

## Escape room in education: a bibliometric study

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### **Abstract**

*The impact of technologies in all areas is one of the main points that characterize the current society. In the educational context, recently, great efforts are being made to adapt the system to characteristics and needs of the students of the 21st century. Gamification in education consist on the use of structures, characteristics, dynamics and aesthetics of games for educational purposes, to increase students participation and motivation. The escape room is a gamified activity in which one or more teams must leave a place during a limited time solving a challenge whose goal is learning. This study pretends to analyze research trends through a bibliometric study of scientific production deposited in Scopus. 32 articles were obtained for the analysis. The results indicate an increase in scientific publications in last decade, and the main mean of dissemination are journals, specially in Social Sciences field. In addition, data shows the low impact and the absence of medium and large producers. Finally, the weight of Spain highlights and the implementation of escape rooms in the Higher Education stage stands ou too.*

**Keywords:** *Bibliometrics; Gamification; Escape room, Education, Motivation, Breakout.*

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## **1. Introduction**

One of the main changes of recent times has been the introduction of technologies in classrooms. This reality has led changes in teaching practices, leading to different methodologies. Gamification is one of them. According to Deterding, Khaled, Nacke & Dixon (2011) is not a term on which there is consensus, although it is accepted that it involves the introduction of gaming elements to motivate students and get implication in their learning. In recent times, gamification has been applied in different educational contexts and stages (Corchuelo, 2018; Fernández, Prieto, Alcaraz, Sánchez & Grimaldi, 2018; Manzano & Baeza, 2018; Martínez, 2017; Pintor, 2017) and in students with functional diversity, specifically in intellectual disability (Vidal, López, Marín & Peirats, 2018), obtaining the improvement of autonomy and inclusion, and the development of communicative and social skills, as a result. Within this framework, in recent years, escape room activities have begun to be applied in the educational field, and in order to know the real impact obtained from its use, we carried out the following research.

In order to study this issue, a bibliometric analysis of the trends of scientific production has been carried out. Some of the questions that are intended to be answered are: Is there scientific research on the implementation of escape room in education? What bibliometric behaviour do these publications have? What countries stand out in the literature? What place does Spain occupy? And what is the impact of these publications?

The starting hypothesis is that gamified strategies applied to education from playful activities such as escape rooms, allow the achievement of learning and the adjustment to the characteristics of students of the 21st century.

## **2. Method**

Bibliometry allows quantifying scientific activity on an object of study (Tomás & Tomás, 2018), in this case, on the applications of the escape room to the educational field.

The scientific production deposited in the Scopus database was used, for being the most complete in temporary coverage, for the number of documents (Hernández, Sans, Jové & Reverter, 2016) and for its scientific prestige.

For the search of the documents to analysis, the words: *escape room* OR *breakout* AND *school* OR *education* were used as keywords in title or summary. No time or language limits were used and the 32 documents obtained in the search were relevant for this study.

The data analysis was performed according to productivity variables and thematic relational nodes. For the graphical representation of the results, co-occurrence maps were made with fractional counting through Vosviewer tool (Van Eck & Waltman, 2010).

### 3. Results

The results of this bibliometric study are grouped around productivity and content analysis.

Regarding the variables involved in productivity, the data are differentiated according to typologies, area of knowledge and temporality; authors and countries; and impact.

#### 3.1. Analysis of the type of documents, area and temporality

First, according to the number of documents resulting in the search, low figures stand out, despite we don't have applied any temporary filters.

Regarding the type of documents of the 32 resulting documents analyzed, the majority (75%) are scientific articles, followed by conferences (19%), and book chapters or notes (3% respectively).

In regard to the area from which these works are carried out, Social Sciences (33%) stand out, followed by others as chemistry (9%), engineering (7%), nursing (7%) or mathematics (3%), among others.

Regarding temporal distribution of scientific productivity, we present the data of documents published per year, it allows to know the frequency of publication on this issue, the interest in this object of study, and the diachronic tendency; and in this case, results only appear stands out only in the last decade. In Figure 1, the number of documents published between 2011 and 2019 is presented, although it is considered that it was in 2016 when the use of this term began in Europe. As it can be seen, the number of publications has increased in recent years, especially since 2017.

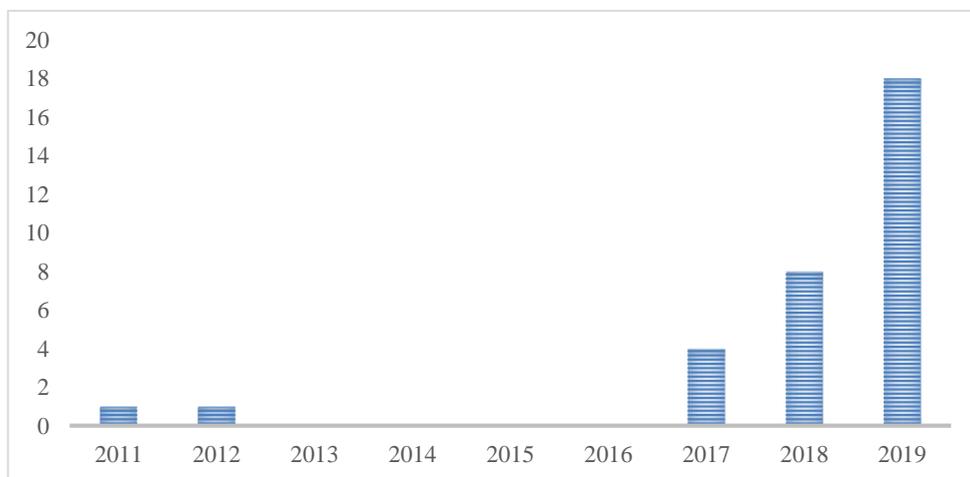


Figure 1. Number of items per year. Source: Own elaboration from Scopus.

### **3.2. Analysis of authors and countries**

In regard to collaboration and co-authorship, there are an amount of 119 signatory authors of the 32 selected articles, therefore, in this field the rate of collaboration is high. Table 1 shows the results according to the number of signatory authors in each article, which allows us to know the collaboration networks generated in the scientific community regarding the use of escape rooms in education.

**Table 1. Collaboration and co-authorship**

<b>Authors</b>	<b>N</b>	<b>%</b>
One	5	15%
Two	5	15%
Three	6	19%
Four	7	22%
Five	3	9%
More than 5	6	19%

Source: Own elaboration.

On the one hand, as observed, most articles were written in collaboration (85%). Half of the documents were written by more than four authors, highlighting the work of Ferreiro-González, Amores-Arrocha, Espada-Bellido, Aliano-Gonzalez, Vázquez-Espinosa, González De Peredo, ... & Cejudo-Bastante (2019) with a total of 10 authors. On the other hand, the distribution of the production is described based on the number of works signed by the same author, based on Lotka's scientific productivity law. Compared to other recent studies focused on the analysis of gamification (Peirats, Marín & Vidal, 2019), on the digitalization of curricular contents (Marín, Pardo & Vidal, 2019) or on the impact of technologies on attention to diversity (Vidal, Marín, Peirats & Pardo, 2019), only occasional producers (119 authors) are found in this case, with only one document in the field.

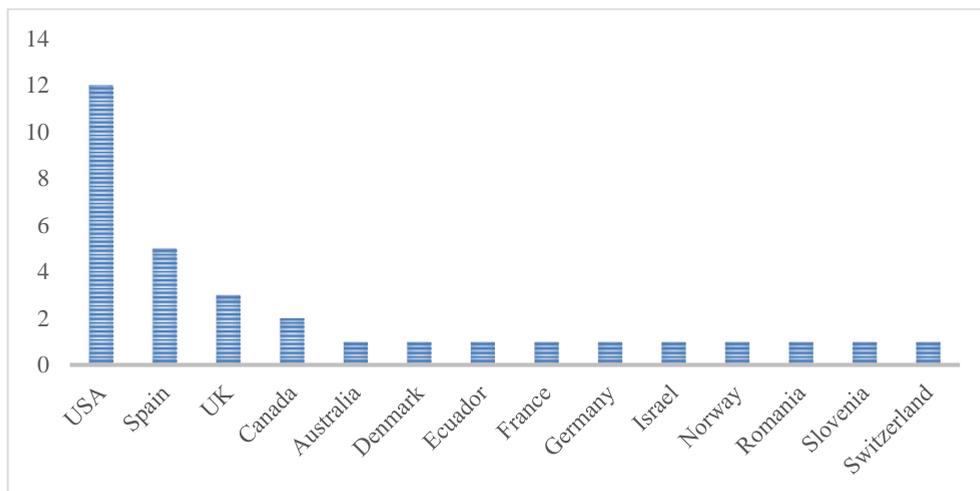


Figure 2. Publications by country. Source: Own elaboration from Scopus.

Furthermore, regarding the bibliometric size of each country (Figure 2), there are great differences, highlighting the United States with 12 documents; Spain with 5 documents (Borrego, Fernández, Blanes & Robles, 2017; Ferreiro-González, et al., 2019; Gómez-Urquiza, Gómez-Salgado, Albendín-García, Correa-Rodríguez, González-Jiménez & Cañadas-De la Fuente, 2019; Lopez-Pernas, Gordillo, Barra & Quemada, 2019; Santos, Miguel, Queiruga-Dios & Encinas, 2019), United Kingdom with 3 and Canada with 2, in addition, a total of 10 countries only have one article.

### 3.3. Impact analysis

Regarding the impact of the articles analyzed, counted through the number of citations received, it stands out that 34% do not have any citation and 47% have between one and five citations. These data reflect the low impact of most jobs among the scientific community. However, there are three articles with more than ten citations (Borrego, Fernández, Blanes & Robles, 2017; Dietrich, 2018; Eukel, Frenzel & Cernusca, 2017).

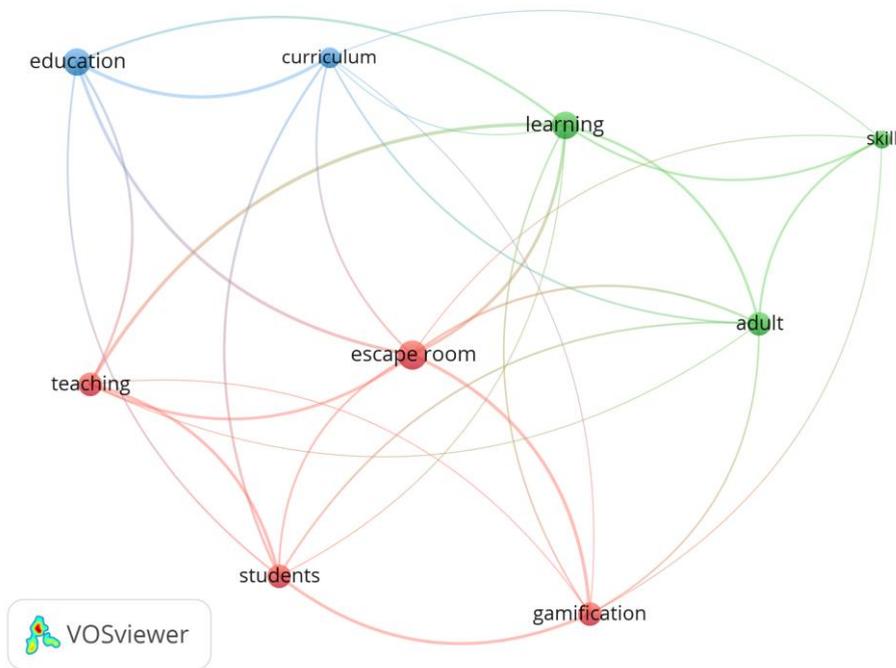
### 3.4. Content Analysis

According to the stages in which each investigation is carried out, more than 80% of the studies analyzed were focused on Higher Education, mainly in the area of future health personnel training, such as in the works from Guckian, Sridhar & Meggitt (2019), Rosenkrantz, Jensen, Sarmasoglu, Madsen, Eberhard, Ersbøll & Dieckmann (2019), or Gómez-Urquiza, et al. (2019).

In terms of benefits obtained by the participating students, we can highlight the promotion of communication and group dynamics, the increase in commitment and attention or problem-solving skills (Ross & Bell, 2019), the improvement of learning (Berthod,

Bouchoud, Grossrieder, Falaschi, Senhaji & Bonnabry, 2019; Franco & DeLuca, 2019; Novak, Lozos & Spear, 2019) or student motivation too (Kinio, Dufresne, Brandys & Jetty, 2019). Likewise, the potential of this activity is affirmed as an innovative educational tool (Ferreiro-González, et al., 2019).

Finally, regarding the content, we have analyze the most frequent keywords and we have group toghether them into categories that emerge from the reading. Analysing the keywords, the high diversity of them stands out, we could find 160 different keywords in only 32 documents. The most frequent keywords in the articles analyzed are: learning, gamification, followed by terms such as students, teaching or curriculum. Figure 3 shows the co-occurrence map of the keywords that reflects the relationships between the terms and the tendency to appear together. Three clusters or thematic relational nodes were distinguished.



*Figure 3. Co-occurrence map of terms. Source: VOSviewer*

#### **4. Conclusions**

The aim of this study was to analyze trends in research regarding the use of escape room activities in educational field. To achieve this objective, a bibliometric analysis of the scientific production available in the Scopus database was carried out, considering the productivity and the content of selected documents.

We can conclude that many are the possibilities of this activity, because in recent times, despite the small number of publications found, promising results have been obtained for the improvement of education from a paradigm in which the main characters are the students, and the focus, the development of life skills.

Finally, in regard to the lines of future research, it is necessary to reflect on the application of escape room in other educational stages, on the implications that the introduction of this resource will have on teacher training, and finally to compare the results of this analysis with those obtained through other databases such as JCR or WOS.

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