CAPÍTULO 20. THE USE OF GAMIFICATION IN EDUCATION: AN EXPLORATORY STUDY

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1. INTRODUCTION

The Information and Communication Technologies (ICTs) have become a means of learning as well as new ways of absorbing knowledge (Pérez-Escoda, Castro-Zubizarreta, & Fandos-Igado, 2016). These new technologies have meant that students can learn in a more creative and at the same time more fun way, having to "learn to learn" after the rapid gradual transformation of the current educational system (Bonilla-Del-Río & Aguaded, 2018). In fact, education cannot live without considering the new technological processes that are developed and evolve in society, nor can it forget the crucial role that ICTs play in the training of students (Rodríguez, Mezquita, & Vallecillo, 2019).

One of the most popular uses of ICTs in the classroom is gamification. Gamification refers to game-based mechanics, aesthetics, and game thinking to engage individuals, motivate them, enhance their learning and problem solving (Deterding, Dixon, Khaled, & Nacke, 2011). Besides, different authors (Gravalos-Gastaminza, Hernandez-Garrido, & Perez-Calanas, 2022; Meier & de León, 2021) have shown that the use of gamification in the classroom has positive effects on education, essential aspect in the daily life of students and teachers who are immersed in continuous teaching innovation. Both groups have had to adapt to new forms of learning, more innovative than those traditionally known.

However, despite the growing importance of ICTs in education, and more specifically gamification, there are still many teachers that are reluctant to use these digital tools in the classroom. In addition, in the world of research, despite the fact that there are studies that highlight the growing importance and need to use gamification in the classroom, there is still a need for current studies that

evaluate the different existing applications and the importance of their use. in education. Therefore, the aim of this study is to analyse the main apps related to gamification and the use of gamification in education. In order to carry out the aim of the study, the collection of your reviews will be obtained from web scraping techniques using open source software, R, applied to the official Android app store, Google Play.

Among the most successful gamification apps, according to the different existing studies, are kahoot, classcraft, plickers, quizizz, quizlet, socrative student, and socrative teacher. Therefore, our study focusses on the reviews of these popular apps.

Kahoot is considered one of the most popular gamification apps. It is a free app that is designed to facilitate learning. This app allows the teacher to create tests with multiple choice questions (Jaber et al., 2016). Kahoot is a tool that offers the opportunity to learn in the classroom and beyond (Kahoot! Studio, 2022). It is an easy-to-use tool. The teacher who is going to use the tool must create a user with a password linked to an email. Once said user has been created, the app allows the creation of test-type questionnaires, with the desired number of questions and the desired duration. In addition, the tests can be complemented with multimedia content such as images, videos and diagrams. For its use, it is not necessary for students to register as users, it is enough for them to access the kahoot website or the application through their mobile phones, laptops or tablets, entering the code that the teacher provides them, as well as a username. Once all the students have entered, the teacher begins the activity. Between each question, once the time has elapsed, the page shows a classification of the different answers that the students have given to the previous question and which was the correct answer, then it shows a table where the five players with the highest score. Once the test is finished, the username and the points of the three users who have obtained the highest score are displayed. At the end of all the questions, the teacher will be able to download an Excel sheet file with the results obtained by each student.

Another popular application is Classcraft. It is considered as a free digital educational tool that allows the teacher to gamify the classroom and direct a role-playing game in which students embody different characters, which leads to different learning experiences (Mora Márquez & Camacho Torralbo, 2019).

This app allows the student to enter an alternative learning process and embody different characters throughout an adventure. This makes the learning process more dynamic and different from the traditional one (Rogers, 2017). This application can be used in different educational areas, since it promotes teamwork and communication.

Besides, Plickers is other well-known free digital application that allows the collection of data in real time to be used in the student evaluation process (García, 2016).

Thanks to the results provided by the application in percentage and weighting format, teachers can assess the level of student learning, which allows positive feedback.

To do this, the application allows the creation of different questions (multiple choice, true or false...). In addition, the tests can be complemented with multimedia content such as images, videos and diagrams. For its development, the application provides different markers for students that will have to be printed before taking the tests. These markers can be oriented in four different ways (a, b, c, d), related to the four possible answers that the application admits.

Using these markings, students will select the answer they consider to be correct, showing their card to the teacher. The teacher will scan and record all the answers from his Smartphone, Tablet or laptop. Simultaneously, it will be possible to visualize on the screen of the teacher's computer the students that are missing to be scanned and the results obtained with their choice .

Furthermore, when it comes to apps related to gamification, we can not forget Quizizz. It is a free application similar to the previous ones in which the teacher must previously register with an email, creating a username and password. This application allows you to create multiple choice tests in which the teacher can incorporate as many questions as he wishes. Unlike Kahoot, when the(Mshayisa, 2020) student answers a Quizizz, she does not need to be looking at the class board or projector since the question appears on each of the devices along with the possible answers.

Besides, Quizlet is a popular free digital tool, notable for its ease of use. It is very useful for teachers since it asks for the creation of test or quiz-type exercises, which allows an easy way to evaluate students on the matter explained. However, its immediacy and simplicity help to attract and focus the attention of students so that they acquire knowledge in a fluid way. This application can be applied in all kinds of educational areas.

Finally, Socrative is a free virtual platform that allows both teachers and students to connect through their mobile devices, tablets or laptops while in class.

This platform allows students to be motivated to participate actively in class, answering questions through their digital device. The activity consists of students accessing Socrative.com and answering the questions that the teacher has previously created in the application on a topic related to the subject. It has the advantage of its ease of use, as well as the speed of being able to observe an individual and also a group report of the students. Once the time given by the teacher ends, the activity closes, and socrative.com automatically sends the teacher via email a statistic of the activity.

2. METHODOLOGY

We base ourselves on the foundation that in order to carry out a complete analysis that obtains findings that are very close to reality, it is necessary to take

into account all the reviews of the chosen mobile applications. To do this, they will be collected automatically using web scraping techniques.

The selected gamification mobile applications to study are Kahoot, classcraft, plickers, quizizz, quizlet, socrative student, and socrative teacher. Reviews will be obtained from the digital distribution platform for mobile applications, Google Play. It has been selected this data source instead of the Apple Store (IOS), because Google Play (Android) leads application downloads (Möller et al., 2012).

Google Play shows the average of the ratings (stars) and the number of downloads worldwide, but the reviews that appear are not those of users from all countries, but according to the language indicated in the web link, Google Play displays reviews written in one language or another. Therefore, in this case, the reviews in Spanish are studied.

From the launch of the apps until December 2021, we have automatically collected 27,162 reviews from Spanish users. The collection of reviews was carried out in January 2022 by web scraping techniques, which automates the collection process. An open source software package R, rvest was used, to make it easy to download and then manipulate HTML and XML.

The steps of web scraping are: (1) parse the structure of the web page, (2) parse the HTML content, (3) get the URL, (4) get the page source, (5) select data, and (6) process the data.

Once the reviews have been obtained, their number of reviews and the score that users have given to each app have been taken into account. The number of reviews has been taken as a measure of interest for each app. This measure has been used, since it is understood that the level of reviews is proportional to the level of interest. The more reviews of an app, the more interest it generates.

A qualitative analysis was also carried out in which we analysed the content of each of the reviews obtained with the aim of identifying the frequency of each word and thus being able to know the users' perception of this type of app through the use of text mining. The most frequent words that appear in the reviews provided by users were obtained by applying the R "tm" library (Feinerer, Hornik, & Meyer, 2008). This is a package consisting of a text mining framework that provides some powerful features for text processing. Some of the features of this package include stopword removal, white space removal etc. All this is used in a corpus that supposes a collection of text documents, being the main structure to manage documents in tm.

3.   RESULTS

The results obtained after carrying out the aforementioned web scraping methodology are shown below.

Firstly, we have selected the main apps related to gamification for the number of reviews because this is an indicator of the interest of each of the apps in the field of gamification. The table 1 shows the interest that the apps have

obtained from Spanish users. The gamification app that generates the most interest is Kahoot that occupies 68.14% of global interest. The second is Quizlet, with 24.67% interest. These two are the main apps, since the rest are below 4% interest. Therefore, for the survey that is intended to be developed, it will focus on Kahoot and Quizlet.

Table 1. Reviews of the main gamification apps

Apps	Reviews	%
Kahoot!	18.508	68,14%
Quizlet	6701	24,67%
Classcraft	979	3,60%
Socrative Student	406	1,49%
Quizizz	312	1,15%
Plickers	186	0,68%
Socrative Teacher	70	0,26%
TOTAL	27.162	

Souce: Own elaboration

Regarding the sentiment of the reviews, it is obtained from the number of stars that each review has indicated. Positive reviews are those with 4 or 5 stars, while neutral reviews are those that get 3 stars and 1 or 2 stars are equivalent to negative reviews. It has been calculated in the table 2 that shows the high percentage of positive reviews. Almost all of the reviews are to indicate positive aspects of gamification apps. Almost 96%. Neutral reviews are almost nil, and negative reviews are also very low. It is clear how this type of apps is highly valued by users.

Table 2. Number of reviews according with the received stars

Sentiments	Reviews	%
Positive	14688	95,6%
Neutral	141	0,90%
Negative	536	3,5%

Source: Own elaboration

To understand the perception of users, we have carried out an analysis of words in which we differ from the positive, neutral and negative ones. This will serve as the basis for developing a brief survey for students. The word frequency will be graphically represented in Spanish, since it is the original language of the reviews. However, in this analysis the results obtained will be translated into English.

Figure 1 shows us the percentage of use of the ten most frequent words of the positive reviews. The most used bigram in the reviews was to indicate that "good app". In addition, other adjectives to qualify the apps were "excellent", "better" and "easy to use". Another aspect to highlight is that these apps are used both to study and to learn. Above all, it stands out that it helps to study the subjects. And it is also emphasized that this type of app is a game.

Figure 1: Most frequent words in positive reviews
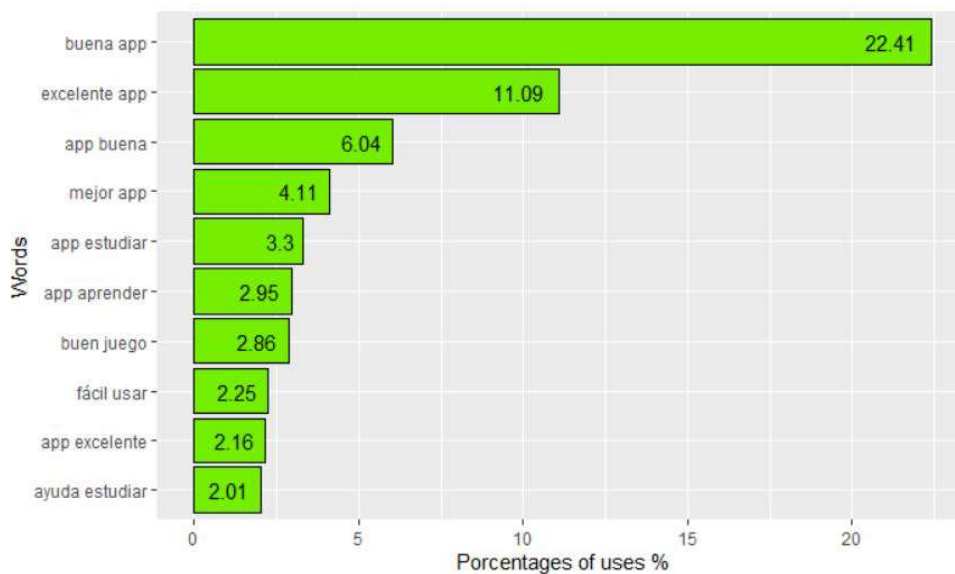
Source: Own elaboration

Regarding the neutral reviews, their most frequent bigrams are shown in Figure 2. It again highlights that it is a good app. But the most interesting thing is that the "night mode" and "rotate screen" functionality is mainly pointed out. In addition, the "free version" aspect is highlighted.

Figure 2: Most frequent words in neutral reviews
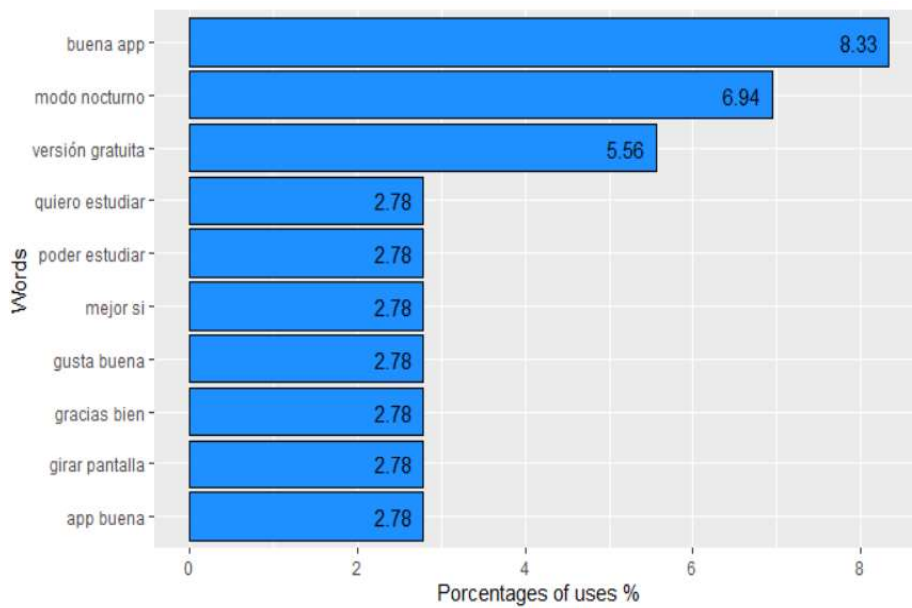
Source: Own elaboration

Figure 3 indicates the negative aspects to consider. The main problem with these apps is when entering the accounts. It seems that it won't start several times. The option to register through Google or Facebook causes inconvenience. New versions also bring problems with them, which is why previous versions stand out.

Figure 3: Most frequent words in negative reviews
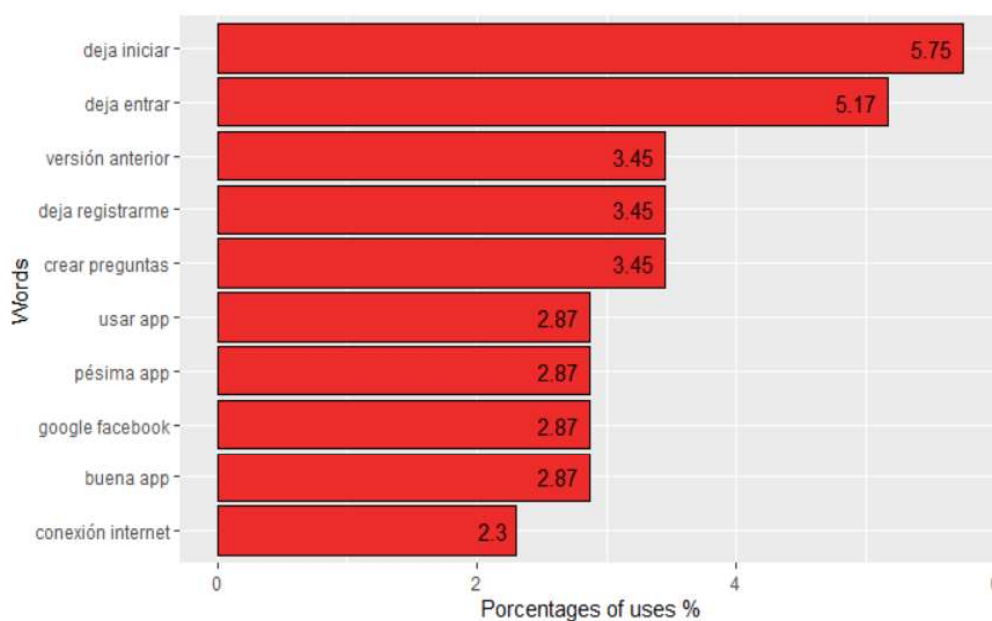
Source: Own elaboration

Few more negative aspects are remarkable from the app itself. Since they also indicate that there are errors with the internet connection, but this is an external factor to the apps, which derives from other problems with the Wi-Fi installation or the device itself.

Once these results are obtained, we are going to carry out a study with the students of the different engineering branches of the University of Huelva with the aim of corroborating the results obtained. In this study, once each of the topics of the Business Administration subject has been completed, we will use the different gamification applications described above to evaluate the students' understanding of the exposed syllabus. Once this evaluation has been carried out, we are going to launch some questionnaires to find out the perception of the students of the University of Huelva about the use of gamification in the classroom. The table 3 shows the questionnaire.

Table 3. Questionnarie

Questions
1)   Have you previously used any educational gamification app?
2)   Rate from 1 to 5 (1 being a low rating and 5 being the highest rating) your perception of gamification apps.
3)   Do you have fun using gamification apps?
4)   Do you use it to learn in classes or to study on your own or both options?
5)   Do you consider the functionalities provided by the free versions of these apps adequate?
6)   Have you used the premium version of these apps? Are they worth it?
7)   What functionality do you miss in this type of app? a.   Dark mode. b.   Allow the screen to rotate. c.   Version accessible to the blind. d.   Others (indicate): _____
8)   Do you have any of these problems? a.   It won't let me enter the app. b.   It cannot register. c.   It does not allow me to create questions. d.   Others (indicate): _____

Souce: Own elaboration

Once the results of the students of the different engineering degrees are obtained, we will compare the results obtained from the analysis of the reviews with the perception of the students of the University of Huelva.

4. CONCLUSION

The conclusions of this study show that apps related to gamification are well received by their users since they value them very positively, especially Kahoot and Quizlet as they are the preferred apps by users. The rest of the study apps seem not to be as popular with users.

When it comes to the theoretical implications, this research contributes to the current background of higher education and gamification. Besides, regarding the practical implications, this research can be useful for developers of gamification apps because it shows the main apps and the aspects that students most and less appreciate about these apps.

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