Effect of Gamification on students' motivation and learning achievement in Second Language Acquisition within higher education: a literature review 2011-2019

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Abstract

This paper focuses on a fairly new motivational technique, the so-called Gamification, which consists of introducing game mechanics in non-game environments to promote motivation and engagement. By the turn of the 21rst century, Gamification took off in the business field and soon after became an attractive concept for researchers and professionals in education as it appears to be an increasingly popular method to motivate learners. Nevertheless, it is still a nascent field in terms of empirical evidence available to firmly support its educational benefits. This paper intends to shed some more light on this topic through a comprehensive review of literature published in the most prominent journals. The present study is framed within the field of Second Language Acquisition (SLA) in higher education and Computer-Assisted Language Learning, and focuses on the effects of gamified learning environments on student's motivation and learning. A Meta-analysis method was used to explore relevant empirical research published between 2011 and 2019. After reviewing a corpus of 68 papers drawn from the leading databases Scopus and Web Of Science, and from which only 15 could be included in the study, we can point out two main findings: (i) there is still very limited literature in the field of SLA and, (ii) results seem to be predominantly positive in terms of motivation and engagement but only a few studies confirm clear interconnections with learning outcomes. The results suggest a lack of solid correlations between Gamification, motivation and cognitive processes.

Keywords: Gamification, Second Language Acquisition (SLA), Computer-Assisted Language Learning (CALL), motivation, learning achievement.

1. Introduction

Due to the fast development of CALL, second language teachers and researchers have to cope with growing pressure to become more technologically oriented, combined with a growing expansion of mobile applications (Godwin-Jones, 2015). With the proliferation of digital gadgets and apps, new sub-fields of study have been developed in CALL such as Gamification, a fairly recent pedagogical technique that seems to enhance motivation in learning among both digital natives and digital immigrants. In the last few years, digital tools for educational purposes have also proliferated both in formal and non-formal education to engage and motivate students in learning (Quest2Learn, Lego education, Kahoot, Minecraft Education, etc.). As a reflection of the proliferation of games in education, they have been incorporated in a wide range of subjects (Domínguez et al., 2013; Sheldon, 2012).

In language learning, we can also find a considerable number of apps which include game elements and help people improve different language skills (Babbel, Duolingo, Busuu, Memrise, to name a few). Their motivational factor can be linked to what several authors addressed as an essential key to succeed in SLA (Dörnyei & Ryan, 2015; Gardner & Lambert, 1972; MacIntyre, 2002). Considering that game-like activities in education seem to help keep students engaged and motivated in learning tasks, it is no wonder that Gamification has become highly appealing to second language teachers.

2. Research questions

Although noted scholars suggest that gamified environments are powerful settings to boost motivation in learning, their cognitive impact has not been sufficiently supported empirically (Dicheva, et al., 2015; Domínguez et al., 2013; Plass, Homer, & Kinzer, 2015). Thus, our work is aimed at answering the following research questions (RQ), within the frame of CALL:

- **RQ1**: What literature has been produced recently on the effect of Gamification on L2 students' motivation or engagement?
- **RQ2:** What literature has been produced recently on the effect of Gamification on second language learning achievement?
- **RQ3:** Are there any significant results to support the benefits of Gamification on both motivation or engagement and second language learning achievement?

3. Theoretical framework

Although the overall framework of this research is Second Language Acquisition (SLA), we will focus on CALL, which can be considered its technological subfield (Chapelle, 2003). CALL is a relatively young research field and has been frequently re-defined as technology evolves (Beatty, 2013). Chapelle (2009, 2016) and Hubbard (2008) suggest that CALL, combined with the appropriate SLA approaches, provides so many opportunities for language learning that it is undoubtedly enriching for educators who exploit them in their teaching settings. Besides its benefits on students' motivation and engagement, CALL also provides high-quality and authentic linguistic materials, immediate and individualized feedback (Li, 2016).

In education, Gamification would be under the theoretical umbrella of CALL and seems to be worth exploring as an offshoot of Game-Based Learning (GBL). Although Gamification and GBL are two close concepts, some confusion still exists regarding their functioning. While GBL is the use of actual games to achieve educational goals, Gamification would be narrowed to the use of some game design elements (Deterding, et al., 2011) to promote engagement and motivation in any context, whether it's an educational setting or not. Werbach and Hunter (2012) defined it as the use of game design techniques in non-game contexts and added: "basically, any task, assignment, process or theoretical context can be gamified". Within gamification-related concepts in education and professional training, the term Serious Games can also cause some confusion. It is another sub-technique deriving from GBL, but it should also be differentiated from Gamification, since it consists of actual digital games made for purposes other than entertainment, for instance education (Classcraft [1]), corporate training (Business Battle [2]) or institutional instruction (Strike Group Defender [3]).

4. Motivational drives in gamification

Werbach and Hunter (2012b) proposed a framework showing how motivation is triggered by Gamification in three different levels, which they named 'elements': *Dynamics* are produced by *Mechanics* that are in turn generated by *Components*. The following figure shows the description and examples of each one of them in an abstraction hierarchy:

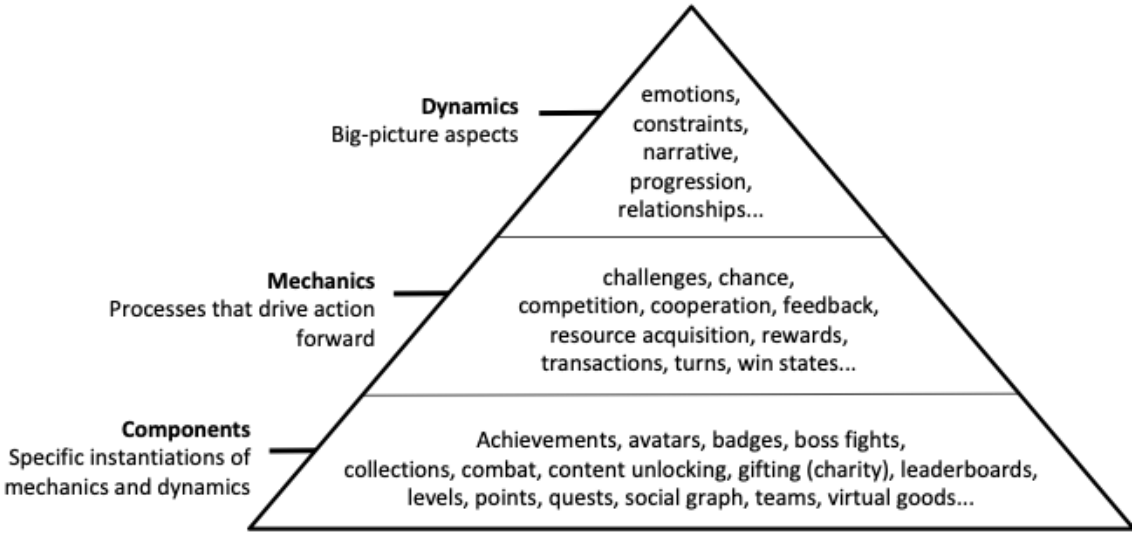

Figure 1. Game elements pyramid from Werbach and Hunter (2012) in For the Win.

Most gamification systems use reinforcement elements (points, levels, badges, leaderboards, etc.) to promote engagement and motivation in users (Subhash & Cudney, 2018; Dicheva et al., 2015). In this sense, the system follows a behaviourist approach, since it impinges on people's behaviour through rewards, reinforcement and immediate feedback at the right time, just like in a Programmed Instruction (Skinner, 1958) aimed at enhancing second language learning.

In their Self-Determination Theory (SDT), Deci and Ryan (2010) defined the most basic distinction between intrinsic motivation, which leads to an action for the sake of enjoyment and interest, and extrinsic motivation, which encourages actions towards external rewards. According to the SDT, human beings show innate needs for *Autonomy*, which relates to self-regulated behaviours; *Competence*, which is the achievement capacity and; *Relatedness*, which involves a feeling of being connected to a community as a safe environment. Following this theory, Marczewski (2019) proposed a framework named RAMP (standing for *Relatedness*, *Autonomy*, *Mastery* and *Purpose*) which integrates the SDT and shows how to motivate different types of players with game elements. Similarly, Zichermann and Cunningham (2011) also described intrinsic motivation drives in gamers, based on Bartle's player types (Bartle, 1996).

Gamification also creates dynamic environments in which people can feel the sense of progress by achieving levels. The idea of progression embeds what Bandura (2012) defined as Self-efficacy in his Social Learning Theory. According to his construct, perceived self-efficacy reflects people's beliefs about their achievement capabilities and consequences of their behaviours. In this sense, positive outcomes such as self-fulfilment and feeling of achievement can boost and sustain intrinsic motivation. The Flow theory also refers to the idea that sustained motivation arises from a balanced relation between a challenge and people's sense of efficacy based on their skills. According to Csikszentmihalyi (1991), people reach the Flow state when they stick to an activity for the sake only of its enjoyment and gratification. This is what Zichermann and Cunningham (2011) refer to as 'engagement loop', a process in which players constantly seek satisfaction through regular rewards. Following this idea, Hamari et al. (2016) explored the correlations between two variables of the Flow theory (challenge and skills), engagement, immersion, and perceived learning. Their study was conducted in engineering disciplines with higher education students and their conclusions showed positive results in perceived learning outcomes, sense of challenge and engagement.

Kapp (2012) states that gamifying activities is a way to incorporate motivating digital game-based learning strategies into the classroom, and provide players (learners) with "the sense of engagement, immediate feedback, feeling of accomplishment, and success of striving against a challenge and overcoming it" (Figueroa Flores, 2015). In order to produce all these motivating

experiences, gamified activities should follow a progressive system with sequenced levels through which players can advance at their own pace.

Along with the spread of Gamification, some researchers also detected little evidence supporting positive effects on both psychological states and cognitive processes, and focussed their work on finding out more about its long-term effects on learning (Dichev & Dicheva, 2017; Hew, et al. 2016; Severengiz, et al., 2018).

5. Methodology

In order to provide clear outcomes, a meta-analysis methodology was used following the six-step review process defined by Rickinson and May (2009): scoping, searching, selecting, analysing, synthesising and reporting.

We first established a strategic search method based on effective scanning of the most relevant literature. The bibliography was retrieved from the two leading international databases: Web of Science and Scopus; the reason for doing this is to ensure high quality standards of the research presented in those articles. We applied a search strategy by introducing different combinations of keywords such as *Gamification, Gamif*, "Second Language" Acquisition, "Foreign language" learning, ESL* or *EFL*. After cross-referencing the publications provided by the two databases, we rejected duplicated results.

The following step consisted of identifying those papers which presented empirical studies. We applied some criteria to eliminate those articles which:

- were only conceptual papers
- were game design/engineering papers
- had the term Gamification mentioned in the text but was not the actual focus of study
- were not conducted with higher education or adult learners
- included participants showing a disability

Table 1. Search procedure and results.

Step	**Procedure description**	**Results from Scopus**	**Results from WoS**
1st	Search using combined Booleans: *gamif*, gamification and «second language", "foreign language", ESL or EFL*	47	50
Papers found		97	
2nd	1st selection excluding duplicates	68	
3rd	Final selection excluding irrelevant literature	15	

Our first search phase provided 97 papers from which we excluded several duplicates. From the remaining articles, we selected the most relevant ones in a second phase. In the third phase, we ended up synthesising and reporting 15 papers, which explored the effects of Gamification on L2 learning. We extracted key content from all the papers and classified it systematically by: authors, date, observed variables, methodology, measuring tools, sample, duration, research questions and results. The following section contains the results obtained after a combined analysis of these key features.

6. Results and discussion

This section aims to answer the three research questions posed in the study:

- RQ1: What literature has been produced recently on the effect of Gamification on L2 students' motivation or engagement?
- RQ2: What literature has been produced recently on the effect of Gamification on second language learning achievement?

All the reviewed studies include experiments, which consist of implementing some self-designed or commercial gamified resource, mainly apps, in second language learning contexts. Practically all of them were conducted with the help of free applications that can be easily accessed or downloaded from the Internet and used whether on a computer or a mobile device. Most experiments incorporated a gamified resource especially created for the study (Berns, et al. & Dodero, 2016; Cardoso, et al. 2017; Liu, et al. 2016; Palomo-Duarte et al., 2016; Perry, 2015), whereas Duolingo and Kahoot were the most popular commercial apps (Bustillo, et al. 2017; Gafni, et al. 2017; Hung, 2017; Iaremenko, 2017; Mateo-Gallego & Ruiz Yepes, 2018; Munday, 2016).

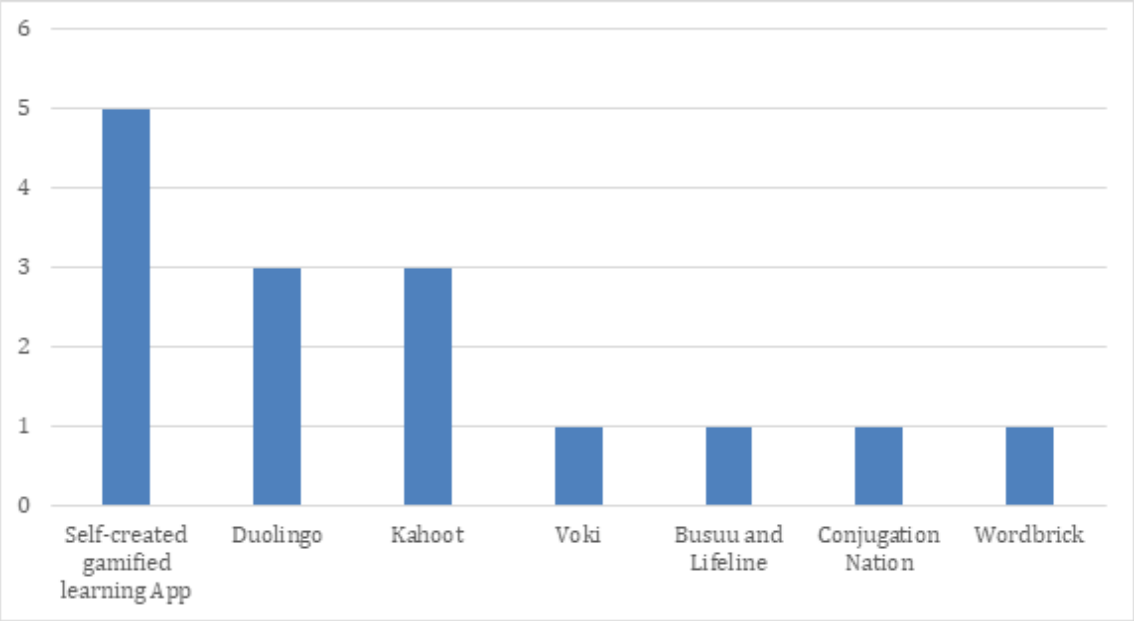

Figure 2. Learning tools used in the studies.

English stands out among the second languages studied. More than half of the studies were performed with students of English (8) and the rest mainly in courses of German (4), Spanish (4), French (3) and Italian (1).

Psycho-behavioural variables seem to be the main focus. This is probably due to the fact that Gamification is often used exactly for that purpose: stimulating psycho-behavioural aspects like motivation and engagement. In fact, almost half of the studies (6) focussed only on psycho-behavioural evidence such as motivation, engagement or attitudes towards the gamified experience (Barcena & Sanfilippo, 2015; Gafni et al., 2017; Iaremenko, 2017; Liu et al., 2016; Munday, 2016; Perry, 2015), five papers were focussed on a combination of psycho-behavioural and cognitive effects (Berns et al., 2016; Bustillo et al., 2017; Castañeda & Cho, 2016; Hung, 2017; Kétyi, 2016) and four were centred just on cognitive results (Cardoso et al., 2017; Mateo-Gallego & Ruiz Yepes, 2018; Palomo-Duarte et al., 2016; Purgina, Mozgovoy, & Blake, 2019).

- RQ3: Are there any significant results to support the benefits of Gamification on both motivation or engagement and second language learning achievement?

From a general point of view, most studies show positive results with a balanced attention on both psycho-behavioural and cognitive variables (11), three are ambiguous and just one showed negative results on learning.

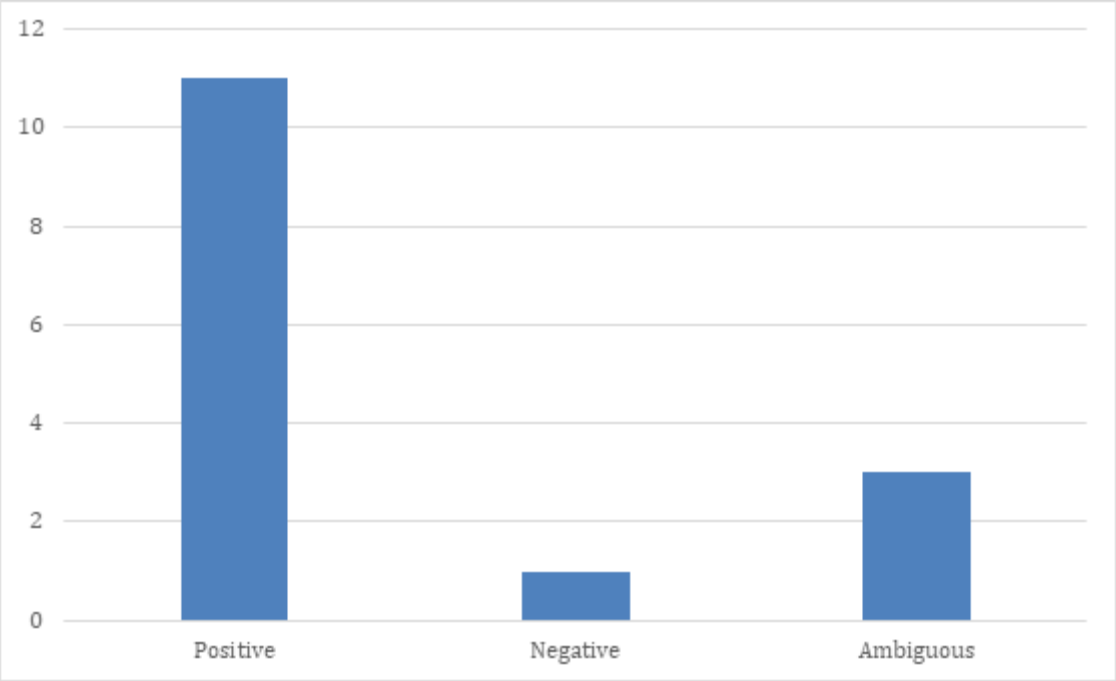

Figure 3. General overview of results.

If we have a closer look at the findings, we can identify different combinations of results but the most common would be centred on: (i) positive results on both learning and students' attitude towards Gamification (Berns et al., 2016; Bustillo et al., 2017; Castañeda & Cho, 2016; Hung, 2017) and (ii) positive results on student engagement (Iaremenko, 2017; Liu et al., 2016; Perry, 2015).

Some researchers reported that participants expressed a sense of challenge and fun using Kahoot (Iaremenko, 2017), and a sense of immersion in an Augmented Reality learning environment (Liu et al., 2016; Perry, 2015). In Perry's study, a self-designed gamified tool (Explorez) was used by students of French at the University of Victoria. Her findings demonstrate that game-based mechanics can be powerful motivators for learners. This author bases her research on a challenging question: *"What if educators could engage learners the way video games engage players?".*

Bustillo et al. (2017) incorporated Duolingo in an A1 course of English and confirmed, on the one hand, a significant improvement in students' listening skills and, on the other hand a positive attitude towards using the app as a learning support. Castañeda and Cho (2016) found that a gamified conjugation app (Conjugation Nation) increased students' confidence while improving their accuracy in conjugating verbs in Spanish as an L2. Their experiment showed a positive attitude of their students towards Gamification, also evidenced in a study conducted by Hung (2017), in which a clicker app (Kahoot) also proved to be beneficial in terms of learning perception. Similarly, Berns et al. (2016) showed positive effects of a gamified tool (VocabTrainerA1) on students' attitudes towards the app. The participants also expressed a high perceived learning by using the gamified learning tool which was in line with positive academic results, specifically in grammar and vocabulary.

Bárcena and Sanfilippo (2015) included avatars in an online Spanish university platform (UNED). In general, their results showed a favourable attitude towards the gamification technique. It made it easier for students to find and learn course-related content online, although a few of them

expressed their rejection as they did not associate "childish" avatars with a formal university learning environment. Gafni et al. (2017) also observed L2 students' positive attitudes towards using Duolingo as a parallel support of their language courses. Although the study was short, students expressed their satisfaction towards the app as a learning enhancer.

Positive benefits on vocabulary acquisition were also evidenced in the study conducted by Palomo-Duarte et al. (2016) who used a self-designed app (Guess it! Guess it!) to gamify an A1 course of German. Positive evidence on learning was also reported by Purgina et al. (2019) who increased grammar achievement by using a gamified digital too (Wordbricks) in an English course.

Kétyi (2016) gamified courses of four different languages using Busuu and Lifeline. After the experiment, the author showed positive results on learning and motivation but could not confirm any correlation between the two variables. Munday (2016) concluded her study with ambiguous results. In fact, students showed a positive attitude towards Duolingo in a basic L2 level (A1) but not in a more advanced level (B2), since they found the app was too limited. Similarly, the study of Mateo-Gallego and Ruiz Yepes (2018) showed inconclusive outcomes when they demonstrated that using Kahoot in an English course helped students decrease their language errors, but did not promote their self-reflection on mistakes.

As the only clearly negative result, Cardoso et al. (2017) demonstrated that using a gamified tool (Prêt à Négocier) in a French course of intermediate level, did not show significant differences on oral skills (comprehensibility and fluency) between a treatment and a control group.

Table 2. Result details.

No. of papers	Authors	Results
4	(Berns et al., 2016), (Bustillo et al., 2017), (Castañeda & Cho, 2016), (Hung, 2017)	Positive both on learning achievement and attitude towards gamification
3	(Iaremenko, 2017), (Liu et al., 2016), (Perry, 2015)	Positive on engagement and motivation
2	(Barcena & Sanfilippo, 2015), (Gafni et al., 2016)	Positive on attitude towards gamification
2	(Palomo-Duarte et al., 2016), (Purgina et al., 2019)	Positive on learning achievement
1	(Kétyi, 2016)	Positive on learning achievement and motivation but with no correlation
1	(Mateo-Gallego & Ruiz Yepes, 2018)	Positive on error correction but negative on students' self-reflections
1	(Munday, 2016)	Positive on attitude towards gamification in level A1 but ambiguous in level B2

No. of papers	Authors	Results
1	(Cardoso et al, 2017)	Negative on learning

Mixed methodologies combining quantitative and qualitative research seemed to be predominant in this research field (Barcena & Sanfilippo, 2015; Berns et al, 2016; Castañeda & Cho, 2016; Hung, 2017; Kétyi, 2016; Mateo-Gallego & Ruiz Yepes, 2018; Munday, 2016; Perry, 2015). There were also a considerable number of researchers who chose purely quantitative methods (Bustillo et al., 2017; Cardoso et al., 2017; Gafni et al, 2016; Iaremenko, 2017; Palomo-Duarte et al., 2016, Purgina et al., 2019), but qualitative research on its own was used in just one study (Liu et al., 2016).

Among those studies including quantitative methodology, five papers (Cardoso et al., 2017; Hung, 2017; Kétyi, 2016; Mateo-Gallego & Ruiz Yepes, 2018; Purgina et al., 2019) out of fourteen included a comparative method using pre- and post-tests with control and experimental groups.

Table 3. Research methodology.

No. of papers	Paper	Methodology	Comparative analysis
8	(Barcena & Sanfilippo, 2015), (Berns et al., 2016), (Castañeda & Cho, 2016), (Hung, 2017), (Kétyi, 2016), (Mateo-Gallego & Ruiz Yepes, 2018), (Munday, 2016), (Perry, 2015)	Quantitative and qualitative	(Hung, 2017), (Kétyi, 2016), (Mateo-Gallego & Ruiz Yepes, 2018)
6	(Bustillo et al., 2017), (Cardoso et al., 2017), (Gafni et al, 2016), (Iaremenko, 2017), (Palomo-Duarte et al., 2016), (Purgina et al., 2019)	Quantitative	(Cardoso et al., 2017), (Purgina et al., 2019)
1	(Liu et al., 2016)	Quantitative	None

The following charts show the duration and the number of participants classified by general criteria. Concerning the duration, we can identify only three studies that covered a course period (four months, sixteen weeks or one semester). The largest number of experiments lasted just one or a few sessions. Three were conducted during two months and two lasted one month.

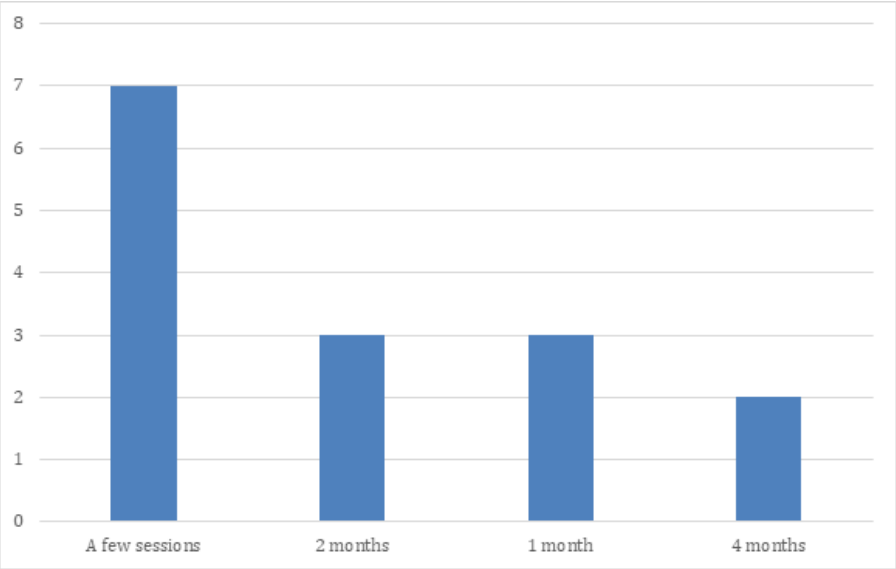

Figure 4. Studies duration.

As for the number of participants, for the sake of simplicity we grouped them in four sizes based on the results: small (3-16), medium (40-94), large (100-120) and very large (273). We can clearly identify a predominant trend in almost half of the experiments (7) which included a considerable number of participants ranging from 40 to 94 students. The smallest range includes four studies with 3 to 12 students. A similar number of papers (3) can be found with 100-120 participants, and the last one is the largest with 273 students involved in the study.

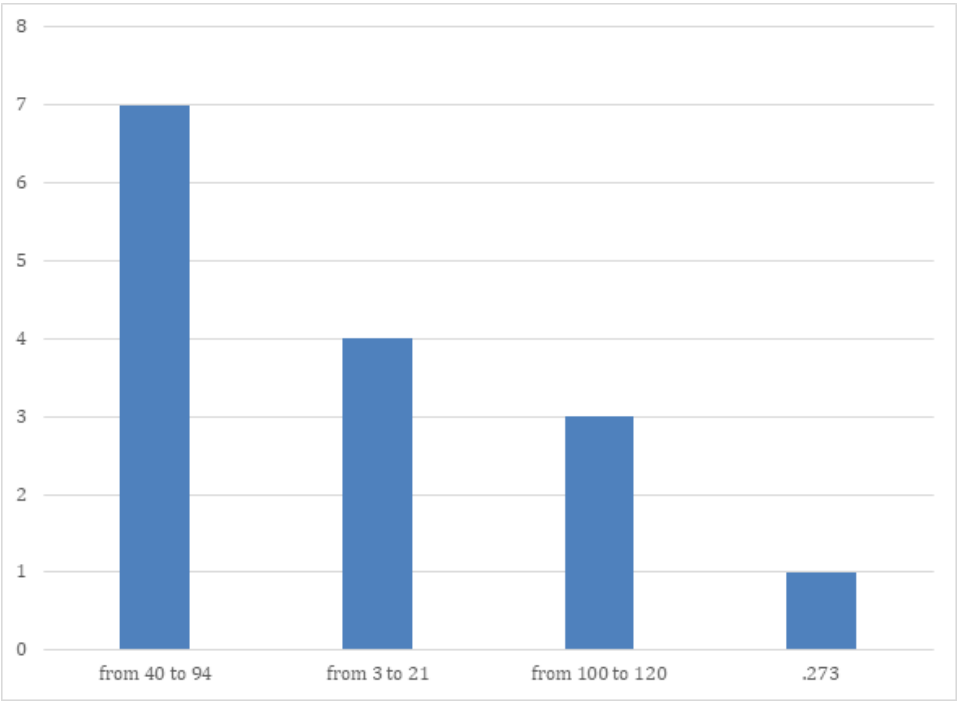

Figure 5. Number of participants in the studies.

After analysing all the papers, we can now recap features from each study that would indicate some kind of limitations from an empirical viewpoint. Besides the very limited number of studies, all of them show some kind of research limitations. Almost 70% of the studies included some quantitative research with no control group. Among all the quantitative studies, 54% lasted less than one month, 31% showed an imbalance between students' gender or between the group

allocation (control vs experimental) and 23% involved small groups of participants. Nonetheless, altogether the reviewed literature provides valuable data to guide researchers and educators keen on using Gamification as a potential booster of second language learning. We hope this paper will spark enough interest among research communities so as to keep on exploring educational benefits of Gamification.

7. Conclusions

Up to now, Gamification has proved to be an efficient technique to boost engagement and motivation but when it comes to education, more research will be needed to provide solid evidence of its benefits both on students' affective states and learning outcomes (Dicheva et al., 2015). The lack of unified discourse among researchers (Hamari, Koivisto, & Sarsa, 2014) shows the need to dig deeper into the effects of Gamification on learning. After a thorough literature search, only a very limited number of papers matched our selection criteria regarding empirical evidence supporting the educational benefits of using Gamification in SLA. This review adds even more weight to the idea that further research should be undertaken to clear up confusing and ambiguous results.

An analysis focused purely on results would show that the use of Gamification with L2 learners is a predominantly positive experience. However, considering the research limitations found in most studies, we should exercise caution, at least until further research has shown clearer results and allows researchers and teachers to reach a general consensus on the role that Gamification should be given in learning contexts.

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Appendix

The complete tables where all the data is displayed can be found clicking on this link: http://eurocall.webs.upv.es/wp-content/uploads/2020/05/Azzouz_Literature_review_tables.pdf

Endnotes

[1] https://www.classcraft.com/

[2] Winner at the 2017 Serious Play Events: https://seriousplayconf.com/2017-serious-play-awards/

[3] MIT news: https://seriousplayconf.com/2017-serious-play-awards/