. Based on previous literature, Kim and Lee (2015) emphasized the cognitive, emotional and social benefits of game-based techniques in education. Firstly, Lee and Hammer (2011), Stott and Neustaedter (2013) and later Dicheva and Dicev (2015), identified four types of game dynamics which have proven to be successful in an educational context, namely, freedom to fail, rapid feedback, progression and storytelling. According to Kapp (2016), games can be extremely useful for providing instant feedback. One example of this is in-class teachers who provide feedback to one student at a time within contexts that are shaped by time constraints. Therefore, integrating the frequent and immediate feedback mechanisms found in game design may prove to be extremely beneficial in terms of establishing a more personalised learning approach.

Muntean (2015) suggested designing rewards that could be obtained when appropriate behaviour is observed in a gamified classroom. Furthermore, teachers usually present

information to their students by dividing it into different categories according to difficulty levels. It may be challenging sometimes to accommodate each student's needs and in this sense, as indicated by Kyriakova and Angelova (2014), games may provide difficulty progression on an individual basis, keeping players at a particular level until they have demonstrated that they are able to pass that level and progress to the next one. Armstrong and Landers (2017) indicate that creating a narrative around a specific task may enhance motivation and engagement, while other elements of game design usually applied to gamification such as leaderboards and badges, encourage competition and participation as well as offering a visual representation of progress (Hamari 2017).

Looking at future directions, Sykes (2018) proposed three ideas which new research on gamification should focus on: (1) increased access to community-based games, (2) meaningful incorporation of virtual reality, and (3) increased access to commercial games. These suggestions find their roots in a previous study by Sykes (2012) in which she highlighted five relevant features of games for language teaching and learning, each of which parallels best practices in second language teaching and learning:

1. There is a learner-directed goal orientation: tasks and goals set for learning are dynamic, learner driven, and directly related to learning objectives.

2. There are opportunities for interaction with the game, through the game, and around the game.

3. Just-in-time and individualized feedback is provided.

4. The relevant use of narrative and context is important: this means the creation of a space in which both of these features can be cultivated to create a meaningful experience.

5. Motivation is central as it is often the result of powerful learning experiences in which the players continually engage.

The positive impact of gaming in the educational sphere, as demonstrated above, has been increasingly investigated since the eighties, however, this review will focus on the potential value of gamification in relation to several important aspects for SLA: motivation, autonomy and community, game context and feedback.

Gamification as a motivational tool to engage learners

In the educational field, games are considered an important part of the development of knowledge and play a role in the engagement of students. Gamification techniques offer the possibility of incorporating games into learning situations while promoting the engagement of students. Several key studies (de Sousa Borges et al. 2014; Caponetto et al. 2014; Hamari et al. 2014; Reinhardt and Thorne 2016) have emphasized that gamification has become an area of great interest for researchers because it provides a valuable alternative to engage and motivate students during their learning process.

According to the NMC Horizon Report (Johnson et al. 2014: 42), the motivational potential of games stems from the way 'designed games can stimulate large gains in productivity and creativity among learners'. Furthermore, to support this view, Ramirez et al. (2014: 647) argue that 'gamification techniques are a critical set of design tools in an educator's toolbox'. Accordingly, the motivational aspect of games has been discussed widely in the literature and examined through the lens of different theories and approaches. Reinhardt and Thorne (2016: 426), for example, explain the concept of motivation in game design theory 'as emerging from the balance between challenge and reward or accomplishment. Game designers try to keep players engaged by providing challenges and rewards through goal and feedback systems targeted at, or just beyond, a player's level'. This status or level of engagement goes back to flow theory as proposed by Czikszentmihalyi in which a feeling of

mastery, complete engagement and intrinsic motivation is at the core of the activity (Shernoff and Czikszentmihalyi 2014). Moreover, in gamification maintaining 'flow' is a means of motivating behavioural and psychological outcomes (Koivisto and Hamari 2014).

Ryan and Deci (2000) identified two types of motivation, intrinsic and extrinsic, in their Self-Determination Theory (SDT). Intrinsic motivation refers to the pursuit of an activity because it is inherently interesting and enjoyable, while extrinsic motivation refers to doing something because it leads to a separable outcome such as receiving rewards and reducing pressure. SDT has attracted considerable research across a range of different disciplines (Ryan and Deci 2000; Denis and Jouvelot 2005; Standage et al. 2005; Ryan et al. 2006) and been shown to be a valuable theory to examine motivation in relation to games and gamification (Deterding 2011). Several recent studies have addressed the need to evaluate the impact of gamification on intrinsic and extrinsic motivation as they are some of the most frequently discussed, yet rarely empirically studied, constructs in gamification research (Hamari et al. 2014; Seaborn and Fels 2015; Mekler et al. 2017).

Luma da Rocha Seixas et al. (2016) discussed the effectiveness of gamification as a motivation and engagement tool among students in the elementary school sector. In this study, students who presented the highest levels of engagement with respect to the indicators were also those who had more badges given by the teacher and, on the contrary, those with lower levels of engagement were those with fewer badges from the teacher. Findings highlighted how the process of building gamification strategies must also be aligned with educational purposes and that both extrinsic and intrinsic motivation promote performance gains as well as increases in the quality of effort that students put into a given task as discussed in Cerasoli et al. (2014)

Games are typically considered to provide enjoyable, intrinsic motivation, and gamification tries to employ these characteristics in non-game applications. Because learners

may lack intrinsic motivation for non-game applications, extrinsic motivation, as seen in the form of rewards or other mechanisms, may be necessary to make them engage in the gamifying process.

The concepts of autonomy and community, together with related concepts such as independent learning, self-direction, cooperation and co-action, are at the core of discussions on learning in general and gamification in particular. The notion of autonomy has a strong link with motivation and was introduced into L2 motivation studies mainly by Deci and Ryan (2000) via SDT. Their work highlights the importance of 'a sense of personal autonomy' in the learning process, which they define as a feeling that learners experience when their behaviour 'is truly chosen by them rather than imposed by some external source' (2000: 70). This concept, as Benson and Voller (2014) indicate, together with the concept of independence, has grown exponentially over the last two decades, becoming mainstreamed as a key concept in educational planning. The authors also offered a definition of a learning community as 'consist[ing] of individuals who come together to accomplish a specific end or goal' (2014: 70). As indicated by Thorne et al. (2012) and Reinhardt and Sykes (2014), when applied to digital gaming and L2 learning, the concepts of autonomy and community are crucial for two specific reasons. Firstly, gamers are often in the position to make independent decisions when playing. Secondly, the use of communal resources external to the games themselves (such as dedicated blogs or social media pages) are an integral aspect to the overall experience. Gamers do in fact participate in online communities and produce game-related paratexts as a result. Therefore, as Chik (2014: 87) stated in her study, 'when digital gaming is a community-based activity, the autonomous learning involved will inevitably be community-based as well'. Chik's empirical research (2014) further discussed the concepts of autonomy and community within the digital gaming field and second language learning (L2) in East Asia. It recommended that teachers and researchers should provide precise structures

and guidance for young L2 learners on how to use digital games to enhance autonomy when learning. As a result, Chik (2014: 97) concluded that 'students can be made aware that they have the ability to turn their preferred leisure activities into learning practices, and learn how to seek help from online communities' to bolster their individual progress.

Game context and feedback provision

According to Reinhardt and Thorne (2016: 426), 'game context can be understood as the context represented by the game narratives around the rules (i.e. the context-in-the-game of abstractions), as well as the cultural and situational context of where, when, and by whom the game is played (i.e. the context-of-the-game)'. Game narratives play an essential role in enhancing cultural competence and improving participation, while enhancing different language skills. Gamers and specifically students use games to learn as they are immersed in a game context and are exposed to flow experiences (Hamari and Koivisto 2014) which may lead to positive learning outcomes (Barzilai and Blau 2014; Sabourin and Lester 2014; Hung, Sun, and Yu 2015). As a consequence, Crisp (2014) suggested that as learning and gamified curricula become more common, learner engagement and flow will improve.

Several research studies have shown how gamification has the potential to provide immediate and effective feedback (Flores 2015; Kapp 2016; Reinhardt and Thorne 2016) which is something that L2 instruction, for example, may not been able to provide easily. When it comes to game design, feedback can be offered through points, sounds and messages. As Reinhardt and Thorne (2016: 425) discussed, in game contexts feedback is 'instructional rather than punitive, and is formative rather than summative' as it is provided in a timely fashion thus giving the possibility to the players to understand the action that caused it, and may be personalized, as it takes into account the feedback already provided, while the quality and quantity of the feedback are also adjusted.

Game design and game elements

Sailer, Hense, Mandl and Klevers (2017) provided specific definitions of the terms involved in gamification, focusing first on the term 'game' itself, moving then to 'element' and finally 'design'. Game design can be described therefore as the action of adjusting all aspects related to games while deciding what a game should be (Schell 2014). Arising from this, Salen and Zimmerman (2004) provided a set of game design principles that should be considered in the designing process:

- Understanding systems and interactivity, as well as player choice, action and outcomes.

- Including a study of rule-making and rule-breaking, game experience and representation and social interaction.

- Adding and focusing on the connection between the rules of a game and the play that the rules engender, the pleasures games invoke, the meanings they construct, the ideologies they embody, and the stories they tell.

Moving on from these principles, researchers have focused on the identification of the different game elements and how they should be incorporated and organized together in order to obtain a successful overall game design (Schreiber and Brathwaite 2009; Reeves 2016). On the one hand, Brathwaite and Schreiber (2009: 112) used the term 'game design atoms' to introduce the basic elements of games, including game states, players, avatars and game bits as well as game mechanics, game dynamics, goals and themes. On the other hand, Reeves (2016) pointed out the ten components that make game design successful include other factors such as self-representations, three-dimensional environments, narrative, feedback, reputation ranks and levels, marketplaces and economies, competition within a rule-based context, teams, communication and finally time pressure.

As Mora et al. (2015) explain, after having organized and integrated game elements into game design fundamentals, what should follow is a standardized structure that brings them together into a framework. However, it is evident that game design is such a flexible process that it does not always need to fall into a precise framework (Julius and Salus 2013). Having said that, a set of conditions such as interface design pattern, dynamics, design and heuristic principles should be met in the designing process in order to have a positive playing experience. This was confirmed by Detering et al. (2011) who indicated that a global set of components is necessary in game design to reach *gamefulness*, namely, game interface design patterns, game design patterns and mechanics, game design principles and heuristics, game models and game design methods.

Game elements

Game elements are core ingredients of gamification as they are the specific components through which the agency of a game can be constructed and/or analysed. There have been several attempts to create comprehensive lists of game elements that can be applied to gamification (Zichermann and Cunningham 2011; Kapp 2012; Robinson and Bellotti 2013; Werbach and Hunter 2015; Sailer et al. 2017). Typical game elements or 'components', as described in some cases, include badges, leaderboards, progress bars, performance graphs, quests and avatars. Indeed, Kapp (2002) suggests a list where typical game elements include goals, rules, conflict, competition, cooperation, time, reward structures, feedback, levels, storytelling, curve of interest and aesthetics, whereas other authors like Robinson and Bellotti (2013) provide detailed lists of elements with their functions in various gamification settings. As indicated by Sailer et al. (2017: 30), it is important to understand that 'different authors follow distinct strategies in their attempts to create such lists. One is to create liberal sets of elements found in any game. Another strategy is to provide a constrained set of elements, which are unique to specific games'. Arising from this research, we propose the use of a

broad list of game elements for SLA teachers and researchers involved in gamification design

(see Table 2.6) with the aim of being as exhaustive as possible.

[Insert Table 2.6 here]

Table 2.6. Game Components and Related Definitions According to the Literature Analysed

Components	Definitions
Avatar	Visual representation of a player or alter ego.
Badges	Visual representations of achievements.
Boss fights	Particularly hard challenges at the culmination of a level.
Collection	Set of items or badges accumulated.
Combat	A defined battle, typically short-lived.
Content-unlocking	Elements available only when players reach objectives.
Gifting	The opportunity to share and give items to other players as a reward or as part of a specific team strategy.
Leader boards	The ranking of players based on the number of points they have been awarded.
Levels	A section or part of the game outlining the number of points a player has. As a player progresses, the levels become increasingly difficult.
Points	Numeric accumulation awarded for certain activities.
Progress bar	Shows the status of a player.
Quests	Specific tasks player have to complete in a game.
Social elements	Relationship with other players within the game.
Social Graphs	Representation of player's social network within a game.
Teams	Group of players working together to reach common goals.
Virtual goods	Items that can be purchased by performing specific tasks within a game.

Werbach and Hunter (2015) took the elements that they consider to be the most important from their own experience of game playing and provided a comprehensive description of the key elements of games organizing them into three distinct categories: dynamics, mechanics and components. Structured as a pyramid, components form the base layer, mechanics the central layer and dynamics the uppermost layer (see Figure 2.2).

Figure 2.2. **'**Categories of game elements (Werbach and Hunter 2015)'
[Insert Figure 2.2 here]

As the base of the pyramid, components provide the largest group of game elements. They are the least abstract among the three categories presented and they provide the tools that can be used to integrate gamification into a field of interest (see Table 2.6).

Mechanics refers to the basic processes that guide users to engage with the content of the game while continuing to drive the action forward. Specifically, the mechanics elements include challenges, chance, competition, cooperation, feedback, resource acquisition, reward system, transactions, turns and win states. Table 2.7 provides a list of game mechanics and related definitions based on Werbach and Hunter's work (2015).

[Insert Table 2.7 here]

Table 2.7. Game Mechanics and Related Definitions Based on Werbach and Hunter (2015)

Mechanics	Definitions
Challenges	Tasks presented that prompt the player to generate a solution.
Chance	Element(s) of possibility/randomness in a game.
Competition	Intuitive mechanic where one player (or a team) wins or loses.
Cooperation	Player(s) who works best together to achieve a specific goal within a game.

Feedback	Providing information on how a player is performing.
Resource Acquisition	Acquiring useful or collectible items as the player progresses.
Reward system	System to motivate player to accomplish a quest.
Transactions	Trades between users (they can be either direct or through an intermediary).
Turns	Sequential participation of players.
Win States	Objectives that make one player the winner. (Note that it is also possible to have 'draw' and 'loss' states).

Finally, dynamics represent the highest conceptual level involving elements in a game. There are five dynamics elements: constraints, emotions, narrative, progression and relationships and these elements must be considered and managed when developing a gamified system. Dynamics elements constitute the abstract notion of a game and when they are included in the design process, gamification occurs naturally. Table 2.8 provides a list of game dynamics and related definitions based on Werbach and Hunter's work (2015).

[Insert Table 2.8 here]

Table 2.8. Game Dynamics and Related Definitions Based on Werbach and Hunter (2015)

Dynamics	Definitions
Constraints	Limitations or trade-offs that need to be considered when designing a game.
Emotions	Feelings that drive the interaction and engagement with a game.
Narrative	Storyline characterizing a game.
Progression	Growth and development of a player navigating a game.
Relationships	Social interactions that occur when games are played.

Gamification and SLA

Having reviewed the context of gamification, the aim of the final section is to investigate the use of digital gamification for foreign language teaching and learning in 3D virtual learning environments. A detailed table is provided in Appendix 1 indicating a summary of the studies analysed on gamification and SLA in terms of, among other variables, the subject of the articles, the methodology employed, the number of participants and the target language. As Figure 2.3 indicates, the highest number of studies were published in 2018 but it is noteworthy that the number of research papers has increased from 2014 onward as has the number specifically addressing digital gamification in 3D virtual learning environments. The year 2019 is not yet complete but, based on the upward trend, it is expected that the number of studies for this year will increase.

Figure 2.3. 'Number of articles published by year (from 2014 to 8 months into 2019)'
[Insert Figure 2.3 here]

A total of 36 publications were identified as falling within the scope of our research and analysed accordingly. A list of several keywords - gamification, Second Life, 3D virtual learning environments and/or language learning, and second language acquisition - were used to identify research in the following databases: Ebsco, Google Scholar and Proquest. Figure 2.4 presents the distribution of the selected publications according to the themes they focused on.

Figure 2.4: 'Theme of the articles'
[Insert Figure 2.4 here]

According to Figure 2.4, the dominant theme was games and the learning environment (n=15) followed by gamification in general (n=6) and gamification and language learning in particular (n=7). An important theme at the core of some of the research analysed was the role of gamification and game elements in evoking a sense of emotional engagement in the player

(n=4). Figure 2.5 shows the distribution of the data collections methods used in the reviewed studies:

Figure 2.5: 'Data collection methods of the articles'
[Insert Figure 2.5 here]

Examining the research more carefully it can be seen that it mainly consisted of quantitative studies (n=14); qualitative studies and meta-analysis had the same number (n=11). It is evident that most of the quantitative research included semi-experimental studies (n=8), qualitative research included case studies (n=9) and the meta-analysis included literature reviews (n=8).

The distributions of the data collection tools used in the examined studies show that questionnaires (n=15) were the highest together with interviews and focus group discussions (n=6). Alternative tools such as concept maps, portfolios and performance tests (n=6) were also quite popular. No data collection tool was specified in twelve of the studies presented. The distributions of the reviewed studies according to the sample showed that the majority of studies were conducted at the undergraduate level. Figure 2.6 presents the distributions of the reviewed studies according to the number of participants and indicates that sample sizes smaller than 100 and larger than 30 were the preferred option (28%, n=11), and this may have been related to the use of parametric tests during data analysis.

Figure 2.6: 'Number of Participants'
[Insert Figure 2.6 here]

Finally, Figure 2.7 presents the distribution of the reviewed studies according to data analysis methods. This figure shows that no data analysis was performed in eleven of the reviewed

studies. In the other studies, quantitative analysis techniques were much more intensively employed (n=34). Among the descriptive statistics used, frequency and representations of central tendency (mean, mode, median) (n=9) were the most frequently used.

Figure 2.7: 'Data Analysis Method'
[Insert Figure 2.7 here]

3DVLEs and language learning

According to Krashen (2014) language learning requires learners to be exposed to rich, comprehensible, varied and compelling linguistic input. Learners need to exploit the foreign language in social, authentic and meaningful contexts to negotiate meaning and to produce comprehensible output. Moreover, as Ellis (2005) has argued, while grammatical competence is important, intercultural and pragmatic competences need to be employed in the learning of the target language.

Research suggests that both the nature of games and the elements that make games fun are intrinsically motivating (Adams et al. 2012). A constructivist approach to game-based learning has pointed out that the Social Play Continuum (Broadhead 2006) concurs with Vygotsky´s Zone of Proximal Development (ZPD), as Liu, Yuen and Rao (2015: 11) indicate, 'by depicting a progression of social development through play' thus providing a framework in which games can be used to develop social competence and social status. Furthermore, according to Galbis-Córdova et al. (2017), research also provides evidence that game-based learning improves competencies such as critical thinking and decision-making, problem-solving, conflict-resolution and communication skills.

In her review of digital games and language learning, Sykes (2018) concluded that studies have examined both game-enhanced learning (e.g. through the use of commercial, off-the-shelf games) and game-based learning (e.g. though the use of digital games built

explicitly for the teaching and learning of world languages) and have shown that digital games support learning in a variety of areas. Benefits include the creation of a learning community (Bryant 2006; Reinhardt and Zander 2011; Peterson 2013), the opportunity for intercultural learning (e.g. Thorne 2008), access to a diversity and complexity of written and spoken discourse (e.g. Liang 2012; Thorne, Fischer, and Lu 2012), access to authentic texts (Squire 2008; Reinhardt 2013), evidence of authentic socio-literacy practice (Steinkuehler 2007; Thorne, Black, and Sykes 2009), and affordances for the sociocognitive processes of learning and language socialization (e.g. Piirainen-Marsh and Tainio 2009; Zheng, Young, Wagner and Brewer 2009), especially of lexis (Purushotma 2005; Neville 2010; Sundqvist and Sylvén 2012; Hitosugi, Schmidt, and Hayashi 2014).

Affordances and challenges of gaming in 3DVLEs

In the game design arena, Lazzaro (2005) identified four keys to unlocking players' emotions: 1) providing opportunities for challenge, strategy, and problem-solving (hard fun); 2) introducing elements that foster mystery, intrigue and curiosity (easy fun); 3) leading players to excitement or relief moods (altered states); and 4) promoting competition and teamwork (people fun). On the other hand, LeBlanc (2000) organized the types of player pleasure into eight categories: sensation, fantasy, narrative, challenge, fellowship, discovery, expression, and submission as cited by Schell (2014). Successful game use, according to LeBlanc (2000), found ways to balance combinations of these categories effectively.

In this respect, Van Eck (2006: 4) asserts that 'games embody well-established principles and models of learning. For instance, games are effective partly because the learning takes place within a meaningful (to the game) context'. This is called situated cognition where the learner takes the environment in which the learning takes place into account. Researchers have also pointed out that play is a primary form of socialization and a

learning mechanism common to all human cultures. Games provide modelling and play strategies in learning and thus help the learners through the use of a constant cycle of hypothesis formulation, testing and revision.

On the other hand, to facilitate foreign language learning, 3DVLEs bring new opportunities to the field, as Warburton (2009: 421) indicates, in that VWs enable:

1) exposure to authentic content and culture, which could facilitate also the exposure to authentic language;

2) the use of visualization, contextualization and simulation to facilitate comprehensible and compelling input;

3) opportunities for extended and rich interactions between individuals and communities, as well as humans and objects which could help learners use the language for negotiation of meaning;

4) immersion in a 3D environment using an augmented sense of virtual presence that could enable learners to experience the language in its authentic and natural environment;

5) content production and the creation and ownership of objects in the learning environment that could help learners with the personalization of the communication and autonomy in learning the target language.

When these affordances are integrated into games, games in 3DVLEs may become an invaluable tool for language learning. However, the use of games in 3DVLEs for learning languages does not come without drawbacks. Van Eck (2006: 22) posits that the digital game-based learning (DGBL) approach is likely to be viewed as nothing more than a fad until educators can 'point to persuasive examples that show games are being used effectively in education and that educators and parents view them as they now view textbooks and other instructional media'.

It is clear then, that there are several challenges associated with games and 3DVLEs before they can be viewed as in any sense 'normalized'. Warburton (2009) and Warburton and Perez-Garcia (2010) report on a survey of newsgroups, blog posts and recent research literature and identified eight broad challenges: 1) technical, 2) identity, 3) culture, 4) collaboration, 5) time, 6) economic, 7) standards, and 8) scaffolding persistence and social discovery. *Technical issues* are either computer-related like bandwidth, hardware and firewalls or server issues such as down time and lag, or use-related issues like navigation, creating objects, and manipulating one's avatar. *Identity issues* describe how freedom to play with identity and manage reputation can become a cause for concern, and accountability for actions becomes displaced. *Culture issues* involve sets of codes, norms and etiquette for joining communities. *Collaboration issues* relate to the need to build trust and authenticity while cooperating through co-construction and because minimal social network schemes may operate within the virtual learning environments. *Time constraints* could occur by validating, running and teaching activities. Checking object permissions, intellectual property rights and accessibility also require a lot of time. *Economic issues* involve costs. Even though basic user accounts to access VWs like Second Life are typically free, anything else costs money such as buying land to build, creating teaching spaces or uploading images and textures. *Standardization* is a problem related to the lack of interoperability between various virtual platforms. *Scaffolding persistence* and *social discovery issues* such as when an avatar remains trapped at the centre of its own community and in-world profiles associated with each avatar provide a limited mechanism for the social discovery of other people, unlike other social networking services.

It is clear that 3D Virtual Worlds have gained in popularity in recent years. The use of 3DVLEs has also increased variation in online and distance education. Playing with educational content scaffolds learners to construct knowledge, enables better retention of

knowledge, creates the necessary social environment for learning, and helps in the application of that knowledge in novel situations. Thus, using educational games that are designed in 3DVLEs with learners in various levels and educational contexts is also gaining prominence.

Designing games for such 3D virtual worlds is potentially extending the possible uses of these virtual environments as well. Through educational games or game-like applications virtual worlds could be exploited much more effectively by learners and educators. Games or game-like applications that were created in 3D environments could enable learners to immerse themselves in individual or collaborative play (Thomas et al. 2018; Thomas, Schneider, and Can 2019). The contexts in which 3D games could be used varies according to the need and interest of the learners. For instance, vocabulary games or game-like scenarios involving role plays with avatars could be used for foreign language learning. Rankin et al. (2006: 33) support the idea that 'game play experiences foster learning in the virtual world as players accomplish game tasks'. Other educational games in mathematics and science have also been designed and used in 3D virtual worlds using foreign languages as the medium of instruction to take advantage of these affordances, and that is an area for future research.

Conclusion

This review has found that empirical research is still limited when it comes to analysing the effectiveness of gamification in educational and SLA settings and practices. Many empirical gamification studies focus in fact on the usefulness of specific game elements in particular learning contexts (Dicheva et al. 2015), however, the scope of the elements being explored is still limited (e.g. points, badges or levels and leaderboards), as well as the relation to specific theories (e.g. Self-Determination Theory). Further research is needed to address the most and least effective game elements and their implementation in relation to specific contexts since, as Seaborn and Fels (2015: 29) argue, 'gamification in action is defined by applying a limited number of game elements to an interactive system, future research should aim to isolate the

most promising and least promising game elements in particular contexts for particular types of end-users'.

In addition, research analysing students' attitudes towards gamification in online learning environments is still limited. As Ortiz, Chiluiza and Valcke (2016) pointed out, there is a lack of validated psychometric measurements that have been designed in accordance with rigorous research methodologies. In relation to game design, further research should be conducted to understand how gamification design elements and methods function and how they interact with individual dispositions, situational circumstances, and the features of particular target activities, as indicated also by Hamari, Koivisto and Sarsa (2014). In relation to this point, empirical research studies are needed to inform both theories and practices.

Looking at future directions in gamification and SLA, it has been proposed that new research should focus on the implications of the increased access to community-based games, the use of virtual reality and the potential of commercial games (Sykes 2018). These suggestions are in line with the features of games used for language teaching and learning that this review has highlighted, specifically the importance of interaction, engagement and motivation; the central role of context and narrative; the potential of individualized feedback; and the requirement for a learner-driven, dynamic approach.

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Appendix I Summary of the studies analysed on Gamification and SLA

No	Publication	Subject of the article	Empirical study	Non-empirical study	Methodology	Participants/ Sample	Target Language(s)
1	Lan et al. (2015)	Games and Learning Environments	Empirical		Quantitative	n=36 (undergraduate students)	Mandarin Chinese
2	Young, M.F. et al. (2012)	Games and Learning Environments		Non-empirical	Literature Review	>300 articles analysed	n/a
3	Udjaja, and Sari (2017)	Games and Learning Environments	Empirical		Qualitative	n=16 (lectures, undergraduate students and college students)	Indonesian as first language + English as FL
4	Wang and Vásquez (2012)	Web 2.0 and SLA		Non-empirical	Literature Review	85 articles analysed	n/a

5	Sykes (2018).	Gamification and Language Learning		Non-empirical	Literature Review	Not specified	n/a
6	Si (2015)	3DVLEs and SLA	Empirical			Quantitative	n=20 Primary Education students (6-8 years old)	Mandarin Chinese
7	da Rocha Seixas, Gomes, and de Melo Filho (2016)	Gamification	Empirical			Quantitative + Qualitative	n=61 Primary Education students (8 years old)	n/a
8	Seaborn and Fels (2015)	Gamification		Non-empirical	Literature Review	n=60 articles analysed (over n=769 search results)	n/a
9	Homer, Hew, and Tan (2018)	Gamification and SLA	Empirical			Quantitative	n=120 Primary Education students (age range 6-11)	Chinese as first language)+ English as FL
	Rieber (1996)	Games and Learning Environments		Non-empirical	Literature Review	Not specified	n/a

10	Rawendy et al. (2017)	Gamification and Language Learning	Empirical		Quantitative	n=30 Primary Education students (age range 6-12)	Chinese
11	Martí-Parreño, Seguí-Mas, and Seguí-Mas (2016)	Gamification and Learning	Empirical		Quantitative (Snowball sampling)	n=98 teachers serving in higher education	n/a
12	Pasfield-Neofitou, Huang, and Grant (2015)	3DVLEs and Language Learning	Empirical		Qualitative (2 case studies)	Case study 1: n=14 higher education students (age range 18-45) Case study 2: n=11 higher education students (age range 18-25)	Chinese
13	Mekler et al. (2017)	Gamification and Learning	Empirical		Quantitative	Between 100-300 participants (age range 17-68)	n/a
14	de-Marcos, Garcia-Lopez, and Garcia-Cabot (2016)	Games and Learning Environments	Empirical		Quantitative (quasi-experimental research)	n=379 undergraduate students	n/a

15	Lu and Kharrazi (2018)	Games for health		Non-empirical	Literature Review	n=1743 health games analysed	n/a
16	Landers and Armstrong (2017)	Games and Learning Environments	Empirical		Quantitative (quasi-experimental research)	n=262 undergraduate students	n/a
17	Kuo and Chuang (2016)	Gamification	Empirical		Quantitative + Qualitative	n=31-100 faculty members + internet visitors	n/a
18	Kuhn and Stevens (2017)	Game design	Empirical		Qualitative (case study)	Not specified (language teachers)	n/a
19	Ku, Huang, and Hus (2015)	Games and Learning Environments	Empirical		Quantitative (quasi-experimental research)	n=31-100 students (10-11 years old)	Chinese
20	Koivisto and Hamari (2014)	Gamification	Empirical		Quantitative (survey)	n=195 responses gathered through a discussion forum	n/a

21	Kayımbaşıoğlu, Oktekin, and Hacı (2016)	Games Design and Learning Environments	Empirical		Quantitative (pre-experimental - games developed + analysis of usage-)	n=60 pre-school students (5 years old)	n/a
22	Jee (2014)	3DVLEs and Language Learning	Empirical		Qualitative (Case Study)	n=34 higher education institute	English
23	Jackson (2016)	Games and Learning Environments		Non-empirical	Literature Review	Not specified	n/a
24	İliç and Arıkan (2016)	Gamification and Language Learning	Empirical		Qualitative (Case Study)	n=24 undergraduate students	English
25	Ibáñez, Di-Serio, and Delgado-Kloos (2014)	Games and Learning Environments	Empirical		Quantitative + Qualitative	n=22 undergraduate students	(C-programming language)
26	Hanson-Smith (2016)	Games and Learning		Non-empirical	Literature Review	Not specified	n/a

27	Gafni, Achituv, and Rahmani (2017)	Games and Learning Environments	Empirical		Quantitative (quasi-experimental research)	n=107 secondary education students	English and French as foreign languages
28	de Freitas (2018)	Games and Learning Environments		Non-empirical	Literature Review (grounded theory)	Not specified	n/a
29	Flores (2015)	Gamification and Language Learning		Non-empirical	Literature Review	Not specified	n/a
30	Dickey (2015)	Games and Learning Environments	Empirical		Qualitative	K-12 educators	n/a
31	Galbis-Córdova, Martí-Parreño, and Currás-Pérez (2017)	Gamification and Learning	Empirical		Quantitative	n=128 undergraduate students	n/a
32	Amoia, et al. (2012)	Game design	Empirical		Quantitative	Not specified	French

33	Uusi-Mäkelä (2015)	Gamification and Language Learning	Empirical		Quantitative + Qualitative (case study)	n=19 secondary education students	English
34	Slovak et al. (2018)	Games and Learning Environments	Empirical		Qualitative (case study)	Students 8-13 years old (n. not specified)	n/a
35	Majuri, Koivisto, and Hamari (2018)	Gamification		Non-Empirical	Literature Review	Not specified	n/a
36	Subhash and Cudney (2018)	Gamification and Learning		Non-Empirical	Literature Review	Higher education context	n/a