Feedback and Gamification in Online Education
Feedback e Gamificação em Educação Online

Cláudia Gomes[1*]
Alda Pereira[1]

[1] Universidade Aberta Palácio Ceia
Rua da Escola Politécnica, n.º 147 -
1269-001- Lisboa, Portugal
*cgomes@lead.uab.pt

Abstract

Gamification has been acquiring importance in several areas, namely in Education. This article intends to make known how feedback was used in the case of a gamified system in Online Education and what the students' perspectives are about the various types of feedback used. The study focused on two half-year curricular units, both subject to a gamified design with several game elements were used as a form of feedback on activities and at different moments: points, badges, performance tables and leaderboards. Collecting data were carried out through observation, questionnaire, and interviews. The results point to the importance of the various types of feedback, and their continued distribution over time.

Keywords: Gamification. Online education. Feedback.

Feedback e Gamificação em Educação Online

Resumo

A gamificação tem vindo a adquirir importância em diversas áreas, nomeadamente em Educação. Com este artigo, pretende-se dar a conhecer um sistema gamificado em Educação Online e qual a perspetiva dos estudantes sobre os vários tipos de feedback utilizados. O estudo incidiu sobre duas unidades curriculares semestrais, ambas sujeitas a um desenho gamificado com diversos elementos de jogo como forma de feedback relativo a diversas atividades e em variados momentos: pontos, medalhas, tabelas de desempenho e placar. A recolha de dados sobre a perceção dos estudantes foi realizada através de observação, questionário e entrevistas. Os resultados apontam para a importância dos vários tipos de feedback, sendo relevante a sua distribuição permanente ao longo do tempo.

Palavras-chave: *Gamificação. Educação online. Feedback.*

1. Introduction

Online higher education brings educational challenges, largely due to the characteristics of this target audience. The application of gamification techniques can be an alternative and exhibit positive results, in terms of motivation and involvement.

In this line, Fardo (2013) mentions that gamification invites to design a system, where several elements of the game are articulated and interconnected, in a motivating and involving path. And by the Horizon Report (JOHNSON et al., 2013), it comes to us that the introduction of games and gamification techniques may increase the involvement and commitment of students in higher education.

Hamari, Koivisto and Sarsa (2014), in an analysis of empirical studies, evaluated that gamification increases motivation and commitment to tasks, while increasing pleasure in activities. However, as negative effects, they reveal the increase and difficulties in the assessment of tasks. Ogawa, Klock and Gasparini (2016), show us that most of the studies analyzed refer to gamification in e-learning environments, with badges, leaderboards, points and levels being used.

The article presented here focuses on part of a broader research project in the context of online higher education, where two gamified designs were developed and implemented in two curricular units (CU) for undergraduate courses at the Open University of Portugal (UAb). The gamified designs integrated nine game elements: narrative, videos, points, badges, leaderboard, feedback, challenge, quizzes and avatar, associated with a specific mechanics for each CU.

Motivating and involving students throughout the CU, triggering participation in the proposed activities, was the main priority of the study. Since gamification is inspired by several currents and theories, for this study areas such as Psychology (namely on motivation), Games, Gamification and Distance Education (DE) were considered.

According to the results obtained, it was possible to verify that one of the elements of the game that was highly valued was feedback. Given the importance of this in distance education, it is important to

deepen the contribution of the use of gamification techniques in contexts of online education with strong feedback mechanics.

Thus, taking into account the work developed and the respective data, this article seeks to make known the different types of feedback used and its receptivity on the part of students. Specifically, there are three issues now under analysis:

1. How do students value the various types of feedback implemented using online gamified designs?

2. How important is feedback directly associated with game elements in a gamified learning system in online distance education?

3. How can gamification techniques increase feedback in an online learning context?

2. Distance and Online Education

If in its early days, distance education relied on reduced technological means, such as the printed book, to which it later joined video and audio, with the appearance of the Internet and the unprecedented development of information and communication technologies, it evolved to more interactive modes, having moved beyond the one-to-many communication paradigm to many-to-many modes. In this context, online education emerged, translating a paradigmatic break with the traditional versions of distance education (HARASIM, 2000). Considered a subsystem of Distance Education by Anderson (2008), its development has been guided by the search for models that substantiate the existence of learner communities, where student-student interactions are highlighted.

Distance education has benefits, but also limitations. If, on the one hand, it presents temporal and geographical freedom to access and carry out the proposed activities, provided that one has access to a computer and an Internet connection, on the other hand, it is a challenge, sometimes difficult and complex to achieve. In effect, distance learning is an active process, involving activities with meaning, relevance and different applicability (ALLY, 2004), integrating new knowledge with what has already been acquired, which requires a reasonable and permanent level of motivation.

Courses can operate with synchronous and / or asynchronous communication, and, as Anderson (2004) points out, one of the great reaches of the Web in educational terms is the possibility of communication and interaction that it provides. It was this possibility that allowed the development of online learning in the context of distance education, in a constructivist perspective, with the establishment of groups of learners where collaborative learning allies with independent study and where asynchronous communication technologies have a relevant role. Online education, based on asynchronous communication, provides unique opportunities for students to have an active participation (HARASIM, 1996) and is based on the principle of active learning (AIRES, 2016).

In turn, the interaction takes on a critical importance in the student's involvement (ANDERSON, 2008), and can take different forms. Anderson (2004) equates six interactions, of which, for our study, we highlight the following: i) student-student interaction; ii) student-teacher interaction; iii) student-content interaction.

It should be noted that interaction has always been valued in distance education. In the most traditional format, focused exclusively on independent learning, it was the object of attention by several authors who sought to think and propose ways to facilitate student-content interaction (ANDERSON, 2008). On the other hand, the student-teacher interaction was confused with behavioral feedback in the first generations of DE. In recent versions of distance education, based on learning models in online communities, feedback takes other forms, using the new technological communication devices, with feedback between peers being relevant, in a perspective of collaborative (re) construction of knowledge.

2.1. Gamified Systems and *Feedback*

Gamification is a trend in various sectors of activity and draws on knowledge from different areas, namely games. Werbach and Hunter (2012) define the term gamification as "the use of game elements and game design techniques in non-game contexts" (p. 26). For the authors, gamification applied to online teaching translates the use of mechanics and game elements in the construction of a gamified instructional design for an engaging, motivational and participatory learning (GOMES, PEREIRA, NOBRE, 2018).

In games, one of the valued elements is feedback. There is a highly positive reading about this element and it is referenced abundantly (BOBER, 2010; MUNTEAN, 2011; LEE, HAMMER, 2011; STOTT, NEUSTAEDTER, 2013; ANTIN, CHURCHILL, 2011; WERBACH, HUNTER, 2012). For Astrom and Murray (2008), game creators, feedback is approached as a situation in which two, or more, dynamic systems are linked, influencing each other.

Zichermann and Cunningham (2011) refer that feedback is the most important element of the game, for directing, guiding, returning information to players and systematically updating the situation where they are at a given moment. Determined by the mechanics and system of the game, in video games feedback is often processed in a feedback loop. A player's action can, in response, strengthen his position in the game, amplifying his advantage or, on the contrary, diminishing his advantage against another competitor.

Feedback also helps the player to make decisions about the strategy to adopt, enhancing the development in the game, as well as feeding his motivation (BURGOS; NIMWEGEN; OOSTENDORP; KOPER, 2007). And, in real time, it allows the player to have a faster, instantaneous bonus and, more importantly, it provides confidence to the player, as there is a quick return on their actions (ZICHERMANN; CUNNINGHAM, 2011). For Kapp (2012), this feedback is of an informational nature, providing information about the actions, correct or incorrect. Although the player is informed about the adequacy of carrying out the task, it does not indicate how to correct his action.

However, the features that characterize feedback in games and in teaching / learning situations are not coincident, depending on the characteristics of each of these contexts. What can be considered as feedback and how it is used in an instructional approach is a function of the learning theory that supports this same approach (MORY, 2004; NARCISS, 2008; THURLINGS, VERMEULEN, BASTIAENS, STIJNEN, 2013). Furthermore, feedback in a formal learning situation is complex, influenced by multiple variables, including the student's cultural context (HATTIE, 2011).

Werbach and Hunter (2012) believe that feedback contributes to desired behavior and that, in a gamified system, it may be the key to effective motivation.

A gamified system, in addition to being based on mechanics, currently aggregates a set of elements that are used in games, namely video games. Although there is no consensus among the various scholars on which elements to include in a gamified system, depending mainly on the reasons underlying its design and the mechanics related to it, it is common to use points, badges, performance graphs, performance tables and leaderboard (ORTIZ-COLÓN, JORDÁN, AGREDAL, 2018; VARGAS-ENRÍQUEZ, GARCÍA-MUNDO, GENERO, PIATTINI, 2015). All of these elements have a feedback function (SAILER; HENCE; MAYR; MANDL, 2017), as they translate ways of informing the participant (s) about the results of a requested action.

For example, in a gamified system, Burgos, Nimwegen, Oostendorp and Koper (2007) refer that specific, contextual and instant feedback, based on learning objectives, increases the motivation, effort and performance of the learner. Furthermore, with appropriate and segmented feedback on the student's performance, he gets information about his path and what is expected of him, being able to consciously make his decisions and strategies on learning.

Mory (2004) distinguishes instructional feedback from informational feedback. The first is of a formative nature, aims to inform the learner about the correctness/ scope of an answer or a product, to provide clues to improve learning, serving a support function. Informational feedback, not specifically used in learning situations, aims to allow a comparison between what has already been achieved and what is intended to be achieved. Although the most frequent is to think of feedback as originating from a source external to the individual, Mory (2004), using works by other authors, warns of the existence of feedback of an internal nature, originating from himself, affecting the way it is interpreted external feedback and being closely linked to a dimension of self-regulation.

Hattie and Timperley (2007) distinguish four forms or levels of feedback, defined according to the respective focus: i) on the task, ii) on the procedures, iii) on self-regulation and iv) on the individual. The first provides information about a product or a learning outcome and can be simply corrective (is it correct or not) or can be further elaborated with detailed explanations, including indications of improvements. Procedural feedback focuses on how the task was performed and the strategies used. Feedback as self-regulation focuses on student monitoring, commitment and control, taking into account achieving a goal or objective. Finally, feedback on the individual refers to appreciative forms of expression about the person itself, not the task, procedures or commitment. In learning situations, these types of feedback influence each other and the boundaries between them are blurred, sometimes nonexistent, integrating the same appreciation of several types.

In a broader perspective, we agree with Hattie and Timperley (2007) when they define feedback as a response obtained after a given action or result, which comes from a teacher, a colleague, another individual, a vicarial experience, a signal, as for example in within a game, or the game itself, following an experience.

Game elements such as points, leaderboards, performance graphs and progress bars act as informational feedback. However, taking into account the feedback typology of Hattie and Timperley (2007), they focus on the result of a given task or set of tasks, but, in our view, several of them are centered on the individual, as is the case the points, the badges, as well as the leaderboard. A performance table, in turn, corresponds better to feedback for self-regulation.

When it comes to learning in online communities, feedback is an element that is confused with the interaction between participants. From a conceptual point of view, a virtual learning community is based on a socioconstructivist perspective, where the individual construction of knowledge is mediated by the exchange of views between participants on a given subject, based on the interpretations of each one on the available information (ANDERSON, 2011). In a formal learning context, it is expected that, in addition to student-teacher interaction, interaction between students will be induced (Anderson, 2003). From this point of view, feedback is a crucial element, whether provided by the teacher or by other students. As Palloff and Pratt (1999) point out, "an important element that should be built into an online course is the expectation that students will provide constructive and extensive feedback to each other" (p. 123).

The gamified designs built incorporated several variations of feedback, as was the case of informational feedback - performance tables, general performance table, final video, points, badges and leaderboard -, the feedback time - time stipulated for the pairs to give their opinion on the work made available and time for the researcher to validate what was requested in the task -, feedback to correct tasks that did not correspond to the requested and feedback to validate and praise the answers given to the requested tasks.

3. Methodology

The development of the study in question followed the Design-Based Research (DBR) methodology. Methodology closely linked to the area of education and the field of applied research, allows the transfer

and displacement of research in education to an improved practice, with a development of principles that guide, inform and improve both practice and research, in contexts educational (ANDERSON; SHATTUCK, 2012).

Two interventions were carried out in subsequent academic years (2014/2015 and 2015/2016). The first covered a first semester curricular unit (CU) with students finishing their degree, French III. After analyzing the development and results, a second intervention was carried out, also in the first semester, but with students starting their academic life - Study and Learning Practices (SLP). The two interventions contemplated a gamified system, covering the entire program of disciplines, with an equal number of elements of the game, but with rules and procedures adjusted to the context of the recipients, defining a simpler game mechanics for the SLP participants, as it is considered be at the beginning of their studies in higher education.

The gamification component - game mechanics - was made known to students at the beginning of the course. The tasks were developed sequentially, by levels, but always of an optional nature.

3.1. Feedback in Gamified Instructional Designs

The gamified designs featured nine game elements - avatar, points, badges, leaderboard, feedback, quizzes, narrative, videos, challenge - but several aspects of the mechanics were adapted to each CU.

One of the game elements widely used in gamified designs was feedback, either in terms of instructional feedback, by the researcher and teacher, or through informational feedback from peers and game elements such as final overall performance table, final video, points , badges and leaderboard.

Feedback took on an instructional role with the teacher and researcher providing support and feedback to students' teaching activity. Informational feedback included: i) feedback between peers, instigated and rewarded through points or badges, depending on the CU; ii) feedback on the activities developed along the route through performance tables and; (iii) a summary of the results achieved throughout the CU through a general performance table and a final video.

In French III, the points counted the accomplishment of the tasks, intending to reward and, thus, encourage students to participate in the development of the same. The badges rewarded a minimum number of comments on the work of the peers. In the possibility of students reaching the five badges in dispute, they had the premium badge, reward for the acquisition of all badges. The leaderboard was assigned to a challenge and would be students who overcame the challenge with a podium layout. Game element very much focused on competitiveness, gave visibility and social power with overcoming the challenge.

In SLP, the points counted the written comments given to tasks performed by colleagues. It encouraged social support, rewarding and encouraging students to read and comment on the work of their peers. The badges rewarded the value equal to or greater than 50% obtained in the quizzes. With these, students had feedback on their performance, being able to do their self-assessment and gain insight into the skills acquired. If the students reached the two badges that were in dispute, they acquired the premium badge. The leaderboard was attached to the challenge. It would be the students who took the challenge SLP Puzzle Contest, with a podium layout, giving visibility and social power, being once again a game element very focused on competitiveness.

From the time point of view, the moments of feedback were staggered, alternately, throughout the route.

3.2. Data Collection

Data collection was carried out using mixed methods - online participant observation, online questionnaire survey, online individual interview survey - in previously outlined stages.

The first phase consisted of participant observation and monitoring of students in the implementation of gamified designs. This monitoring was used to analyze the receptivity of gamified designs and, if necessary, for a quick and concise intervention in something that could be creating stress in the normal functioning of the CU. The registration, in observation grids, allowed to systematize all the information collected, which helped in the elaboration of some questions for the second phase of data collection, the questionnaire survey.

The online questionnaire survey, aimed at students, was applied using the LimeSurvey platform, with groups of questions using nominal and ordinal scales (Likert scale of 5 points), related to the students' experience in gamified designs, to the game elements used , mechanics, different personal preferences that could not be obtained only by collecting data by observation.

For both interventions, the questionnaire followed the same line, although it had some different questions, taking into account the adaptation to the constructed gamified design. Table 1 lists the questions related to feedback.

Table 1: Questions related to feedback in the questionnaires in the two courses

Questions Presented in Questionnaires for the French III and SLP CUs	French III	SLP
I enjoyed receiving written feedback from my peers	Yes	No
I enjoyed receiving electronic feedback from my peers	Yes	No
I prefer written feedback over electronic feedback	Yes	No
I enjoyed receiving comments from my colleagues	No	Yes
I consider it important to receive comments / feedback from my colleagues / peers	Yes	Yes
I think the feedback regarding the badges is important, the day after the end of the tasks	Yes	No
I think it's important to have had a document with the badges I got	No	Yes
I consider it important to have a performance table at the end of each (activity or topic)	Yes	Yes
I liked having the final video with the scores throughout the CU	Yes	Yes
I consider it important to have had the leaderboard document for the contest	No	Yes
I consider it important to have had a final summary video of the course at CU	No	Yes
I think the feedback we received from the researcher is important	Yes	Yes
I liked the feedback I received, but I considered it insufficient	Yes	No
I liked the feedback I received, but it wasn't fast	Yes	No
I liked the feedback I received	Não	Sim
I considered the feedback insufficient	No	Yes
I considered the feedback not fast	No	Yes

Source: Elaborated by the authors, based on the research carried out

The third phase of data collection resulted in individual interviews, following participation in the online questionnaire. The interviews were conducted online, recorded and later transcribed for content analysis. The interviews were semi-structured and, despite containing the same guidelines, the guide was adapted to the answers given in the questionnaire and interventions performed in the observation phase, aiming to clarify and / or deepen questions of the observation made or coming from the questionnaire.

The analysis of data from the interviews was carried out through content analysis, which according to Bardin (1977) is an increasingly subtle set of methodological instruments in constant improvement, which applies to different discourses.

The data from the questionnaire were treated with the support of the IBM SPSS program, version 22. The content analysis was prepared with the support of the N´Vivo program, version 10, and Microsoft Excel. The observation forms were developed in Microsoft Word (case of SLP) and Excel (case of French III). For the writing and presentation of data, confidentiality and anonymity issues were guaranteed.

4. Analysis and Discussion of Results

Seventeen of the twenty-six students enrolled in French III (65%) and thirty-nine out of 82 SLP students (48%) responded to the questionnaire; of these, sixteen students from e-class 1 and twenty-three students from e-class 2. Due to the fact that five SLP students indicated in the first part of the questionnaire they did not perform any task, the number of responses related to questions about the feedback decreases to thirty-four (42%).

Ten students from the CU de French III and fourteen students from the SLP CU (three students from e-class 1 and eleven students from e-class 2) participated in the interview.

The questionnaires had high levels of reliability. In the case of the question group, regarding feedback, it presented a very good internal consistency in the questionnaire for SLP students with a Cronbach's Alpha of $\alpha = 0.964$ and Cronbach's Alpha in Standardized Data of $\alpha = 0.962$. In the questionnaire for French III students, the group of questions of the feedback game element presents values for Cronbach's Alpha of $\alpha = 0.805$ Cronbach's Alpha in Standardized Data of $\alpha = 0.712$, revealing a good and reasonable internal consistency, respectively.

During the course of the CU, some students spoke about feedback on peer work, feeling it as a source of support and learning, in the case of the students in the final year of their program. For students starting their studies, this feedback seems to have gained even more prominence. The encouragement and reward for this type of contact enabled students to create a community outside the teaching platform and students shared their appreciation for collaboration between peers, the encouragement of it, but also the feedback from the CU researcher and teacher.

The vast majority of students, from both interventions, responded positively to feedback from their peers (Figures 1 and 2).
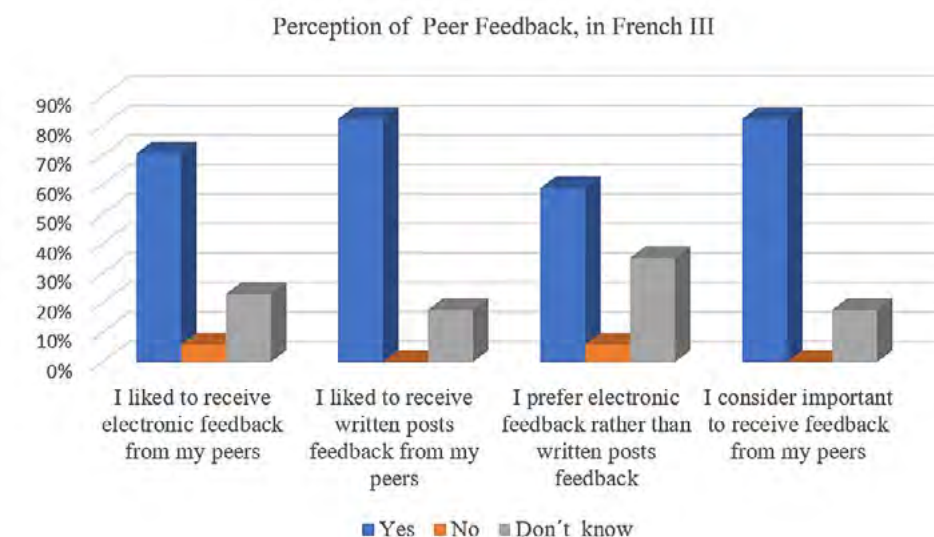
Figure 1: Perception of peer feedback, in French III.
Source: Elaborated by the authors, based on the research carried out

Among French III students, 71% enjoyed receiving electronic feedback from their peers, 82% receiving written feedback from their peers and 82% considered this feedback important. A more modest majority, 59% prefer written feedback from peers over electronic. In addition to this positive view of receiving feedback from peers, no student stated that he did not like receiving written feedback from his peers, nor did he consider it important to receive feedback from his colleagues.

Among SLP students, 82% liked having received feedback from their peers and 88% considered this type of feedback important. Only one student did not like receiving feedback from his peers and does not consider it important.
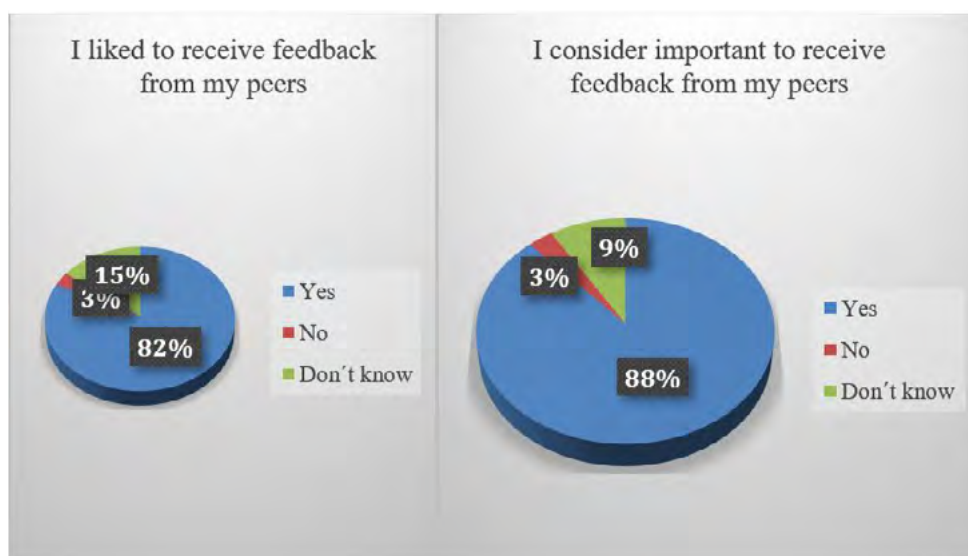

Figure 2: Perception of Peer Feedback in SLP.
Source: Elaborated by the authors, based on the research carried out

In the interviews, the positive assessment was confirmed. In the case of French, more than half of the students interviewed perceived these comments as a form of attention to the other (60%) and as an aid to learning (50%). Although it was found that several students (30%) indicate that they have not commented

on the work of their peers due to not knowing them and, as a consequence, they do not feel comfortable doing so.

In the case of SLP, several of the interviewees (29%) perceived the feedback received by the peers as an aid and some as attention to the other (14%), being based on reciprocity and relationship with the colleague. In this case, they appreciated and considered it important to receive and give feedback, largely because this feedback is felt as support, but also because of the confidence they have in the opinion of their peers.

With regard to the importance of badges, the situation is not very clear with regard to French III students. The same does not happen with the performance tables and the final video, because in both cases, the tendency to have appreciated these elements is clear (Figure 3). In the interviews, it was possible to perceive the importance of the performance tables, since all the interviewees perceive the performance tables as something positive. They are considered a guide, a regulatory element, an opportunity to compare work between peers.
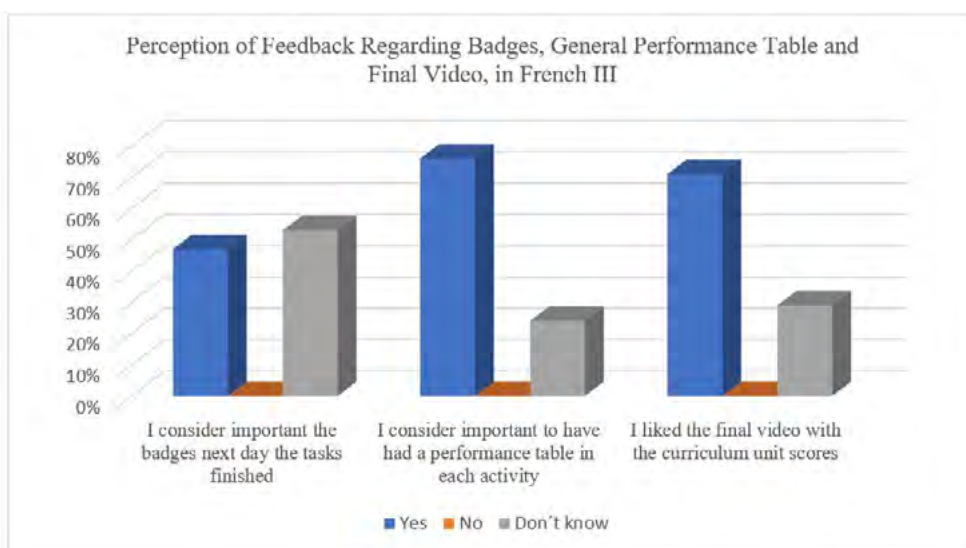

Figure 3: Perception of feedback regarding badges, general performance table and final video, in French III
Source: Elaborated by the authors, based on the research carried out

With regard to SLP students, 68% considered it important to have had the badge document, as opposed to 29% who considered it indifferent to have received such a document. The score assumed close values, although less important, with 59% of students considering it important; however, the score for the final challenge, the Puzzle SLP Contest, was not highly valued and 38% were even indifferent. In an interview, it was found that almost all of the interviewees revealed that the leaderboard made sense in the context used, as it was a contest and the competitions were for their participants. Only one student interviewed mentioned that he was indifferent, considering that the score is for those who like to compete. Given that there was no opportunity to interview all respondents to the questionnaire, we admit that this high value of "indifferent" responses in the questionnaire may have its origin in students who did not participate in the Puzzle SLP Challenge and for whom the score did not show any value.

Despite these different values in relation to badges, in the two curricular units, it was possible to verify, based on another section of the questionnaire, that students in both classes faced the inclusion of badges and points, as well as obtaining them differently. French III students preferred points to badges, unlike SLP students (Figure 4).
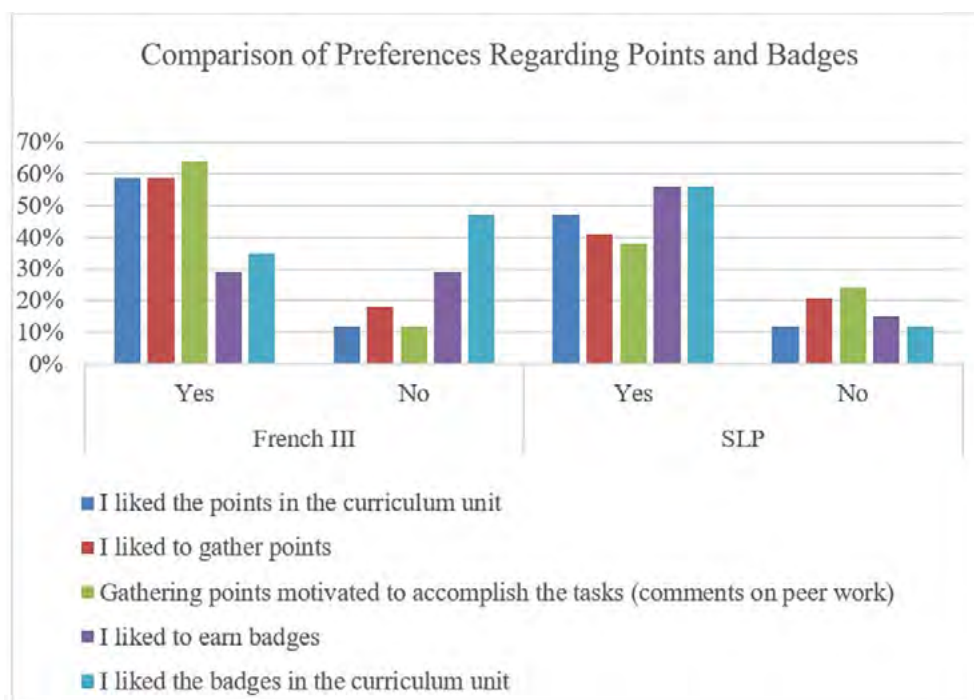
Figure 4: Comparison of preferences regarding points and badges
Source: Elaborated by the authors, based on the research carried out

This may have different explanations. On the one hand, these two types of game elements were assigned to different tasks, which may have caused differences of appreciation: in French III, the badges were associated with a minimum number of comments given to the work of the pairs and, in SLP, the badges were linked to a minimum value of 50% of the quiz value. The points, in French III, were linked to the performance of tasks and in SLP, to the comments given to the work of the peers. The hypothesis is raised that students have valued these elements in terms of the valuation they have made for the tasks related to them.

On the other hand, we must bearing in mind that these two types of game elements are related to individual feedback, although in the case of points associated with a competitive element and in the case of badges to a public recognition of a place won. Therefore, the hypothesis of different valuation according to the academic path should be considered. That is, end-of-course students prefer elements that induce competition, while beginners are more satisfied with the fact that they have achieved an achievement.

Another possibility raised is that students value instructional tasks more and play elements less. SLP students valued badges because they rewarded positive performance in quizzes; French students liked points more, probably because they rewarded the tasks requested at the end of each video that presented the narrative.

Although this question needs further investigation, the fact that both are valued is, in our view, an indication that these game elements are a form of individual feedback to be taken into account in gamified curriculum designs in online learning contexts.

The performance table was highly valued by SLP students (82%). However, in the interviews it was possible to verify that only 21% saw this element as a way of regulating their performance throughout the course. With regard to the final video, most respondents to the questionnaire (71%) considered it important (Figure 5), which was confirmed in the interviews (57%) of the respondents.
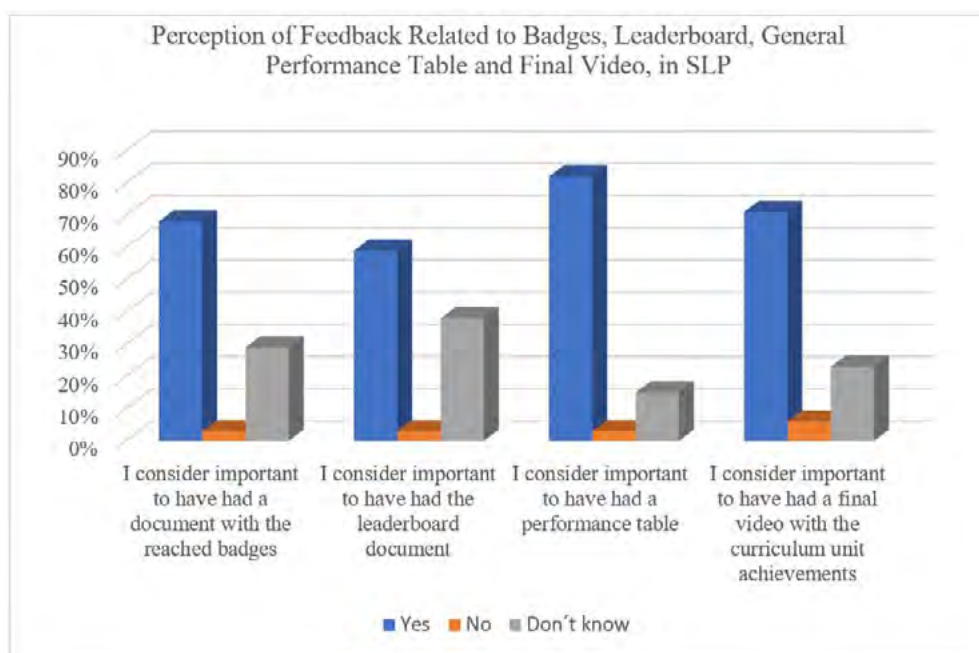
Figure 5: Perception of feedback related to badges, leaderboard, general performance table and final video, in SLP

Source: Elaborated by the authors, based on the research carried out

5. Conclusions

At this point we will try to summarize some conclusions in response to the research questions raised.

With regard to the appreciation of students for the various types of feedback implemented, the data collected allow us to conclude that the gamified designs presented to students, with a strong feedback component, worked in different ways and with different actors, had a very positive reception and appreciation , favoring adherence and a different online learning experience.

Of the students who participated in our questionnaire and interview, peer feedback was very well received, with percentage values above 80% when asked if they liked to receive written feedback from their peers or have received comments from peers. This type of feedback was revealed by the students as a form of attention to the other, an aid, reciprocity and relationship with the other. This result supports the need to belong to a community, intergroup support and social learning as sources of important and required academic growth in online education.

The feedback and monitoring of the teaching team was also important for students, with values above 80% attesting to this importance. Regarding the importance of feedback directly associated with game elements, remember that badges, points, performance tables and leaderboard were used.

The performance tables, in turn, were very well received by students, both for SLF students (82%) and for French III students (71%). Considered by students, according to the interviews, as a guide, a regulatory element, an opportunity for comparing work between peers, these feedback elements translate a form of informational feedback that enhances self-regulation, helping students to better plan their strategies at as they continue the course of the course.

In the same sense, it seems to be possible to point to the hypothesis of the performance table and the final video, synthesis of the students' achievements, highly valued by the students, to have a positive effect in terms of self-regulation.

Regarding the last question, it should be noted that in the two curricular units under analysis, game elements were used as forms of feedback designed to encourage interaction between students, promoting mutual help and collaborative learning. Such was the case with the awarding of badges in French III and points in the case of SLF, rewarding the elaboration of constructive comments on the work of colleagues.

In this line, the use of gamification techniques allowed, due to the different types of feedback, a more systematic monitoring of students, taking advantage of forms of informational feedback, in addition to instructional feedback. However, the importance of the pace of the various forms of feedback during the course should be emphasized, alternating these different modalities over time.

Instructional designs using gamification techniques allow us to put game elements to work in favor of feedback and guidance on the work developed, not overloading the teacher and, still, providing more and differentiated feedback to the student.

It is understood that when developing a gamified instructional design with this diversity of feedback sources, students will feel an orientation about what is requested and expected of them in the CU. At the same time, it is important to emphasize the importance of feedback not only resting on the teacher, but on the peers themselves. This allows the development of a community and a feeling of closeness, reducing feelings of isolation that sometimes exist in distance education. In this context, the informational feedback present through gamification techniques can be of great importance to encourage interactions between students.

The availability of feedback can be in written, multimedia or digital format. For example, written comments about the tasks and performance tables, videos related to the provision of the various tasks, or digital as in the case of badges, points and leaderboards. The pace is previously set according to the various activities and tasks proposed. Gamified designs, when built in advance of their implementation, allow sharing their mechanics with the participants, which favors their confidence in the pedagogical process and in the proposed learning path.

In this line, we assess that the feedback placed on a gamified design and its multiplicity of orientation, source actors, motivation and communicational diversity becomes an important factor for DE students and a fundamental element to consider in teaching strategies. Due to the particularity of gamified systems being designed according to the needs of the target audience, the game elements can be worked with mechanics that flow for a wide range of moments and types of feedback.

References

AIRES, L. e-Learning, Educação Online e Educação Aberta: Contributos para uma reflexão teórica. **RIED. Revista Iberoamericana de Educación a Distância**, v. 19, n. 1, p. 253-269, 2016. DOI: http://dx.doi.org/10.5944/ried.19.1.14356.

ANDERSON, T. Getting the Mix Right Again: An updated and theoretical rationale for interaction. **International Review of Research in Open and Distance Learning**, v. 4, n. 2, p. 1-14, 2003.

ANDERSON, T. Toward a theory of online learning. Foundations of educational theory for online learning. In: T. Anderson & F. Elloumi (Ed.). **Theory and practice of online learning**. Canada: Athabasca University, 2004, p. 33-60.

ANDERSON, T. **The Theory and Practice of Online Learning**. 2 ed. Edmonton: Athabasca University, 2008.

ANDERSON, T. Three Generations of Distance Education Pedagogy. **International Review of Research in Open and Distance Learning**, v. 12, n. 3, p. 80-97, 2011.

ANDERSON, T.; SHATTUCK, J. Design-Based Research: A decade of progress in education research? **Educational Researcher,** v. 41, n. 1, p. 16-25, 2012.

ALLY, M. (2004). Foundations of educational theory for online learning. In: T. Anderson & F. Elloumi (Ed.). **Theory and practice of online learning**. Canada: Athabasca University, 2004, p. 3-31.

ANTIN, J.; CHURCHILL, E. F. Badges in social media: A social psychological perspective. In: **CHI 2011**, May 7–12, 2011, Vancouver, BC, Canada. Disponível em: http://gamification-research.org/wp-content/uploads/2011/04/03-Antin-Churchill.pdf.

ASTROM, K. J.; MURRAY, R. M. *Feedback* **Systems: an introduction for scientists and engineer**s. New Jersey: Princeton University Press, 2008.

BARDIN, L. **Análise de Conteúdo**. Lisboa: Edições 70, 1977.

BATES, A. W. **Technology, e-learning and distance educatio**n. 2 ed. Oxon: Taylor & Francis, 2005.

BOBER, M. Games-based experiences for learning. **Futurelab, innovation in education**, 2010. Disponível em: https://www.nfer.ac.uk/media/1775/futl11.pdf.

BURGOS, D. et al. Game-based learning and the role of feedback: a case study. **Journal Advanced Technology for Learning**, v. 4, n. 4, p. 188-193, 2007.

FARDO, M. L. A gamificação aplicada em ambientes de aprendizagem. **Novas Tecnologias na Educação**, v. 11, n. 1, p. 1-9, 2013. DOI: https://doi.org/10.22456/1679-1916.41629

GOMES, C.; PEREIRA, A.; NOBRE, A. (2018). **Gamificação no ensino superior online: dois exemplos**. Lisboa: Universidade Aberta, 2018.

HAMARI, J.; KOIVISTO, J.; SARSA, H. (2014). Does Gamification Work? – A literature Review of Empirical Studies on Gamification. *In:* **47th Hawaii International Conference on System Science**, pp. 3025-3034. IEEE Computer Society Waikoloa, HI, USA, 2014. DOI: 10.1109/HICSS.2014.377

HARASIM, L. Online Education. In: T. M. Harrison, & T. Stephen (Eds.). **Computer Networking and Scholarly Communication in the Twenty-First-Century University**. New York: State University of New York Press, 1996, p. 203-214.

HARASIM, L. Shift happens. Online education as a new paradigm in learning. **The Internet and Higher Education**, v. 3, n. 1, p. 41-61, 2000.

HATTIE, J. Feedback in schools. In: Sutton, R., Hornsey, M.J., & Douglas, K.M. (Eds.). **Feedback: The communication of praise, criticism, and advice**. New York: Peter Lang Publishing, 2011, p. 1-14.

HATTIE, J.; TIMPERLEY, H. The power of feedback. **Review of Educational Research**, v. 77, n. 1, p. 81-112, 2007.

JOHNSON, L.; ADAMS BECKER, S.; CUMMINS, M.; ESTRADA, V.; FREEMAN, A.; LUDGATE, H. **NMC Horizon Report: 2013 Higher Education Edition.** Austin, Texas: The New Media Consortium, 2013. Disponível em: https://www.nmc.org/publication/nmc-horizon-report-2013-higher-education-edition/

KAPP, K. M. **The gamification of learning and instruction: game-based methods and strategies for training and education.** San Francisco: John Wiley & Sons, 2012.

LEE, J. J.; HAMMER, J. Gamification in Education: What, How, Why Bother? **Academic Exchange Quarterly**, v. 15, n. 2, 2011.

MOORE, J. L.; DICKSON-DEANE, C.; GALYEN, K. e-Learning, online learning, and distance learning environments: Are they the same? **Internet and Higher Education**, v. 14, p. 129-135, 2011.

MORY, E. H. Feedback research revisited. In: D. H. Jonassen (Ed.). **Handbook of research on educational communications and technology**. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers, 2004, p. 745-783.

MUNTEAN, C. I. Raising engagement in e-learning through gamification. In: **6th International Conference on Virtual Learning ICVL**, 2011. Disponível em: http://www.icvl.eu/2011/disc/icvl/documente/pdf/met/ICVL_ModelsAndMethodologies_paper42.pdf.

OGAWA, A.; KLOCK, A. C.; GASPARINI, I. (2016). Avaliação da gamificação na área educacional: um mapeamento sistemático. In: V Congresso Brasileiro de Informática na Educação, 2016, Uberlândia. **Anais eletrónicos** XXVII Simpósio Brasileiro de Informática na Educação, Uberlândia, MG, Brasil, pp. 440-449. Disponível em: https://www.br-ie.org/pub/index.php/sbie/article/view/6725

ORTIZ-COLÓN, A.M.; JORDÁN, J.; AGREDAL, M. Gamificación en educación: una panorámica sobre el estado de la cuestión. **Educ. Pesqui.**, São Paulo, v. 44, p. 1-17, 2018. Disponível em: http://dx.doi.org/10.1590/s1678-4634201844173773

PALLOFF, R. M.; PRATT, K. **Building Communities in Cyberspace**. San Franscisco: Jossey-Bass Publishers, 1999.

SAILER, M. et al.How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. **Computers in Human Behavior**, v. 69, p. 371-380, 2017.

STOTT, A.; NEUSTAEDTER, C. Analysis of gamification in education. Technical Report 2013-0422-01, **Connections Lab**, Simon Fraser University, Surrey, BC, Canada, 2013. Disponível em: http://clab.iat.sfu.ca/pubs/Stott-Gamification.pdf.

THURLINGS, M. et al. Understanding feedback: A learning theory perspective. **Educational Research Review**, v. 9, p. 1-15, 2013.

NARCISS, S. (2008) Feedback Strategies for Interactive Learning Tasks. In: J.M. Spector, M.D. Merrill, J.J.G. van Merrienboer, M.P. Driscoll (Eds). **Handbook of Research on Educational Communications and Technology**. 3 ed. Mahaw, NJ: Lawrence Erlbaum, 2008, pp. 125-144.

VARGAS-ENRÍQUEZ, J. et al. Análisis de uso de la gamificación en la ensenãnza de la informática. In: XXI Jornadas de la Ensenãnza, 2015, Andorra La Vella, pp. 105-112.

WERBACH, K.; HUNTER, D. **For the win - how game thinking can revolutionize your business**. Philadelphia: Wharton Digital Press, 2012.

ZICHERMANN, G.; CUNNINGHAM, C. **Gamification by design: Implementing game mechanics in web and mobile apps**. Canada: O'Reilly, 2011.