Gamification for Technology-Enhanced Language Learning (TELL) – Success factors of gamified language learning platform design

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Abstract: The use of gamification as a TELL strategy has aroused increasing interest, but there are still many unanswered questions. In this context, and to find the success factors in the design of a Gamified Language Learning Platform (GLLP), an exploratory, cross-sectional study was developed. Critical factors for the success of GLLP were identified and classified, as well as the perceptions of users mainly from China and Portugal (n = 555).

Crossing data, the principles "Specific, clear, moderately difficult, immediate goals", "Clear, concrete, actionable learning tasks with increased complexity" and "Immediate feedback or shorten feedback cycles; immediate rewards", emerge with special relevance.

These results are important in the design of new tools, but also, to alert educators to the use of GLLP as a learning complement. It will also be useful, to raise the awareness of educational institutions, for the creation of gamified tools, which can increase motivation, interest, and efficiency in the teaching/ learning process.

Keywords: gamification, language teaching, success factors, VLE, TELL.

Resumen: El uso de la gamificación como estrategia TELL ha despertado un interés creciente, pero todavía hay muchas preguntas sin respuesta. En este contexto, y para encontrar los factores de éxito en el diseño de una Plataforma de Aprendizaje de Idiomas Gamificados (PAIG), se desarrolló un estudio exploratorio transversal. Se identificaron y clasificaron los factores críticos para el éxito de PAIG, así como las percepciones de los usuarios principalmente de China y Portugal (n = 555).

Cruzando datos, los principios "Objetivos específicos, claros, moderadamente difíciles", "Desafíos y misiones claros y concretos, tareas de aprendizaje útiles con complejidad creciente" y "La retroalimentación inmediata, o en ciclos cortos, recompensas inmediatas", emergen con especial relevancia.

Estos resultados son importantes en el diseño de nuevas herramientas, pero también para alertar a los educadores sobre el uso de PAIG como complemento de aprendizaje. También será útil, para sensibilizar a las instituciones educativas, para la creación de herramientas gamificadas, que pueden aumentar la motivación, el interés y la eficiencia en el proceso de enseñanza / aprendizaje.

Palabras clave: gamificación, enseñanza de idiomas, factores de éxito, EVA, TELL.

1. Introducción

With the intensification of globalization, communication between different cultures is becoming increasingly natural, raising the need for multilingual competences. The importance given to language learning, in society, in general, brings us not only opportunities but also new challenges. With the number of foreign language learners growing, there is also a greater concern with the educational process in terms of quality and effectiveness.

Numerous factors interfere with the quality of teaching/learning in classrooms, including the lack of adequate physical structure in many schools, the incapability of educators to deal with learning problems presented by students, the still very timid partnership between the family and the school (the school community as a whole), the demotivation of students regarding the traditional (often tiring) teaching methods and the lack of perception of the practical applicability of the worked content, etc. (Paula, 2016). Moreover, rapid technological evolutions are changing students' learning habits, which has a great impact on the teaching and learning landscape (Zhou & Wei, 2018). In this respect, the Technology Enhanced Language Learning (TELL) has been viewed as a potential solution for this, since digital technologies can break up space and time barriers, provide flexible, customized and self-paced environments, improve students' engagement, promote learner autonomy and improve language skills (Krajka, 2007; Leone, 2008; Maria Cavalcanti Nery Ferreira, Mattar, & Pisan Soares Aguiar, 2020; Pawlak & Kruk, 2012).

The term gamification emerged in the digital information industry in 2008 and began to be used in the second half of 2010 when several conferences and key people of the industry popularized it (Sebastian Deterding, Dixon, Khaled, & Nacke, 2011). It is seen as a ubiquitous strategy that serves to motivate people and influence their behavior, which is defined as "the use of game elements and game design techniques in non-game contexts" (Werbach & Hunter, 2012). Its application in education was presented as a solution to the apathy and disinterest presented by students during learning. According to Lee and Hammer (2011), gamification can help motivate students to be engaged in the classroom, give teachers better tools to guide and reward students, besides encouraging the development of lifelong learning habits. Furthermore, learning with gamification can make education a fun experience (Lee & Hammer, 2011; Silva & Bax, 2017). However, there is a lack of understandings about which gamification elements or factors contribute to enhancing learning, especially in the foreign language learning field (Pujolà & Appel, 2020).

In this context, this study aims to find out an effective way to use gamification in the TELL environment and is intended to identify the success factors to design a

gamified system. The analysis is based on an empirical study composed of one qualitative examination of five successful gamified language learning apps and one quantitative research about the perspective of learners and/or educators.

Six sections follow this introduction. The next section consists of a brief conceptual framework which discusses the applicability of gamification in language teaching/learning and how it can be applied in the TELL environment, followed by a summary of the principles relevant to the success of gamification in education. Section 3 presents the methodology description. Section 4 and 5 contain, respectively, the results of two research, following in Section 6 the analysis of the results. Lastly, Section 7 presents conclusions and limitations.

2. Background

2.1. Gamification

Gamification refers to the use of game elements and mechanics in different game contexts, the purpose of which is to create or adapt the user experience to a particular service, process or product to generate positive emotions, motivate, engaging people, acquiring competencies or offering benefits such as physical or virtual rewards in performing tasks (Pantoja & Marques Pereira, 2018). The term derives from "game", which means an application of games. In other words, it makes a formal system with rules, involving variable and quantifiable results, in which the player dedicates himself to obtain a certain result and feels bound, and the consequences are optional and negotiable (Juul, 2003). This can be explained by the typical tendencies of human beings towards competition, achievement, social position, altruism, self-expression, among others (Noran, 2016). Thus, we can confirm that the operation of gamification is to harness the natural reaction of the game, specifically the commitment and linking, by creating a game context to reach a certain purpose.

Unlike games, gamification incorporates only selected elements of games, according to the need and intention of use (Engedal, 2015a). Therefore, it reinforces the advantage of games by encouraging problem-solving and improving the experience, avoiding distraction and excessive dependence.

In order to understand and use gamification, we need to identify what makes games attractive, exciting and motivating (Paula, 2016). Despite the existence of various game formats, there are always common features. According to Alves and Maciel (2014), the most common elements can be classified into three aspects: dynamics, mechanics and game components. Here follow the elements identified by the author:

- Dynamics: penalties, emotions, narrative, progression, and relationship.
- Mechanics: challenges, luck, cooperation and competition, feedback, resource acquisition, rewards, transactions, turns, and states of victory.
- Components: achievements, avatars, badges, boss fights, collections, combat, content unlocking, donating, scoring, levels, points, research or exploration, social graphics, and virtual goods.

Among the three, the game mechanics are primarily responsible for making a gamification proposal engaging, motivating, and ultimately effective (Paula, 2016).

2.2. Gamification and language teaching strategies

Language teaching has been much discussed, especially concerning the questions of whether or not there is an ideal method and what contributions each method can make to support the language teachers (Abdel & Santa, 2009). Among the most well-known methods/ approaches are the Grammar - Translation Method, Direct Method, Audiolingual Method, and Communicative Approach (Qing-xue & Jin-fang, 2007). However, with the development of technology, new educational theories and methodologies were created. One of those, designated Task-Based Language Teaching, which was developed based on the Communicative Approach, is in a prominent position for solving the problem of demotivation and the lack of students' participation in learning (Frost, 2015; Plews & Zhao, 2016).

According to the Task-Based Language Teaching Method, "the lesson is based around the completion of a central task and the language studied is determined by what happens as students complete it" (Frost, 2015). Therefore, a class is divided into the following steps: pre-task, task, planning, report, analysis, and practice. As advantages, this approach sets students free from language control, gives them a natural language context created by themselves, allows them to explore the target language, motivates communication, and makes language learning more interesting. This meets the characteristics of gamification since both strategies let students be in the central position of learning with enough autonomy to achieve a goal in a motivated and fun way. Therefore, the combination of the two pedagogical strategies could make the integration of game elements into language teaching even more viable and practical.

As we know, gamification has a motivating effect on the educational landscape, as it provides learners with greater involvement, immersing them in a context that blends virtuality and reality (Letras, 2016). Nowadays, as contemporary language learners are increasingly more willing to be taught by digital ways with various technology supports (Kruk & Peterson, n.d.), gamification is a promising trend that can be considered as a readaptation of ludic culture to the conditioning techniques of cyberculture, a natural movement intertwined with human development through interaction with entertainment (Martins & Giraffa, 2015). Therefore, it's of great significance to analyze how to apply gamification in the TELL environment.

2.3. Gamification in TELL

TELL, also designated as Computer Assisted Language Learning (CALL), is defined as "any language learning activity that uses technological means and/or tools for efficiency, motivation, and learning style flexibility" (Zhou & Wei, 2018). This field dates back to the 1960s and has experienced four stages of evolution driven by technology development (Chun, 2019):

- Structural TELL (the 1970s-1980s): in this stage, the mainframe was used as the major technological tool, while language learning was seen as a formal structural system, with a strong focus on Grammar translation and audiolingual. The principal use of technology was to help with drill and practice to increase its accuracy.
- Communicative TELL (the 1980s-1990s): it was a stage where PCs began to get a large presence in life. Simultaneously, as a cognitive aspect of language learning was stressed, enhancing communicative language learning in a mentally constructed system drew particular attention. In

this respect, technology was used in communicative exercises aiming to improve fluency in conversation.

- Integrative TELL (the 2000s): during this period, Multimedia and Internet entered into the scene, while a sociocognitive perspective of language was taken into account, leading the language teaching paradigm to be content-based and promoting the language learning for specific purposes according to different social interaction needs. The technological tools played the role of the agency to create authentic discourse.

- Ecological TELL (the 2010s): this stage resulted from the penetration of mobile and wearable devices. Since language has been perceived as symbolic and intercultural competence, there are more digital literacies and multiliteracies available supported by new technologies. These tools were adopted to foster global communication, whose principal objective is to identify language learners as global citizens.

In the TELL environment, it needs to emphasize the significance of including self-regulation learning strategies into learning task design, especially for distance learners (Zhou & Wei, 2018). According to Oxford (2017), there are three dimensions of strategic self-regulation: cognitive strategies that refer to remembering and processing language, affective strategies that are associated with emotions, beliefs, attitudes, and motivation, and sociocultural-interactive strategies which are linked with contexts, communication, and culture. Since digital tools give learners more autonomy and freedom, these self-regulation strategies play an important role in ensuring the effectiveness of learning and embedding language learning into games, online platforms, and/or apps.

As one of the innovative methodological choices in TELL (Smith, 2017), studies involving digital games can be classified in game-enhanced, game-based, and game-informed studies (Sykes & Reinhardt, 2012). Whereas the latter, defined as "applying principles and insights from the study of games and play, sometimes outside the confines of what is typically classified as games" (Chun, 2019), is related to the concept of gamification when the game elements are applied intentionally in unusual ways or contexts and the learner can feel the learning process unusually gameful (Reinhardt, 2019).

The study of Pujolà and Appel (2020) suggests two approaches of implementing gamification in TELL: using gamification tools that are already designed to manage the gamified learning experience or gamifying the course using a variety of technological tools and apps. Thereby, we can classify the existing tools or platforms into two categories:

- Gamification platforms/ systems: refer to those platforms/ apps that help to set up and manage gamified courses, lessons, or quizzes, such as ClassDojo, Quizlet, etc. They can also be systems that create game-like features in VLEs, namely Moodle and Edmodo.

- Information and communication technology (ICT) tools: consist of the ICT apps/ resources that permit to carry out learning tasks in relation to gamification mechanics and components, for instance, using Voki for creating avatars and Pointagram for managing leaderboards.

The present research was developed in the former field to show the proper way to design the gamification platform for TELL.

2.4 Relevant principles for using gamification in education

Although gamification promotes increased motivation and user involvement, the real impacts vary from case to case (Engedal, 2015b). Therefore, the critical success factors need to be identified, as a gamified system does not always produce the maximum effect. Some prior studies have pointed out relevant principles for the successful use of gamification in education in general, which are demonstrated in the following table, elaborated in the light of a study by Dicheva et al. (2015).

P1. Various game elements - a gamified system must integrate several game elements since humans do not have the same reaction to a game element. One element may be motivating for one person but not so motivating for others (De-Marcos, Domìnguez, Seanz-de-Navarrete, & Pagès, 2014). Thus, there is a greater chance of success if several elements of the game are considered in the design of the game.

P2. The priority of intrinsic motivation - successful gamification should endeavor to encourage users to engage in an activity through intrinsic motivation that arouses positive feelings and emotions in users, rather than just integrating the typical external reward mechanism of games, because if these stop working, the user will tend to give up. For this reason, through intrinsic motivation, it is possible to create a long-lasting effect toward gamification (Deci, Koestner, & Ryan, 2001).

P3. Goals: specific, clear, moderately difficult, immediate goals - the objectives of each task should be specific and allow learners to know clearly what knowledge they will acquire and how it will be acquired at the end of each learning. These should be compatible with the difficulty of the learning activity.

P4. Challenges and quests: clear, concrete, actionable learning tasks with increased complexity - tasks build the learning path. These tasks should be clear, concrete, and useful in promoting the acquisition of knowledge and skills. They must also be planned with a sequence of increasing complexity to make the ultimate learning goal easier to achieve.

Table I. Educational gamification design principles.

Principles	Game mechanics applied	Authors
P1		Engedal (2015b) Pujolà and Appel (2020)
P2		Nicholson (2012) Pujolà and Appel (2020)
P3		Lee and Hammer Kapp (2012)
P4		Lee e Hammer (2011) Zichermann and Cunningham (2011) Deterding (2013) Simões, Díaz, and Fernández (2013)
P5		Lee and Hammer (2011) Zichermann and Cunningham (2011) Simões, Díaz, and Fernández (2013) Gordon, Brayshaw, and Grey (2013) Engedal (2015b)
P6	Points, progress bars, levels, virtual goods/ currency	Zichermann and Cunningham (2011)
P7		Lee and Hammer (2011)
		Zichermann and Cunningham (2011) Kapp (2012) Simões, Díaz, and Fernández (2013) Gordon, Brayshaw, and Grey (2013) Nah, Zeng, Telaprolu, Ayyappa, and Eschenbrenner (2014)
P8	Badges, leaderboard, levels, avatars.	Zichermann and Cunningham (2011) Deterding (2013) Simões, Díaz, and Fernández (2013) Iosup and Epema (2014)
P9	Points.	Simões, Díaz, and Fernández (2013)
P10	Points, badges, leaderboard, avatars.	Lee and Hammer (2011) Deterding (2013) Simões, Díaz, and Fernández (2013)
P11		Iosup and Epema (2014)
P12		Lee and Hammer (2011) Deterding (2013) Simões, Díaz, and Fernández (2013) Iosup and Epema (2014)
P13		Lee e Hammer (2011) Deterding (2013) Gordon, Brayshaw, and Grey (2013) Iosup and Epema (2014)
P14	Avatars	Kapp (2012) Simões, Díaz, and Fernández (2013) Nah, Zeng, Telaprolu, Ayyappa, and Eschenbrenner (2014)
P15	Avatars	Lee and Hammer (2011) Simões, Díaz and Fernández (2013)
P16		Zichermann and Cunningham (2011) Iosup and Epema (2014)
P17	Countdown clock	Kapp (2012)
P18		Engedal (2015b)

Source: Adapted from de Dicheva et al (2015)

P5. Customization: personalized experiences, adaptive difficulty; challenges that are perfectly tailored to the player's skill level, increasing the difficulty as the player's skill expands - a gamified learning offer should be tailored to the user's profile. Variables such as gender, age, culture, type of player, determine the impact of motivational factors such as type of activities, aesthetics, game mechanics, etc. Therefore, adapting to users' profiles makes it possible to meet their needs and provide them with a better experience (Engedal, 2015b; Koivisto & Hamari, 2014; Letras, 2016). In addition, difficulty and challenge levels must

be tailored to the participant's level of competence to provide a personalized experience.

P6. Progress: visible progression to mastery - clear and visible progress indicators are important for users to gain insight into their learning performance and to be motivated by their continued progress.

P7. Feedback: immediate feedback or shorten feedback cycles; immediate rewards instead of vague long-term benefits - whenever students complete a task, they should get feedback and rewards, preferably immediately or within a short time.

P8. Competition and cooperation/ social engagement loops - social involvement is indispensable in the gamification of learning, which not only increases student's participation in activities but also contributes to mutual learning (De-Marcos et al., 2014). Competition and cooperation, as socialization activities, promote interaction and specifically motivate those with a competitive and cooperative profile.

P9. Classification/ level up - the gamified education system should quantify and expose the achievement and progression of students.

P10. Visible status: reputation, social credibility, and recognition - it is about creating a space where users' achievements and interactions are visible to the entire community. It is very motivating to satisfy the need for social recognition.

P11. Access/ unlocking content - this is a reward mechanism whereby users will be assigned new content after certain actions.

P12. Freedom of choice: multiple routes to success, allowing students to choose their own sub-goals within the large task - the gamified system should give users some autonomy, so that they can freely choose the learning path, from the objective to the activities.

P13. Freedom to fail: low risk from submission, multiple attempts - activities within a gamification system should be less risky to give users the freedom to fail and make multiple attempts.

P14. Storytelling - the gamified system should create an immersive learning environment using stories, plots, and avatars.

P15. New identities and/ or roles - the gamified system should allow users to assume different identities during learning, namely: competitor, conqueror, socializer, explorer, through the use of avatars.

P16. Easy access - The gamified system should allow users to quickly and simply access the content at the desired time.

P17. Time restriction - the creation of time limits to perform a task in a gamified system.

P18. Constant evolution - the gamified system must be constantly evolving to deal with the novelty effect - "the tendency for human performance and engagement to initially improve when something new is introduced in a process" (Engedal, 2015b). With the constant addition of new elements, such as unlocking new avatars, skills, or even study content, the sense of curiosity and interest in users remains.

In the next section, we will present, in detail, the methodology adopted.

3. Methodology

This exploratory study uses the triangulation of quantitative and qualitative data. The following research objectives were defined: 1. Identification of critical factors of designing a successful gamified language learning platform. 2. Classification of critical factors (primary or secondary).

To meet this challenge, the research process was divided into three sequential phases:

Phase 1: Qualitative selection of successful gamified language learning apps;

Phase 2: Examination of selected apps by using critical factors;

Phase 3: An online survey about leaners/ educators' perceptions of critical factors.

The online survey consisted of qualitative and quantitative questions. In terms of quantitative questions, existing scales were used as measures. The scale items "When studying with this application, I am happy" and "Time flies when I'm using the

application" of BIQ3 were adapted from Dessart et al. (2016) to fit the context of this research, while the "I believe that games improve my understanding of the topics covered" and "I believe that the game is a valuable use of time for learning" were borrowed from Fotaris et al. (2016). We captured the relevant principles for gamification success from literature identified in Table I as critical factors of gamified language learning apps measures (BIIQI) and some changes were made to enhance respondents' understanding of the respective scale items. The scale items of BIQ3 were on a five-point Likert-type scale anchored between "1-Strongly Disagree" and "5-Strongly Agree". In the evaluation of critical factors, respondents were asked to indicate the degree of importance of each of the items by using a five-point scale with "1-Not important" and "5-Extremely important" as anchors.

The survey was initially created in Portuguese and translated into English and Chinese. The data were collected through Google Forms (Portuguese and English version) and WJX (Chinese version).
The data were collected between the 5th and the 22nd of April.
A content analysis was done for the open questions, creating main categories and subcategories (Bardin, 2011; Guerra, 2006).

3.1 Qualitative selection of successful gamified language learning apps
There are currently a number of gamification initiatives used in the TELL environment, some of which are successful gamified apps. To further analyze its feature, a qualitative selection was conducted with the apps available in Google Play (for Android users) and App Store (for iOS users). As presented in Table II, the evaluation is based on the three subjective criteria: "an important role of gamification", "a large number of users; "positive users' assessments and comments", which weight 40%, 30%, and 30%, respectively. A five-point scale was used in this evaluation, and the final grades were obtained by adding up all the points considering its respective weighting. The five apps with the highest final grades were chosen as successful gamified language learning apps for further analysis.

By preselection, 18 gamified language learning apps from Google Play and App Store were assessed.

According to the results, the five apps with the highest final grades are Duolingo, Memrise, Mondly, Drops, and Hello Chinese, on which detailed research was carried out to determine essential success factors for using gamification in language teaching.

Table II. Qualitative selection of successful gamified language learning Apps.

	An important role of gamification (40%)	A large number of users (30%)	Positive users' assessments and comments (30%)	Final grade
Duolingo	5	5	4	4.7
Memerise	5	4	5	4.7
Mondly	5	4	5	4.7
Drops	5	3	5	4.4
Hello Chinese	5	3	5	4.4
50 Language	2	4	4	4
Chinese Skill	4	3	5	4
Learn Match	4	3	5	4
Bussu	3	4	5	3.9
Lingo Deer	3	4	5	3.9
Studycat	5	3	3	3.8
Lingo Play	5	2	3	3.5
Fun Easy Learn	4	2	4	3.4
Mestre Ling	3	1	5	3
Ling Wing	5	1	1	2.6
Tall Embark	4	1	2	2.5
uTalk	4	2	1	2.5
Lingua TV	3	1	1	1.8

4. Successful gamified language learning apps analysis
The following is a brief introduction and analysis of these platforms crossing their characteristics with the previously identified principles.

Drops: it offers courses in 31 languages, with special emphasis on vocabulary memorization through mnemonic exercises. Levels and trophy are principle game elements (Drops, 2019).

Duolingo: it offers 85 courses in 24 languages. The teaching methodology is based on the translation between the language learned and the language of instruction. As game mechanics, points, levels, and trophies are used (Duolingo, 2019).

Hello Chinese: is specialized in Chinese teaching, which aims at improving basic language skills through

exercises. As for incentives, it displays the daily study goal, weekly learning goals, total oral practice time, and "gold coins" (Hello Chinese, 2019).

Memrise: it is available on the website and mobile app format, offering 16 language courses. Learning focuses on vocabulary and is accomplished through exercises using word cards and short videos. The associated game elements are points, levels, ranking panel, etc. Also, social elements are stressed (Memrise, 2019).

Mondly: it provides courses in 33 languages with emphasis on vocabulary and grammar. It seeks to create dialogues in immersive contexts using plots and avatars. The other game dynamics used are points, levels, progress bars, rankings, among others (Mondly, 2019).

Table III. Educational gamification design principles used by platforms.

Principles	Drops	Duolingo	Hello Chinese	Memrise	Mondly
P1	x	x	x	x	x
P2	x	x	x	x	x
P3	x	x	x	x	x
P4	x	x	x	x	x
P5	x			x	x
P6	x	x	x	x	x
P7	x	x	x	x	x
P8		x		x	x
P9	x	x		x	x
P10		x		x	x
P11	x	x	x	x	x
P12	x	x	x	x	x
P13	x	x	x	x	x
P14		x			x
P15					x
P16	x	x	x	x	x
P17	x		x	x	
P18				x	x

By analyzing the platforms based on the gamification principles used, it appears that they have some common characteristics. As for the gamification design strategy, they all integrate more than one game element and give priority to intrinsic motivation, especially competence and autonomy. In terms of motivating factors, the typical elements of games related to goals, challenges, progress indicators, feedback and reward, content unlocking, freedom of choice and the freedom to fail are found on all platforms. To provide a good experience, platforms strive to allow easy access.

When it comes to the distinctions, in contrast to Drops and Hello Chinese that focus mainly on the personal progression of users, Duolingo, Memrise, and Mondly also attach importance to social relationships, enabling the creation of interpersonal links through competition and cooperation activities, and satisfying the need for social interaction. Regarding learning personalization, it is available in Drops, Memrise, and Mondly, however, personalization resides only in content, not in game components. Among the five platforms, Mondly is the only one that uses the principle of storytelling and new identities, creating various conversation contexts with predefined stories and characters. In addition, Memrise and Mondly follow the principle of constant evolution, as they always offer new learning content.

Therefore, we can conclude that in order to successfully use gamification in language teaching, it is not necessary to follow all the principles presented. However, some are indispensable, P1, P2, P3, P4, P6, P7, P11, P12, P13, P16, and can be classified as primary factors. The others, which intend to complete the game mechanics, take into consideration their own pedagogical strategy and the positioning of the system. For example, the plot and avatars in the case of the immersive learning application.

5. Users' perceptions of critical factors

In this section, we will introduce Phase 3, concerning the online survey about leaners'/ educators' perceptions of critical factors.

In order to conduct the survey, and obtain more reliable responses, it was necessary to subdivide the principles into factors. In some cases, it turns out that a principle corresponds to more than one factor. The table with the correspondences is shown below:

Table IV. Adaptation of principles into factors

Principles	Factors
P1	F6: Various elements of games
P2	F14: Creating emotional connection
P3	**F1: Specific and clear objectives**
	F2: Moderately difficult goals
P4	**F3: Clear, concrete challenges and missions**
	F4: Useful learning tasks with increasing complexity

P5	**F5: Personalization according to individual experience**
P6	**F7: Visible progress indicator (points, progress bars, levels, virtual goods, currencies)**
P7	**F8: Immediate feedback (or in short cycles) with immediate rewards**
	F9: Virtual rewards (points, coins, etc.)
P8	F10: Competition (eg, use of medals, leadership panels)
	F11: Cooperation/ loops of social involvement
P9	F12: Classification (for further progression in the game - level increase)
P10	F13: Visible status (of reputation, recognition, social credibility)
P11	F15: Access or unlock study content (by the user)
P12	**F16: Freedom to choose goals and study paths**
P13	**F17: Possibility of failure**
P14	F18: Storytelling (use of specific elements of stories - character, environment, conflict, message)
P15	F19: Use of avatars
P16	**F20: Easy access to learning**
P17	F21: Time restriction on exercises
P18	F22: Constant evolution of the study environment

Statistical analysis

Chi-square was performed to analyze the relationship between two categorical variables. Standardized residual in each cell of the contingency table was calculated with z test as post hoc (Howell, 2013; Tabachnick & Fidell, 2013).

Two ordinal scales, one of agreement and other of importance, with five-points were used to answer the questions. Nonparametric tests were used to analyze differences between groups, Mann-Whitney U for two groups and Kruskal-Wallis for three groups (Corder & Foreman, 2009; Kvam & Vidakovic, 2007). Kruskal-Wallis post hoc were calculated with Bonferroni correction.

The effect size was evaluated with eta-squared for Mann-Whitney U (η_U^2) and Kruskal-Wallis (η_H^2), Cohen's rule of thumb was considered in the interpretation (.01- small, .06 - medium, .14 – large) (Cohen, 1988; Tomczak & Tomczak, 2014).

Alpha levels of p<.05 were considered statistically significant (Howell, 2011).

The analysis was conducted with the statistical package SPSS 22.0 and STATGRAPHICS 18.0.

Participants

A total of 555 participants answered the survey, 38.2% in the Portuguese version, 2.5% in English, and 59.3% in Chinese. 58.7% of the sample were female and 41.3% were male. The distribution by age groups was: for less than 14 years 2.9%, 14 to 17 years 19.5%, 18 to 24 years 32.6%, 25 to 34 years 13.5%, 35-44 years, 13.3%, 45-60 years 15.9%, and more than 60 years 2.3%.

More than half of the participants, 59.4% had Chinese nationality, 31.4% were Portuguese, 9.2% had other nationalities. In regards to education, 5.6% had basic or lower education (up to 9th grade), 24.2% secondary education (10th to 12th grade), 40.4% had bachelor's degrees, 24.5% had postgraduate or Master's degrees and 5.2% had PhD degree.

The main occupation was student (58.2%), 19% were teachers, 22.8% had diverse jobs.

Results

In the sample, 44.5% often play online games, and only 29.9% have some experience using gamified apps to learn a language.

In the next question, regarding the apps they have used, they overwhelmingly identify Duolingo (55%). It is followed by Drops (10%), Memrise (9%), Hello Chinese (8%), Mondly (6%). Some respondents suggest 百词斩 (3%), 沪江开心词场 (2%) and others with less than 3 occurrences each but which in total correspond to 7%.

Among 166 respondents who have experience in using gamified language learning apps, 65 confirmed that they were still using them, 11 of whom demonstrated that they used the apps sometimes or only if necessary. The most referred reason for persistence (31 respondents) is that the apps are "Useful for learning", facilitating particularly memorization. Follow the reasons "Interesting" and "For specific necessities" with 10 and 5 references, respectively. Besides, 6 respondents gave "Other reasons" and 2 didn't mention any reason. On the contrary, 78 respondents gave up using the apps. "Inefficacy/ inefficiency/ poor quality" was the most common reason for giving-up referred by 21 respondents, following "No time" (10 respondents), "Unattractiveness" (10 respondents), "No perseverance/ motivation" (6 respondents), "Price" (6 respondents), and "No necessity" (5 respondents). As other deficiencies of the apps, 4 respondents mentioned "Hard to use" and 2 "Lack of interaction". In parallel, 2 respondents gave up because of "Forgetfulness" and 3 respondents for "Other reasons", while 6 didn't specify any reason.

To simplify the analysis we will call "gamer" or "gamers", the person or people who answered positively that usually play online.

We can verify that males play significantly more frequently online games than females [play 56.8% of the male and 35.9% of the female; $\chi^2(1)=23.742$, p<.001]. The standardized residuals for the male gamer (z=2.8, p<.05) and female gamer (z=-2.3, p<.05) had statistical significance. Gender differences were not statically significant at the experience using gamified apps to learn a language [$\chi^2(1)=0.233$, p=.637].

To test age differences the number of cells was reduced and some age groups were aggregated, thus four groups were created: ≤24 years; 25-34 years; 35-44 years; and ≥ 45 years. Differences in play online games by age groups were statistically significant [$\chi^2(3)=39.883$, p<.001]. In the age group ≤24 54.4% (z = 2.6, p <.01) play online more than expected in a random distribution, and those over 45 years old 19.8% (z = -3.7%, p <.01) played less. The standardized residuals for other age-groups did not have statistical significance.

The experience using gamified apps to learn language by age, was also statistically significant [$\chi^2(3)=11.730$, p<.008], obtained statistically significant standardized residual the group of 25-34 years that 42.7% (z=2.0, p<.05) that use gamified apps.

Agreed with the sentence "When studying with this application, I am happy" 47% of the respondents. For the "Time flies when I'm using the application" 36.7% didn't position themselves and 37.3% expressed agreement. 45.2% agreed with the sentence "I believe that games improve my understanding of the topics covered". Half of the respondents believe that the game is a valuable use of time for learning (agree 50.6%).

Table V. Means, standard deviations and median of the degree of agreement with the sentences, statistical differences between gamers and non-gamers (n=166)

		Total sample	Gamer No	Gamer Yes	*U*	*P*
When studying with this app, I am happy.	*M*	3.6	3.6	3.6	3399.5	.987
	SD	0.9	0.9	0.8		
	Mdn	4.0	4.0	4.0		
Time flies when I'm using the app.	*M*	3.5	3.5	3.5	3262	.626
	SD	0.9	1.0	0.9		
	Mdn	4.0	3.0	4.0		
I believe that games improve my understanding…	*M*	3.7	3.6	3.8	3168	.416
	SD	1.0	1.1	1.0		
	Mdn	4.0	4.0	4.0		
I believe that the game is a valuable use…	*M*	3.7	3.6	3.8	2996	.152
	SD	1.0	1.1	0.9		
	Mdn	4.0	4.0	4.0		

M-Mean; SD – Standard deviation; Mdn – Median; U – Mann-Whitney's U.

No statistically significant differences were found between those who play online and those who do not in their experience with language teaching apps (Table V).

Individuals of other nationalities (Table VI) obtained a significantly higher mean in the degree of agreement with the idea that the game is a valuable use of time for learning (U = 2461.0, p = .001; $\eta_U^2=.07$), as well as teachers (T) relatively to other occupations/ jobs (O) [H(2)=7,667, p =.001; $\eta_H^2=.03$; post hoc T>O, p<.05].

Table VI. Means, standard deviations and median of the degree of agreement with the sentences, statistical differences between nationalities (Chinese vs. Other) and occupations (Teacher vs. Student vs. Other, n=166)

		Nationality Chin.	Oth.	*U*	*p*	Occupation/ job Teach.	Stud.	Oth.	*H(2)*	*p*
When studying with this app, I am happy	*M*	3.6	3.6	3290.5	.691	3.8	3.6	3.4	3.077	.215
	SD	0.9	0.8			0.6	0.9	0.8		
	Mdn	4.0	4.0			4.0	4.0	4.0		
Time flies when I'm using the app	*M*	3.6	3.5	3209.0	.503	3.8	3.6	3.2	5.620	.060
	SD	1.0	0.9			0.8	0.9	1.0		
	Mdn	4.0	4.0			4.0	4.0	3.0		
I believe that games improve my understanding…	*M*	3.6	3.8	3035.0	.203	4.0	3.7	3.5	2.446	.294
	SD	1.1	1.0			0.8	1.0	1.2		
	Mdn	4.0	4.0			4.0	4.0	4.0		
I believe that the game is a valuable use…	*M*	3.5	3.9	2461.0	.001	4.2	3.7	3.5	7.667	.022
	SD	1.1	0.9			0.6	1.0	1.1		
	Mdn	4.0	4.0			4.0	4.0	4.0		

We must point out that only data showing statistically significant differences were presented.

Gamers assign significantly greater importance to the following factors: Various elements of games (U=28808.0, p<.001; η_U^2=.05); Visible progress indicator (U=33445.0, p=.011; η_U^2=.01); Virtual rewards (U=33760.5, p=.018; η_U^2=.01); Competition (U=32687.5, p=.003; η_U^2=.02); Cooperation / loops of social involvement (U=30841.0, p<.001; η_U^2=.03); Classification (U=33877.0, p=.021; η_U^2=.01); Visible status (U=33272.5, p=.009; η_U^2=.01); Use of avatars (U=31845.5, p=.001; η_U^2=.02); Constant evolution of the study environment (U=3390.5, p=.022; η_U^2=.01).
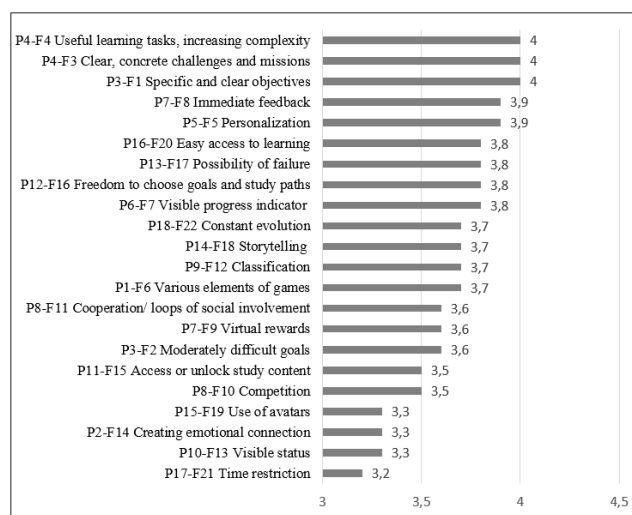
Graph I. Means of agreement with sentences about success factors of gamified apps.

The people that use gamified apps to learn a language assign significantly greater importance to the following factors: Moderately difficult goals (U=27899.5, p=.008; η_U^2=.01); Clear, concrete challenges and missions (U=28486.0, p=.021; η_U^2=.01); Useful learning tasks with increasing complexity (U=25416.5, p<.001; η_U^2=.03); Personalization according to individual experience (U=26329.5, p<.001; η_U^2=.02); Various elements of games (U=26844.0, p=.001; η_U^2=.02); Visible progress indicator (U=28955.0, p=.044; η_U^2=.01); Cooperation/ loops of social involvement (U=28992.5, p=.049; η_U^2=.01); Classification (U=28426.5, p=.020; η_U^2=.01); Freedom to choose goals and study paths (U=27770.5, p=.006; η_U^2=.01); Storytelling (U=27673.5, p=.005; η_U^2=.01); Easy access to learning (U=28343.0, p=.017; η_U^2=.01); Constant evolution of the study environment (U=27113.5, p=.002; η_U^2=.02).

We analyzed, in detail, the group of people who says that plays online and who has experience in using gamified apps. This group concerns 92 individuals, corresponding to 16.6% of the sample. We found that this group, compared with others, assigns significantly greater importance to the following factors: Personalization according to individual experience (U=19019.0, p=.007; η_U^2=.01); Various elements of games (U=18043.0, p=.016; η_U^2=.01); Cooperation/ loops of social involvement (U=18043.0, p=.036; η_U^2=.01).

Considering the nationality, Chinese assign significantly greater importance to the following factors: Moderately difficult goals (U=32329.5, p=.007; η_U^2=.01); Virtual rewards (U=33169.0, p=.027; η_U^2=.01); Competition (U=31109.0, p=.001; η_U^2=.02); Cooperation/ loops of social involvement (U=31116.5, p=.001; η_U^2=.02); Use of avatars (U=23297.5, p<.001; η_U^2=.11); Time restriction on exercises (U=27248.5, p<.001; η_U^2=.05). For other nationalities more importance was given to the factors: Useful learning tasks with increasing complexity (U=31496.5, p=.001; η_U^2=.02); Personalization according to individual experience (U=32681.5, p=.012; η_U^2=.01).

Students (S) gave more importance to factors such as: Moderately difficult goals [H(2)=8.926, p=.012; η_H^2=01; post hoc S>O, p<.05]; Various elements of games [H(2)=13.629, p=.001; η_H^2=02; post hoc S>O, p<.05]; Immediate feedback (or in short cycles) with immediate rewards [H(2)=7.972, p=.019; η_H^2=01; post hoc S>O, p<.05]; Virtual rewards [H(2)=10.090, p=.006; η_H^2=01; post hoc S>O, p<.05]; Competition [H(2)=6.167, p=.046; η_H^2=01; post hoc, p>.05]; Cooperation/ loops of social involvement [H(2)=7.742, p=.021; η_H^2=01; post hoc S>O, p<.05]; Use of avatars [H(2)=25.136, p<.001; η_H^2=11; post hoc S>T & S>O, p<.05].

Teachers and students obtained higher means in the factors: Classification [H(2)=12.349, p=.002; η_H^2=02; post hoc T>O & S>O, p<.05]; Access or unlock study content [H(2)=12.764, p=.002; η_H^2=02; post hoc T>O & S>O, p<.05]; Constant evolution of the study environment [H(2)=13.744, p=.001; η_H^2=02; post hoc T>O & S>O, p<.05]; Clear, concrete challenges and

missions [$H(2)=6.589$, $p=.037$; $\eta_H^2=01$]; Easy access to learning [$H(2)=8.000$, $p=.018$; $\eta_H^2=01$; post hoc T>O & S>O, $p<.05$].

There were no statistical differences between nationalities in playing online [$\chi^2(1)=2.003$, $p=.157$]. Gamified apps are significantly [$\chi^2(2)=21.758$, $p<.001$] less used by Chinese ($z=-2.5$, $p<.05$) than by other nationalities ($z=3.0$, $p<.05$).
As expected, students more often play games online [$\chi^2(2)=32.042$, $p<.001$] than teachers. Post hoc tests for students that play $z=2.7$, $p<.05$, and for teachers was $z=-2.7$, $p<.05$.

6. Discussion

Now we will systematize the information previously presented.
To describe their experience with the gamified apps, the individuals placed their average responses at the level of agreement, that is, above the neutral point. It can be concluded that, for respondents, gamified apps provide experiences of joy, the feeling of time flying, understanding of respondents, and the perception that time was well used in learning.

For a differential understanding of the results, differences were tested, in the importance attributed to the relevant factors for a gamified app, regarding the fact of being a player or not, having or not experience with gamified apps, nationality, and occupation.

Users of gamified apps are those who stand out the most in the number of factors valued. They obtained statistically superior differences, in the degree of importance, compared to those who do not use these apps, in 11 factors. Taking into account the analyzed groups, these are the only ones who stand out in the valuation of "Freedom to choose goals (F16), and "Storytelling" (F18).
Gamers and gamified app users, converge on the importance attached to the "Various elements of the games" (F6), "Cooperation" (F11), "Classification" (F12), "The use of avatars" (F19), and the "Constant evolution of the environment of study" (F22). They also value "Moderately difficult goals" (F2), "Clear challenges and missions" (F3), "Useful learning tasks" (F4), and "Personification according to experience" (F5).
Only gamers stand out in the appreciation of visible status (F13). It is even more important for gamers than

for non-gamers the "Visible progress indicator" (F7), "Immediate feedback" (F8), and "Competition" (F10).

Some differences between nationalities were also found, which can eventually translate into cultural differences. Non-Chinese nationals attributed a significantly higher degree of importance to "Useful learning tasks" (F4), and "Personalization according to experience" (F5). However for Chinese people are more important: "Moderately difficult goals" (F2), "Virtual rewards" (F9), "Competition" (F10), "Cooperation" (F11), "The use of avatars" (F19), and "Time constraints on exercises" (F21).
As we have seen, these differences are not due to the fact that they are more gamers.

With regard to occupation/ job, teachers and students valued significantly more than other occupations/ jobs, the "Classification" (F12), "Access or unlock content" (F15), "Constant evolution of the study environment" (F22) and the "Easy access to learning" (F20).

Students, who are more online players (than other occupations/ jobs), do not share with the group of gamers the importance of some factors. They place greater value on "Virtual rewards" (F9), "Easier access to learning" (F20), and "Personalization according to individual experience" (F5).

Qualitative analysis shows that more people gave up using gamified language learning apps than those who continue using them, which reinforces the constraint of using gamification in the TELL environment currently. Almost half of the respondents who are still using the apps agreed to the usefulness of gamification, especially for memorization. Analyzing the underlying reasons for discontinuance, both gamified platforms' deficiencies and users' personal and psychological characteristics resulted in the give-up. The most common problems of these apps identified in this study are "Inefficacy/ inefficiency/ poor quality", "Unattractiveness", "Hard to use", and "Lack of interaction".

7. Conclusion and Final Considerations

This work starts by introducing the concept of gamification and how it fits into language teaching strategies. Then presents the TELL concept, how it has developed to present day, and the growing relevance of integrating gamification.
With this in mind, an extensive literature review was

developed, identifying 18 main principles for the use of gamification in education.

Through an analysis of 18 gamified applications, only 5 were selected, which were considered as the most successful gamified tools.

Crossing each of these 5 apps with the 18 principles considered important, 10 primary factors were extracted.

In the last phase, the users' perceptions of apps were analyzed and the 18 principles were converted into 22 factors, as presented in Table IV, answering to the first objective of the investigation "Identification critical factors of designing a successful gamified language learning platform".

To answer the second research objective "Classification of critical factors (primary or secondary)", we analyzed the factors through quartiles (each quartile with a value of 1.25), considering that they are presented on a scale of 1 to 5. Thus, those that had an average higher than 3.75 were proven more important.

We consider, as primary factors, those that occurred simultaneously in the qualitative and quantitative analysis - as outlined in Table IV. In the first column (gray shading), are the principles resulting from the qualitative analysis. In the second column, marked in red, green, and blue, are the main factors resulting from the quantitative analysis (the most important in red, followed by green and finally blue). Eight primary factors emerge from this analysis: F1, F3, F4, F7, F8, F16, F17, F20. All the identified factors, in the quantitative study, were confirmed in the qualitative study, except for F5 "Personalization", which was considered a secondary factor in the previous study, but valued in the survey.

According to the literature review, the emotional association is one of the gamification tendencies. However, the respondents' perceptions manifested that it wasn't one of the most valued factors and appeared only at the penultimate position.

Triangulating the quantitative and qualitative data, other conclusions emerged. As men play significantly more than women, it is important to consider the gender issue in the design of gamified systems, trying to arouse interest in both groups even if different stimuli have to be used. The age group of those who play the most is up to 24 years old and are mostly students. However, the age group between 25 and 34 years old are the ones who most use gamified applications and consider this to be a useful form of learning. Regarding the most valued factors, it is also noted that gamers mainly value secondary factors, which were less valued by the sample as a whole.

Therefore, we can conclude, as being of extreme importance, that the design of gamified systems for TELL should allow a high level of parameterization and personalization to users. Hence, it will be possible to consider and create different environments depending on gender, age, culture, individual preferences, level of knowledge, or even "status" as a player (from basic to advanced or professional level).

These results are important in the design of new tools, to educators and educational institutions.

Several limitations point out opportunities for future research. The quantitative research conducted in this study focused on the perceptions of Chinese and Portuguese, thus the results might not be generalized for language learners of other nationalities. Given that the learners' native language and cultural background have impacts on their foreign language acquisition (Romero & Manjarres, 2017; Shatz, 2017; Villanueva, 1989), future researches should take cultural prospects into account, collecting data of users from other countries to increase the generalizability of our findings and examine the potential divergence between cultural differences.

Also, experimental studies in terms of usability tests should be carried out to find out exactly what happens because the users' perceptions may not be very reliable. They may also increase the value of the sample or even increase the number and variety of questions. As it is a relatively new area, and still little studied, it is recommended to carry out more qualitative analyzes using, for example, interviews.

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