



# The E-Learning in University Studies: A Scientific and Social Analysis

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## ARTICLE INFO

## ABSTRACT

The aim of this study is to validate the use of e-learning as a learning methodology after the urgent need generated by the pandemic. A comparative analysis is carried out between scientific studies on the subject and social listening to contrast whether e-learning is still a reality today. We start by analysing the scientific activity in the Wos database through a bibliometric study, from which we extract a systemic review and a meta-analysis from 2019 to the present day. The PRISMA statement focuses this analysis on 50 articles from 26 sources from a total of 192 authors. Subsequently, through artificial intelligence and social network listening, we find out what is being said about e-learning. By analysing and comparing the scientific and social results, conclusions are reached that shed light on the current challenges of using e-learning systems in higher education. Despite the fact that e-learning should remain a learning style parallel to higher education, as demonstrated by the positive experiences of university students, teachers and staff during the COVID-19 pandemic, currently research on the subject and mentions in networks show that this learning system has not followed an adequate development on an educational level. The rapid growth of e-learning during the pandemic has been relegated to a mere mirage, which we think should continue to grow in the near future.

**Keywords:** Online Learning; Network Analysis; Social Listening; Scientific Studies; Pedagogical Innovation; Teaching Methodology, University.

## INTRODUCTION

Technologies have been gradually incorporated into higher education, bringing changes to the teaching and learning process through a virtual teaching modality based on interactive communication and access to knowledge (Nieto-Sánchez, 2018). Before the pandemic, many universities already had experience in virtual modes, especially in distance or blended learning programmes, but little experience in online modes, but after the unexpected appearance of COVID-19, educational institutions had to face transcendental changes and make immediate decisions in order not to paralyse learning at different educational levels.

However, even before the coronavirus, the adoption of e-learning in businesses, schools and educational institutions was growing exponentially; according to a report by Global Market Insight, the e-learning industry is expected to be worth \$375 billion by 2026.

At this point, e-learning appears to be an important support for students and teachers, creating virtual learning spaces through virtual platforms and video conferencing... as shown in the report E-learning 2022: The Online University Student. Trends and Perspectives states that the percentage of students taking some form of online training will rise to 74%, highlighting the level of penetration of this modality.

Despite this boom, the term e-learning has been used unevenly due to the lack of consensus on its conceptualization, characteristics and implications, which vary according to the author and the academic field that addresses the topic (Rodrigues et al., 2019). It is preceded by the letter e, which stands for electronic, and learning, which implies learning.

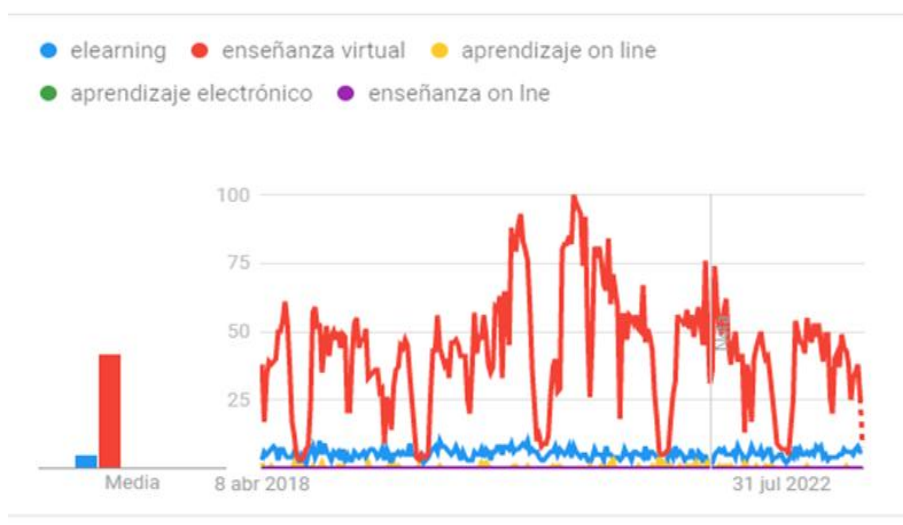
Therefore, in simple terms, it refers to learning activities that use electronic devices. Therefore, e-learning is often understood as the knowledge that is delivered through a computer and is useful for teaching and

learning.

Other terms used as synonyms for e-learning include computer-based training, online learning, virtual learning, web-based learning, etc. Virtually all of these terms imply that the learner and the teacher, tutor or instructor are physically separated for a large part of the learning process or action and that they communicate through some form of technological mediation.

Moreover, they are consistent in that they all refer to the use of information and communication technologies in different educational activities, whether carried out individually or in groups, working online or offline, synchronously or asynchronously, through networked or stand-alone computers or other electronic devices (Area and Adell, 2009; Romiszowski, 2004; Garrison and Anderson, 2003).

In order to define the terms with which to begin this research, a search was first carried out using Google, from 2018 to 2022, for both web and news, in Spain and the world. The results obtained are shown in the following graphs, where it can be seen that there are significant differences between our country and the rest, since in the former practically only the concept of virtual teaching is searched for on the web, while in the rest the same is done, but with the term e-learning.



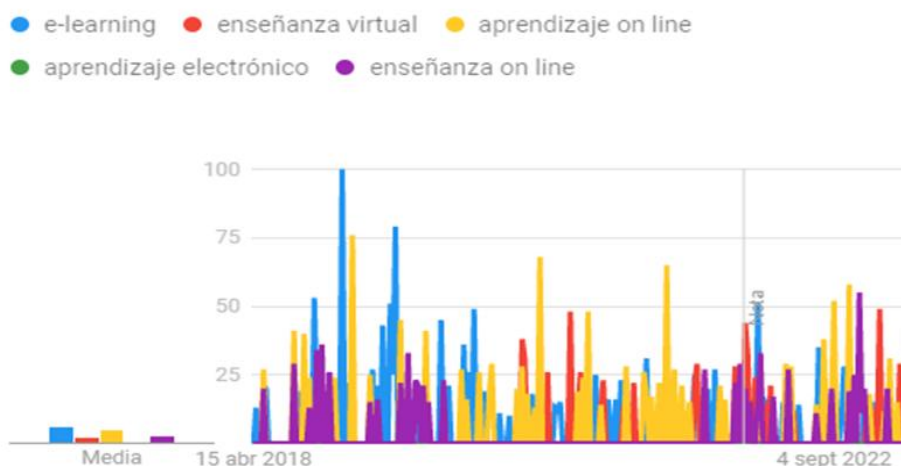
**Figure 1.** Web searches in Spain.

**Source:** Google Trends, 2023

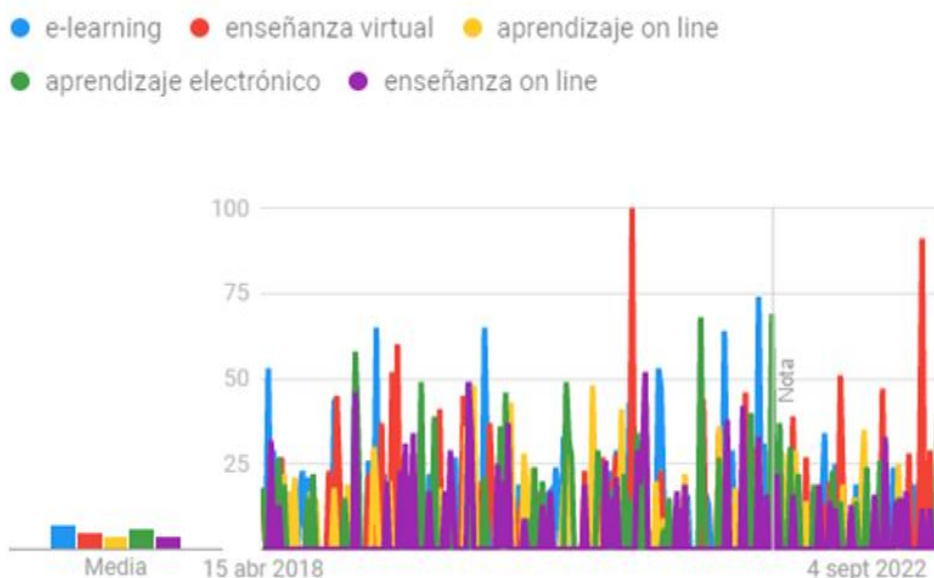


**Figure 2.** World web search.

**Source:** Google Trends, 2023



**Figure 3.** Spain News Search.  
**Source:** Google Trends, 2023



**Figure 4.** World News Search.  
**Source:** Google Trends, 2023

For this reason, throughout this study, we will mainly use the terms e-learning and virtual teaching, as these are the most frequently referenced terms on the web, which will allow us to narrow down the research data to be carried out, although in some cases it will also be necessary to use any similar term due to its relevance.

Once the terminology on which the research is based has been clarified, the main objective of this study, after verifying that its meaning is still unclear, is to develop an updated vision of e-learning, focused on results in higher education, from a scientific point of view and from the point of view of society in general. The aim is to match the knowledge structure developed by researchers as an online learning style with the reality of websites and social networks in order to draw conclusions about the reality of e-learning today.

Therefore, the review aims to answer two research questions:

(Q1) What is the scientific view of e-learning in higher education?

(Q2) What is the social listening of this concept, and what is the opinion of society in general on websites and social networks?

A bibliometric review is proposed, through the application of R-Studio Cloud, based on the quantitative analysis of the scientific literature published in indexed journals since 2019, in order to verify the state of the question before the start of the pandemic, indexed in Web of Science (Wos), chosen for this research because it is the most comprehensive scientific information platform for consulting the databases of the Institute for Scientific Information (ISI) and its purpose is to provide analytical tools that allow the scientific quality of publications to be assessed. However, the Scopus database was used to compare some of the information in the Wos database.

Arksey and O'Malley's (2005) five-step framework for mapping the scientific literature was followed, consisting of: a) identification of the research question; b) systematic search for scientific evidence; c) selection of studies; d) data extraction; and e) collection, synthesis and dissemination of results.

In addition, the article selection process has been improved using the Preferred Reporting of Items for Systematic Reviews and Meta-Analyses Approach (PRISMA) by Moher et al. (2009).

For the social listening research, the Brandwatch platform was used, which allows us to search both the website of interest and the web and social networks for all conversations that mention the concept under analysis, as well as reviews, positive or negative comments and blog articles where any mention is made.

## THEORETICAL FRAMEWORK

E-learning does not have an exact date of birth but is the result of the convergence of various technologies and educational trends that have developed over time. However, it can be said that e-learning, as we know it today, emerged in the mid-1990s with the advent of the Internet and the World Wide Web as a knowledge strategy in universities, combined with distance learning and the beginning of the use of the Internet in higher education.

In its early days, it focused on the delivery of online educational content, often in text format and with little interactivity. However, over time and with the development of new technologies, e-learning has evolved into more interactive and collaborative forms of online learning, including multimedia elements such as video, audio, animation and educational games.

With the emergence of online learning platforms and the adoption of standards and technologies such as SCORM (Sharable Content Object Reference Model) and LMS (Learning Management System), e-learning has become an increasingly popular form of education around the world, with the potential to deliver training programmes on a large scale and in a flexible and accessible way. We can consider that e-learning has gone through three different phases: e-learning 1.0, 2.0 and 3.0, as the evolution of the e-learning model, is inextricably linked to the evolution of the web (García-Peñalvo and Seoane-Pardo, 2015).

E-learning 1.0 is the one that emerged with the advent of the Web environment, with the appearance of learning (content) management systems (LMS or LCMS), which made it possible to support the management of studies and the organisation of courses for learners.

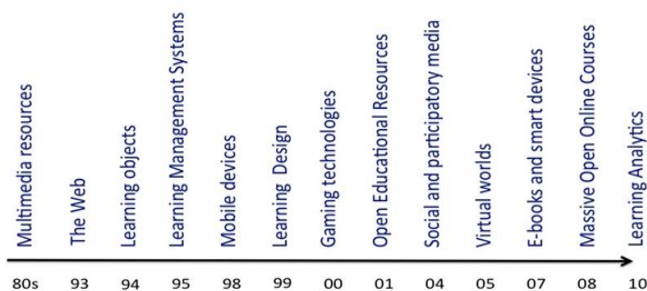
The second generation of e-learning (2.0) appeared with the application of Web 2.0 to teaching, becoming a collaborative tool thanks to the use of wikis, blogs, and podcasts...

One of the great innovations of the third generation of e-learning has been access to learning resources through the use of mobile devices. We are talking about personal learning environments that also rely on data mining and artificial intelligence. In addition, from 2010 until today, e-learning 3.0 has been increasingly inspired by social networks because they offer innovation and a more fun and creative learning environment (Dewi, R. R. et al, 2021), making learning more accessible in the form of blogs, Twitter threads, short videos and documentaries (Keegan, 2020).

Today we are already immersed in Web 4.0, and with it Education 4.0, which embraces the fourth generation of virtual learning and aims to create learning environments that are more flexible and responsive to students' needs in terms of time, place and rhythm.

In this generation, learning models are adapted and personalised in real-time according to learner profiles. Artificial intelligence (AI) is emerging as the main enabling technology for Education 4.0 (Popenici and Kerr, 2017).

A summary of the main historical milestones of e-learning is shown in the figure below.



**Figure 5.** The e-learning timeline  
**Source:** Adapted from Conole, 2013

Currently, according to the E-learning 2022 Report: The Online University Student. Trends and Perspectives, Spain ranks second among European countries in terms of the proportion of people participating in some form of e-learning activity, both for men (45%) and women (43%), with only Denmark having a higher percentage. The e-learning market share in Europe is expected to grow by USD 28.36 billion between 2020 and 2024.

According to the 2022 Online Education Trends Report, 43% of administrators say their institutions will continue to offer online and distance learning options to students, up from 33% last year (Venable, 2022).

This steady growth is due to the technologies adopted by educators, which allow for greater interactivity and hybrid models of online and face-to-face activities, changing learning, teaching and assessment in ways that may persist after the pandemic (McKinsey, 2022). The concept of e-learning is approached by researchers from terms that are strongly emerging in the educational context, such as simulators, augmented reality, etc., which become alternatives to enhance students' cognitive skills, as long as they are accompanied by strategies that activate prior learning, reinforce knowledge and lead to learning (Ortiz Benavidez, 2006), game-based learning, augmented reality, among others, which become alternatives that improve students' cognitive skills, as long as they are accompanied by strategies that activate their previous learning, reinforce knowledge and lead to meaningful learning (Ortiz Benavides and Piña López, 2018).

E-learning is based on a solid theoretical framework that combines traditional pedagogical approaches with digital technologies to provide accessible, personalized and effective education. Therefore, technological advances continue to drive the evolution of e-learning, and it is expected that this educational modality will continue to grow and transform education around the world. The following are some of the key theories and approaches that explain the workings and effectiveness of e-learning:

**Social learning theory:** This theory states that learning is a social process in which students learn not only from their teachers but also from their peers and the environment in which the learning takes place. In e-learning, virtual learning communities (VLCs) allow interaction between students and teachers, facilitating knowledge sharing and collaborative learning.

- **Autonomous learning theory:** This theory focuses on the role of the learner as the protagonist of the learning process. E-learning allows students to choose the pace and sequence of their learning, enabling them to take greater responsibility for their education.

- **Problem-based learning theory:** This theory is based on the idea that learning is most effective when it focuses on solving problems. E-learning can provide simulation-based learning environments and scenarios where learners can apply theoretical knowledge to practical situations.

- **Theory of constructivism:** This theory states that learning is an active process in which the learner constructs his or her own knowledge through experience and interaction with the environment. E-learning can provide tools and resources for learners to construct their own knowledge in an interactive and participatory way.

- **Situated cognition theory:** This theory focuses on the importance of context in learning. E-learning can provide learning environments that simulate real-world situations, facilitating the transfer of knowledge and skills to practical situations.

#### **Conole (2014) divided e-learning pedagogies into four categories:**

1. **Associative** - a traditional form of educational delivery. It emphasizes the delivery of theoretical units of information, learning as an activity through structured tasks, where the focus is on the individual, with learning through association and reinforcement.

2. **Cognitive/constructivist:** Knowledge is seen as dynamic and expanding rather than objective and static. The main tasks here are to process and understand information, to make sense of the world around us. Learning is often task oriented.

3. **Situational:** Learning is seen as social practice and learning through social interaction in context. The learner has a clear responsibility for their own learning. This approach is therefore 'learner-centered'.

4. **Connectivist** - learning through a networked environment. Connectivist theory advocates a learning organisation in which there is no body of knowledge to be transferred from educator to learner, and where learning does not take place in a single environment but is distributed across the web and people's engagement with it constitutes learning.

In the scientific literature, research can be found that deals with the attitudes of students towards e-learning (Bertea, 2009; Padilla-Rodriguez 2009; Abdelrahim and Amr, 2016; Thakkar and Joshi, 2017), finding generally positive student behaviour, which may or may not depend on previous experience of use, but no studies have been conducted on the attitudes of society in general towards this type of teaching.

Siemens (2014) and Darabi et al. (2013) agree that one of the most important requirements in online learning is the development of well-designed courses with interactive and engaging content, but in addition to the quality of the pedagogical design, the success of learning in e-learning largely depends on the learner's ability to direct and manage their own learning process by setting appropriate goals and strategies to achieve their objectives, as there is research (Rowe and Rafferty 2013; Van Laer and Elen, 2017) that shows how learners in online learning environments tend to fail due to their lack of autonomy. The analysis of the effectiveness of e-learning for students at university level was also questioned by Ali et al. (2018). A questionnaire was administered to a sample of 700 students, 94.9% of whom used different e-learning techniques and tools, and the results showed that students supported that e-learning is easy to use, saves time and is affordable.

Now, if any kind of learning methodology requires learner motivation, in e-learning, whether synchronous or asynchronous, it is important to motivate learners by providing them with constant communication and feedback. As stated by Barbosa & Garcia (2005), online assessment is an important step within the e-learning process because it provides convenient feedback to all participants in the process, helping to improve the learning and teaching experience.

Finally, it should be noted that e-learning and the major adaptations that its implementation requires also require great academic and institutional flexibility, as concrete protocols for planning and implementing this new teaching modality are still scarce in many higher education institutions (Cerdas-Montano et al., 2020), so it is essential to evaluate the quality of each step and progress.

In conclusion, an evaluation of distance education is necessary to determine the degree of acceptance of the e-learning system by its users.

## METHODOLOGY

In order to carry out the bibliometric study, the five stages of Arksey and O'Malley (2005) will be analysed, which will allow us to carry out a systematic review of the scientific literature.

### a) Identifying the research question.

The research question is defined by means of the PICO formula (population, intervention, comparison and outcome), which poses structured questions divided into components in order to carry out a correct bibliographic search when addressing certain aspects to be studied (Table 1).

**Table 1.** PICO methodology application.

Population	e-learning
Intervention	Scientific vision in higher education
Comparison	Social listening
Outcomes	Current real-life X-ray of e-learning in society

**Source:** own elaboration

### The review, therefore, aims to answer two research questions:

(Q1) What is the scientific view of e-learning in higher education?

(Q2) What is the social listening of this concept, and what is the opinion of society in general on websites and social networks?

Your answers will allow us to achieve the desired results.

This research focuses on scientific articles published in the Wos database between 2019 and 2023, processed with the Bibliometrix application for R Studio, which allows a complete bibliometric analysis, following the scientific mapping workflow (Aria and Cuccurullo, 2017).

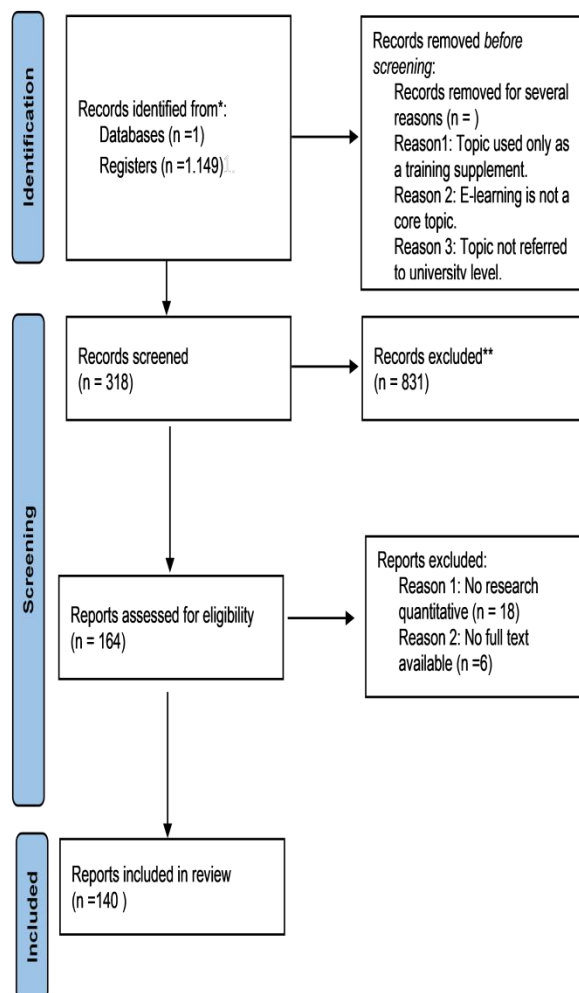
The articles obtained were selected based on the Boolean search e-learning and university or online learning and university and according to the following exclusion criteria:

- Document type: article.
- Year of publication: between 2019 and 2023.
- Language: English and Spanish
- Wos Category: Education & Educational Research.
- Web of Science Index: ESCI, SSCI and ESCI-Extended.

These restrictions yielded a total of 1,149 articles.

**b) Systematic search for scientific evidence.**

This was carried out according to the Preferred Reporting of Items for Systematic Reviews and Meta-Analyses Approach (PRISMA) of Moher et al. (2009), which eventually allowed us to select 140 articles, the flowchart of which is shown in Figure 6.



**Figure 6.** PRISMA flowchart of the article selection process.

**Source:** Adapted from <http://www.prisma-statement.org/PRISMAStatement/FlowDiagram>

**c) Selection of Studies.**

In addition, it was decided to complement the PRISMA approach with a second analysis of the scope of the results and findings obtained and with a higher number of citations obtained, so that a total of 50 articles from 26 sources by a total of 192 authors with an average of 3 citations per year were collected.

**d) Data Extraction.**

All selected articles were examined to extract data to answer the first research question. The Excel spreadsheet containing these studies is included as supplementary material to this paper at the following link: <https://bit.ly/3NyAaTn>

**e) Compilation, summary and dissemination of results.**

This last stage will be developed in the following section.

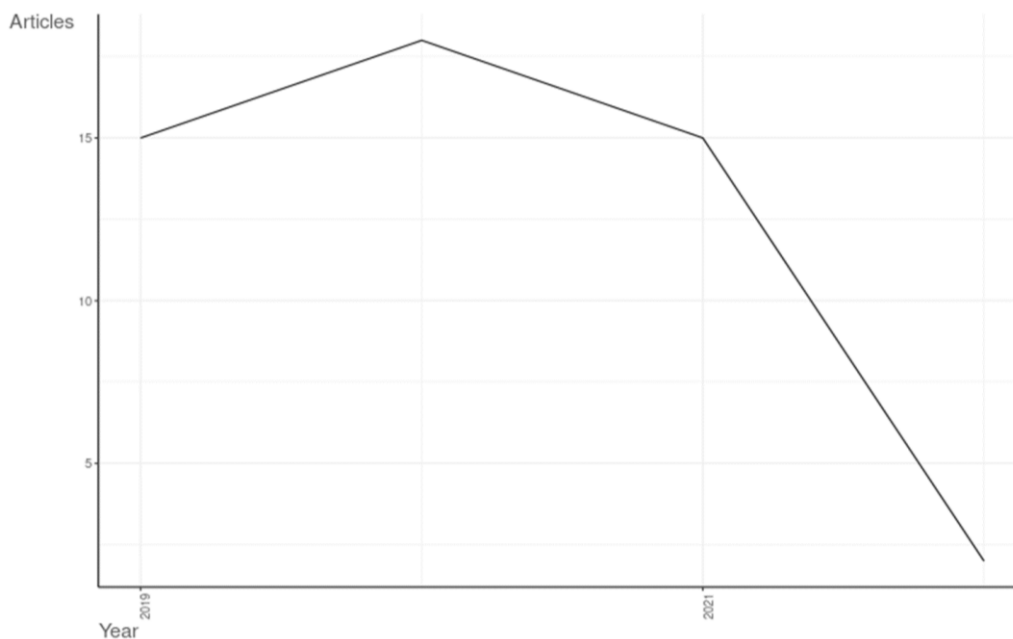
**RESULTS**

The most interesting results obtained for the two proposed research questions are presented below.

**a) (Q1) What is the scientific view on e-learning in higher education?**

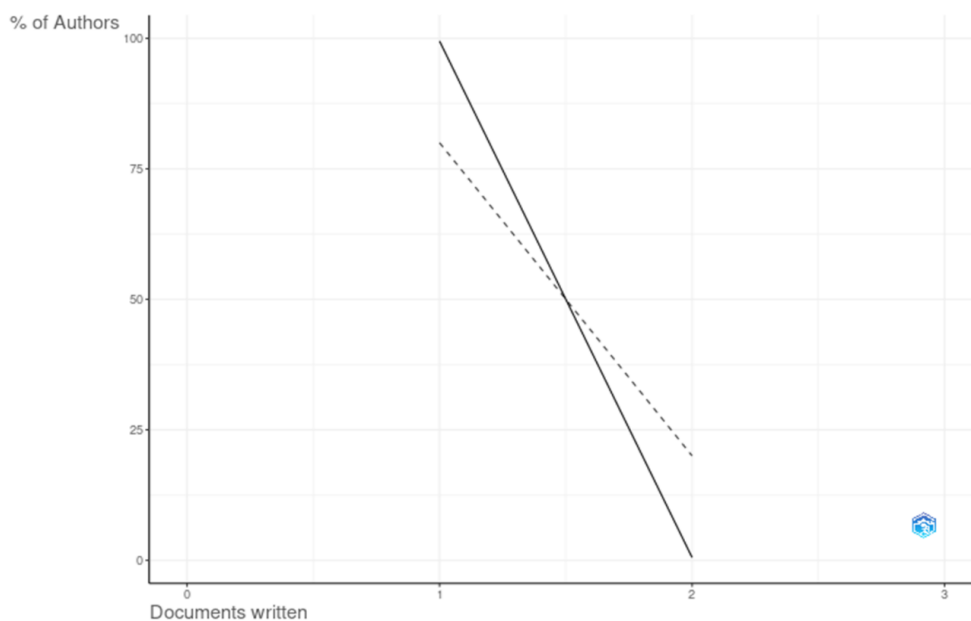
Firstly, the results of the bibliometric study on production, affiliations, collaboration and dissemination are analysed to answer the question of the scientific vision of e-learning in higher education.

Regarding the annual scientific production, shown in Figure 7, it can be seen that it suffers a significant decrease after the boom caused by the pandemic in 2020, going from 18 articles published in 2020 to 2 in 2022.



**Figure 7.** Annual scientific production  
**Source:** Bibliometrics

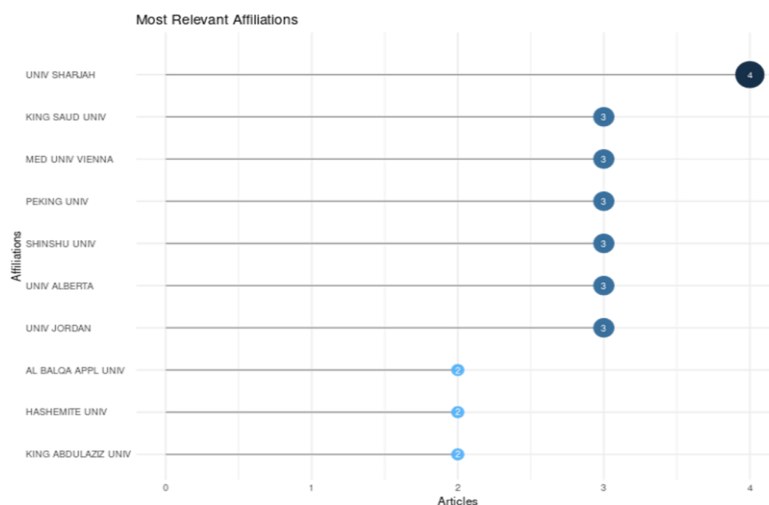
In terms of personal productivity, Lotka's law, which states that a small number of authors publish a significant number of documents, is not verified in this case, since a total of 192 authors signed the 50 articles, of whom 191 wrote at least one article.



**Figure 8.** Productivity of authors according to Lotka's law.  
**Source:** Bibliometrics

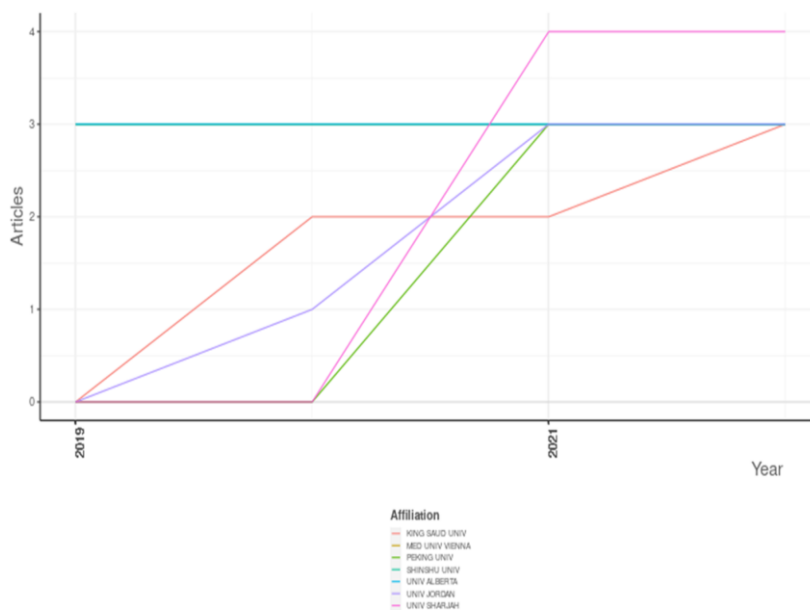


With regard to the most relevant affiliations of these authors, Figure 8, it is worth noting that the majority of their production comes from Arab universities, although there are two Spanish universities (the University of Oviedo and University of Cordoba) with two articles each published in these years.



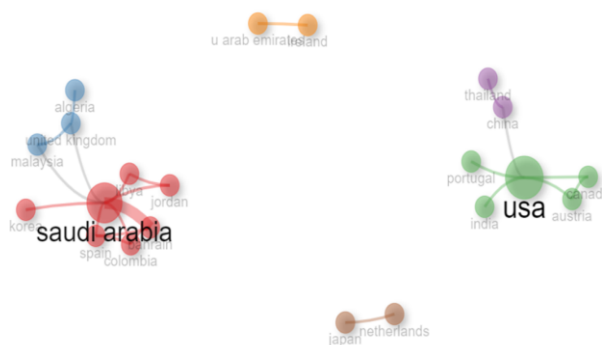
**Figure 9.** Main affiliations of authors  
*Source:* Bibliometrics

The following graph (Figure 10) shows that only two of the main institutions that have researched online learning have maintained their scientific production; Sharjah University has managed to produce one more article, while others have abandoned their research, such as Peking University and the University of Jordan.



**Figure 10.** Affiliations between 2019 and 2023.  
*Source:* Bibliometrics

On the other hand, there is little collaboration between authors, as shown in Figure 11, which makes it difficult to consolidate research.



**Figure 11.** Collaboration network by country  
**Source:** Bibliometrics

In terms of the number of citations, as shown in Table 2, which lists the 15 most cited authors, the researcher M. Al-Balas stands out, who, together with colleagues from various Jordanian universities, received 218 citations for a scientific research study explaining how to implement distance learning in medicine in the face of the pandemic. Also noteworthy is the publication of AM. Maatuk, also from a Jordanian university and in collaboration with authors from Jordan, Saudi Arabia and Libya, received more than 105 citations for a study on the challenges and opportunities of e-learning during the pandemic from the perspective of students and instructors. This data confirms that it is Arab universities that have become more involved in e-learning issues and that the reason for this was the unexpected emergence of covid-19, which is why some researchers have already abandoned this line of study.

**Table 2.** The 15 most cited authors

Main author and year	DOI	Total citations
AL-BALAS M, 2020	10.1186/s12909-020-02257-4	218
MAATUK AM, 2022	10.1007/s12528-021-09274-2	105
WYNTER L 2019,	10.1186/s12909-019-1462-9	88
ALMUSHARRAF NM, 2020,	10.3991/ijet.V15i21.15647	81
HANDEL M, 2020,	10.1080/15391523.2020.1846147	76
HASSAN MA, 2021	10.1080/10494820.2019.1588745	75
FARDOUN H, 2020	10.14201/eks.23437	60
PHAM HH, 2020	10.1080/07294360.2020.1823945	59
MULLER AM, 2021	10.3390/educsci11010019	58
RAJABALEE YB, 2021	10.1007/s10639-020-10375-1	56
PULJAK L, 2020,	10.1186/s12909-2-020-02343-7	56
ELSHAMI W, 2021	10.1080.10872981.2021.1920090	55
OZADOWICZ A, 2020	10.3390/educsci10100292	55
ALDOWAH H, 2020	10.1007/s12528-019-09241-y	52
JIANG, 2021	10.1080/10872981.2020.1854066	51

**Source:** own elaboration

Keyword analysis is also considered a good formula to identify the research topics of a scientific field (Li et al., 2021), for this purpose we created the word cloud focusing on the 50 keywords, which include the terms extracted from the titles, abstracts and keywords (Figure 12) and the co-occurrence network of the most used

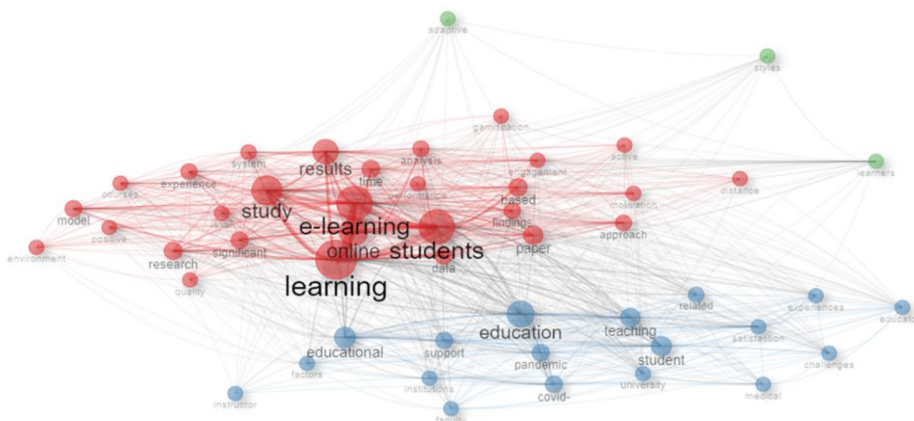
concepts in the abstracts and titles of the articles (Figures 13 and 14). In both cases, there is a high degree of co-occurrence of the concepts discussed in these studies.



**Figure 12.** Word cloud  
**Source:** Bibliometrics

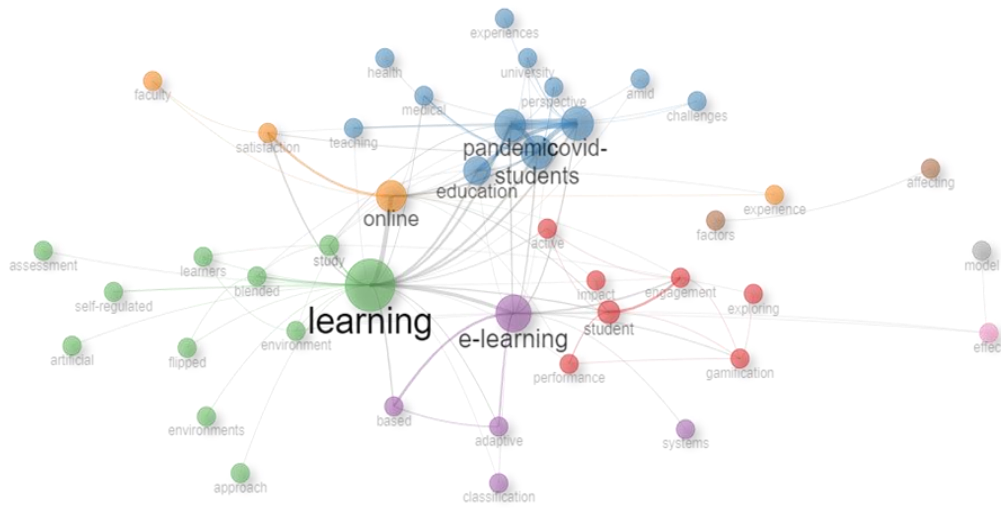
To analyse the co-occurrence of terms based on the fraction counting method (Perianes et al., 2016), a minimum of 50 occurrences in the abstracts was set to obtain a readable tree (map). According to the study, the top five keywords obtained were learning (0.057), students (0.049), e-learning (0.049), study (0.041) and online (0.038).

Three clusters are also identified: the first cluster deals mainly with the problem of this type of learning, with concepts such as learning, e-learning, online, students, study and results. The second cluster focuses on more general concepts and is related to the pandemic, with concepts such as education, teaching, pandemic or covid, and finally, the third and smaller cluster is concerned with adapting to these new styles, with concepts such as styles and adaptive. In summary, the three clusters focus on the analysis of e-learning as a new learning style after the pandemic and its adaptability to other styles.



**Figure 13.** Map of co-occurrence of terms in abstracts  
**Source:** Bibliometrics

Something similar occurs when analysing the co-occurrence of terms in titles, although here there are more groupings (clusters), the keywords are similar: learning, e-learning, pandemic, Covid, students and online.



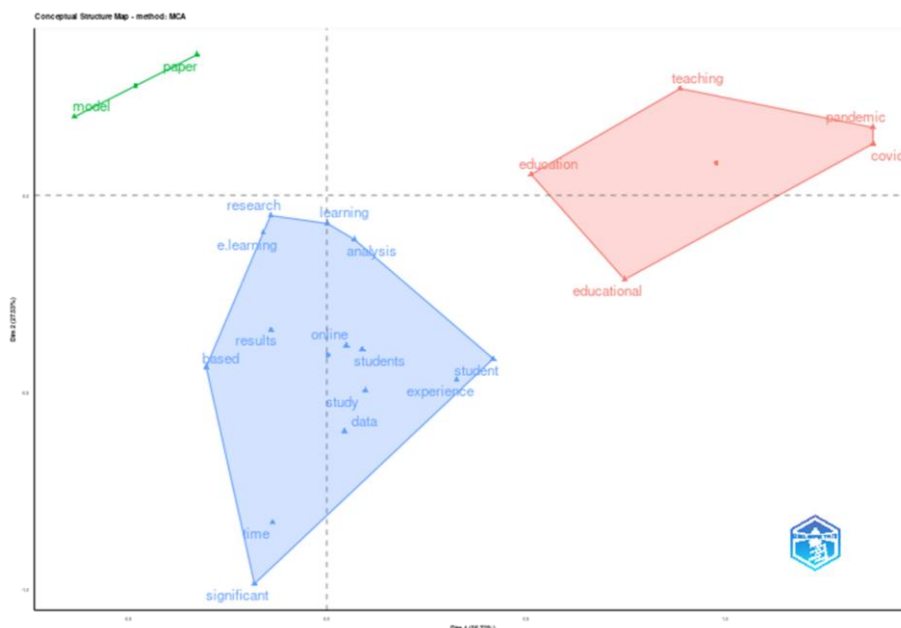
**Figure 14.** Map of co-occurrence of terms in titles  
**Source:** Bibliometrics

Finally, a multiple correspondence factor analysis was carried out on the field abstracts with 50 terms and three clusters, resulting in the factor map and dendrogram shown in Figures 15 and 16. This study is interesting in that it aims to deepen the knowledge of the relationships between qualitative variables observed in the same population, and it is carried out with multiple correspondences instead of simple ones, because it focuses on a variable representing individuals (authors), while the rest are qualitative or ordinal variables representing qualities.

Figure 14 shows the factorial graph, where the cumulative inertia is 84.2%, and the data with multiple variables have been compressed in a low-dimensional space to perform multiple correspondence analysis (MCA) to draw a conceptual structure of the field and K-means clustering to identify groups of documents expressing common concepts. The results are interpreted based on the relative position of the points and

their distribution along the dimensions; the closer words are represented on the map, the more similar their distribution is (Cuccurullo, Aria and Sarto, 2016).

Keywords that are closer to the central point indicate that they have received a lot of attention in recent years (Xie et al., 2020). In the case of the blue cluster, the closest words are online, students and results, in the other two clusters the distance is greater.

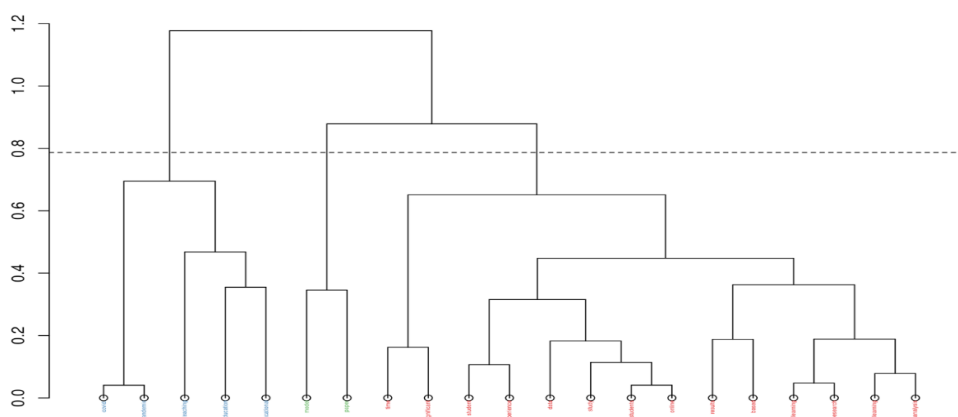


**Figure 15.** Factorial graph with MCA  
**Source:** Bibliometrics

**MATERIALS AND METHODS**

The dendrogram (Figure 16) is a graphical representation of the data in the form of a tree organised into subcategories that are broken down until the desired level of detail is reached. Each leaf of the dendrogram represents an element or observation so that as you move up the tree some of the leaves become branches.

These correspond to observations that are similar to others. Further up the tree, branches merge with leaves or with other branches. Earlier mergers (further down the tree) correspond to groups of observations that are more similar to each other. In contrast, observations that merge further up the tree (near the end of the tree, later in the tree) tend to be quite different. In this case, it can be seen that the closest concepts are covid-pandemic; students-online; students-research, while others such as covid-pandemic and student-experience are far apart, which may be due to the fact that after some time has passed since the pandemic, new learning experiences are no longer linked to the needs experienced at that time.



**Figure 16.** Dendrogram  
**Source:** Bibliometrics

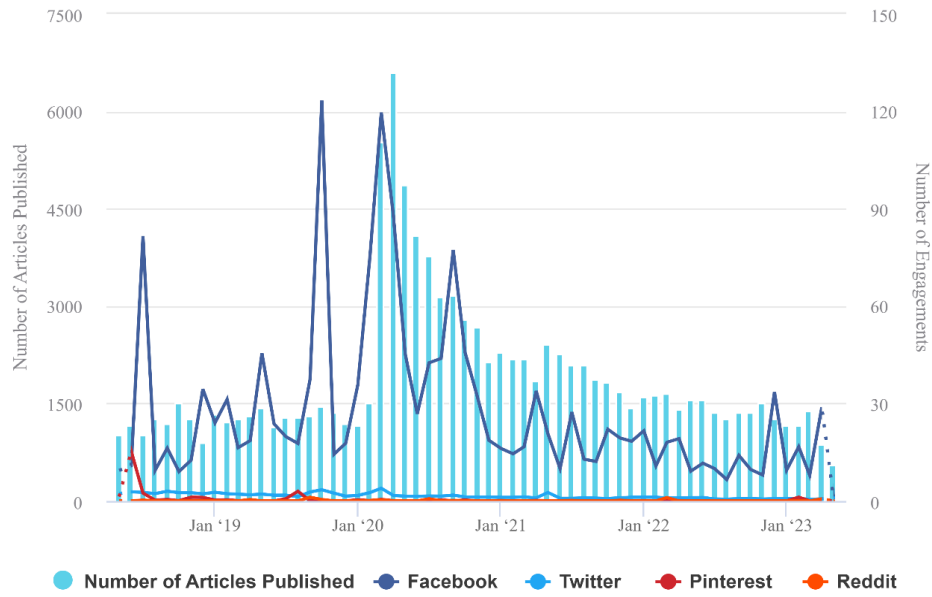
**b) (Q2) What is the social listening of this concept, and what is the opinion of society in general on websites and social networks?**

For this part of the research, 15,880 articles and a total engagement of 222,458 mentions were analysed. In terms of engagement and content over time, Figure 17 shows the volume of content published each month and the interactions (engagement) for each of the main networks over the last five years. This makes it possible to see whether a topic is becoming more or less popular.

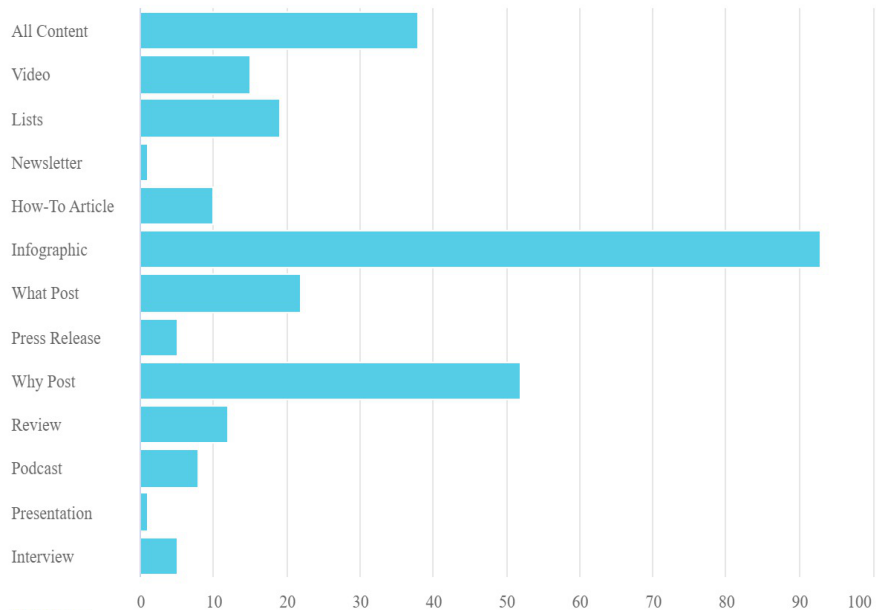
In this case, the highest number of publications took place in April 2020 (6,604 articles) with an average engagement of 90, with the majority of this engagement coming from the social network Facebook (88).

This date coincides with the peak of the pandemic not only in our country but also in the rest of the world. The estimate for the month of 23 May is only 554 articles, with an average interaction of 2, a figure that shows how interest in writing about the concept under study has gradually been lost.

A more detailed analysis of these data shows that the network with the highest engagement is Facebook, followed by Twitter, and the one with the lowest participation is Reddit. As for the formats with the highest engagement, infographics and why publish (this type of headline is usually used to arouse curiosity and provoke new information) stand out, while the formats with the lowest engagement are presentations and newsletters (Figure 18).



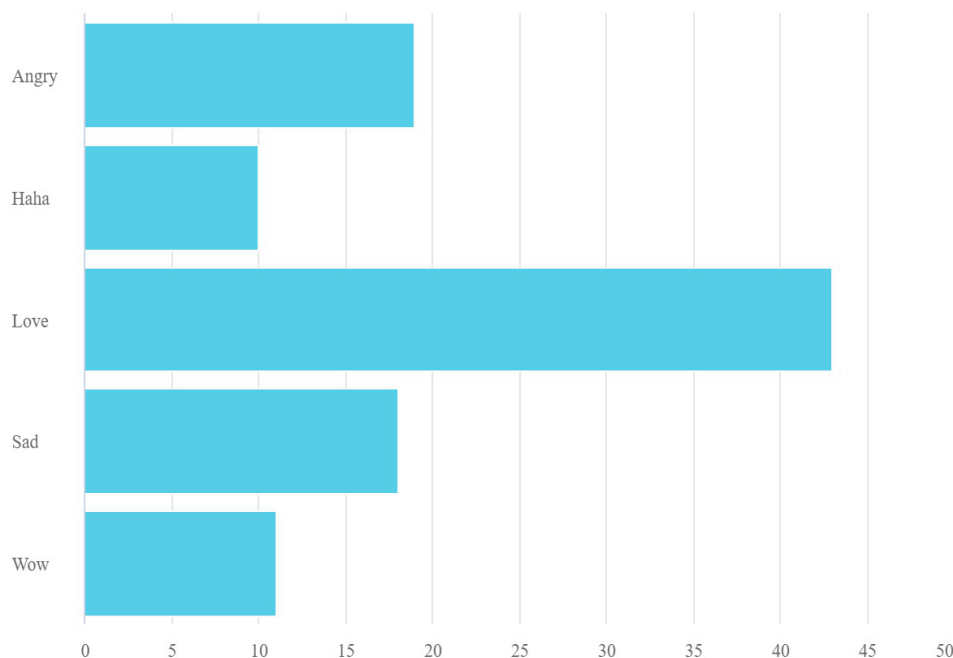
**Figure 17.** Engagement and content over time  
**Source:** Brandwatch



**Figure 18.** Engagement and network  
**Source:** Brandwatch

Other interesting facts are that the best day to publish is Sunday, with an average engagement of 60 for articles published on this day, and that articles of around 1000-2000 words have an average engagement of 79.

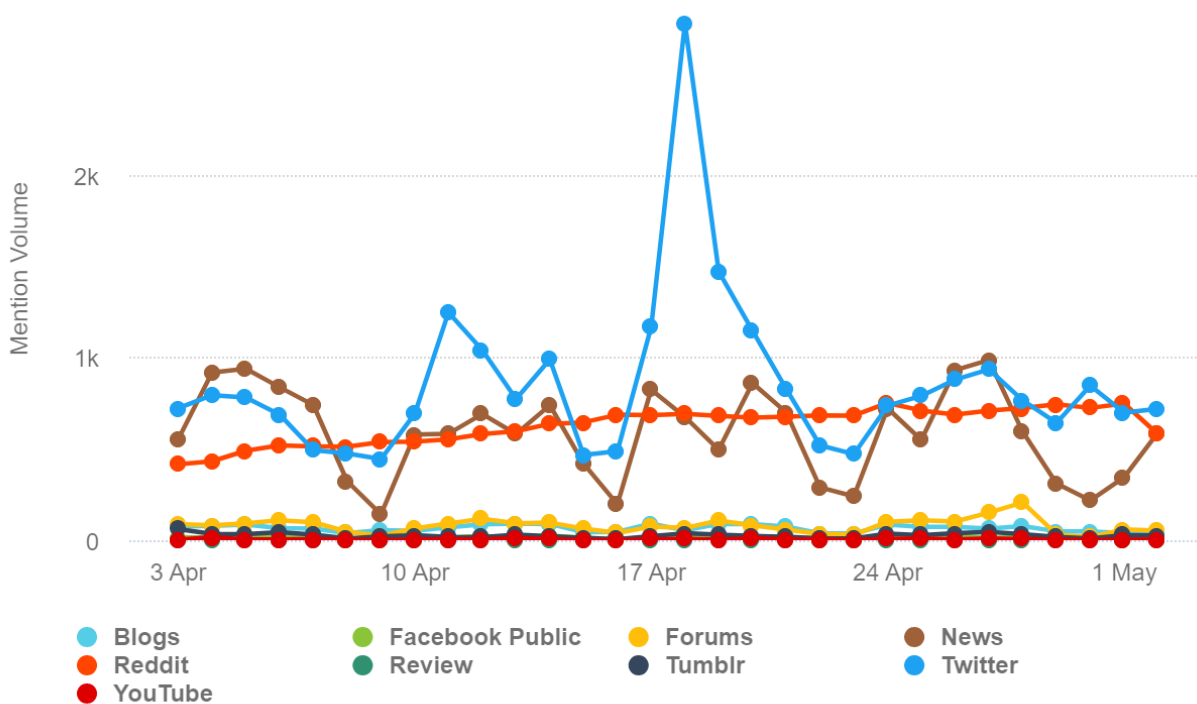
As for the reactions received, Figure 18 shows that 200.5K were collected, of which 43% were "love", which means that the public accepts the concept of e-learning well.



**Figure 19.** Facebook reactions to the analysed content.

**Source:** Brandwatch

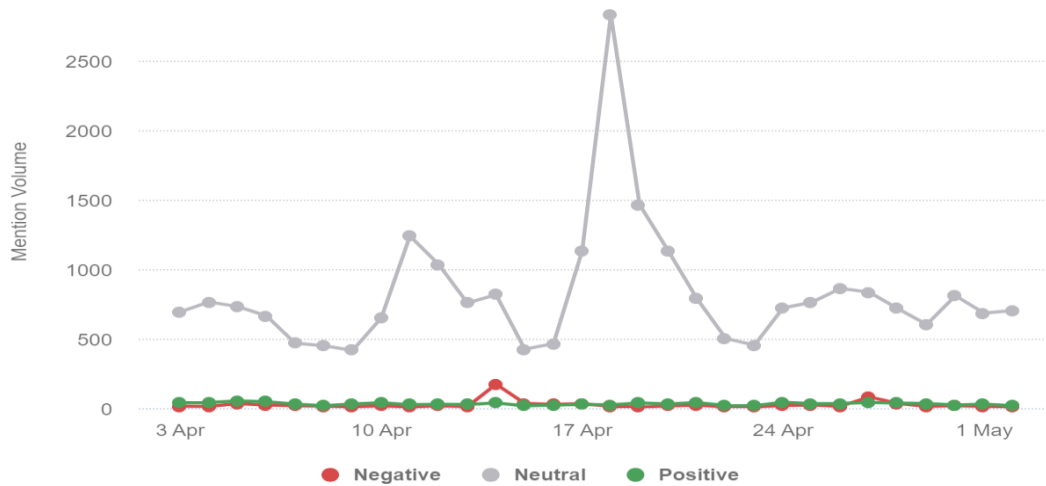
Figure 20 shows the mentions by type of source for the last month of April, with Twitter continuing to have the highest number of mentions (around 700), although far from the figures of April 2020. However, other sources such as Reddit and newsletters are now appearing, while Facebook (now public) has dropped significantly.



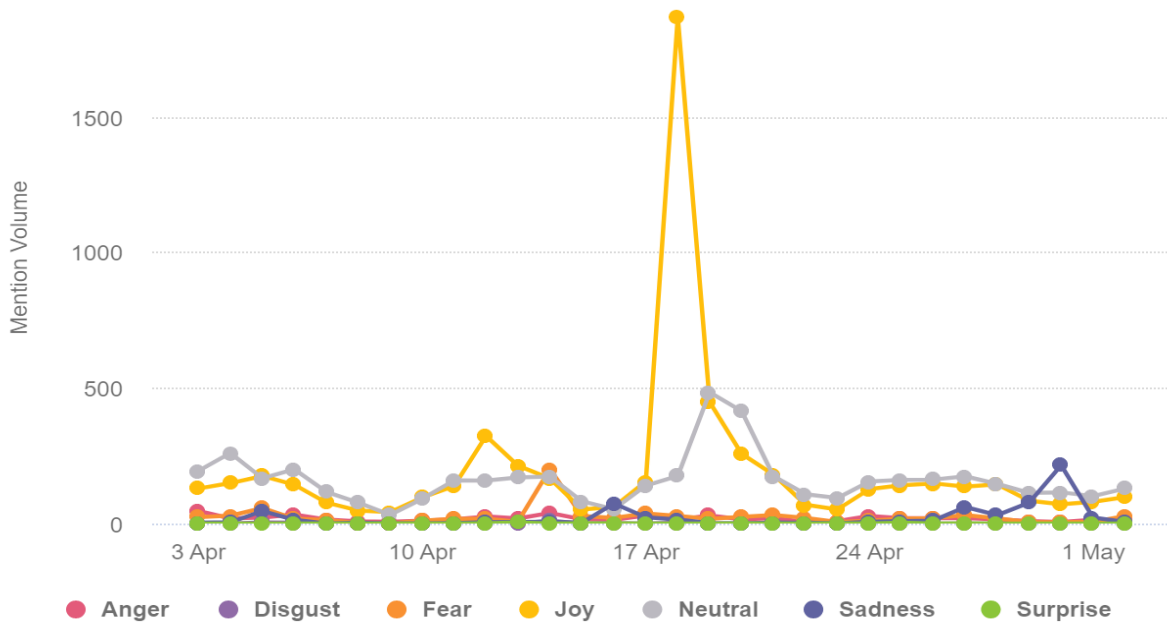
**Figure 20.** Mentions by source in the month of April 23.

**Source:** Brandwatch

The feelings and emotions generated by this concept have also changed, with the majority now neutral (94% on average), as shown in Figure 21 for feelings and Figure 22 for emotions, although in the case of emotions, an average of 46% of cases show joy and 36% neutrality, which could mean that the public who have used e-learning methods have done so without any apparent problems and were satisfied.



**Figure 21.** Emotions in the month of April 23  
**Source:** Brandwatch



**Figure 22.** Sentiment in the month of April 23  
**Source:** Brandwatch

**CONCLUSIONS AND DISCUSSION**

As the pandemic spread, online learning methods began to be used, allowing students at all levels of education to continue their studies.

The emerging digitalisation of education offered an opportunity to transform learning, and a survey conducted by Class Technologies (Times Higher Education), which integrates Class software for teachers with the Zoom Meetings platform, found that 67% of higher education students preferred a hybrid learning environment at their institution.

According to data from the Global e-Learning Industry in the Post-COVID-19 Business Landscape, the global e-learning market, estimated at \$332.6 billion in 2022, is expected to reach a revised size of \$686.9 billion by 2030, growing at a compound annual growth rate of 9.5% over the period 2022-2030. The same report predicts that the academic sector will grow at a compound annual growth rate of 9.1%, reaching \$431 billion by the end of the period.



The data support the rise of e-learning, but what is the current reality of e-learning? Has it followed the expected evolution in education? At the scientific level, the number of academic articles published on the subject has been decreasing, from an average of 15 in the year before the pandemic to only 2 last year, although, in accordance with the scientific rigor linked to the quality of the publications, only studies with an average of 3 citations per year were taken into account.

It is also particularly important to analyse the affiliation of the authors, who in most cases come from Arab universities and collaborate with each other so that the majority of research is linked to countries such as Jordan, the United Arab Emirates or Saudi Arabia.

In these countries, e-learning platforms have rewritten and reinvented the fundamentals of teaching forever, as many universities around the world, including the University of Sharjah, has officially announced new policies to implement lifelong blended learning approaches, taking into account the recommendations made by the participants of a study conducted at the Faculty of Communication of the University, in order to provide a blended model that is more appropriate to the specialisation and meets the needs of the students (Snoussi & Radwan 2020).

Among the topics most identified by these authors that mark the latest research trends, studies on the academic performance of students in virtual education stand out, but also on the tools that support thematic content, such as virtual reality, video games and gamification, studies on the impact of the covid-19 pandemic in education, and the role of universities in developing studies on e-learning, its adoption and motivation among students. Perhaps the gamification of content in digital education is one of the main reasons that will drive the growth of the e-learning market in Europe over the next few years.

It should also be remembered that lifelong learning will be essential given the creation of new roles with specific skills in the workplace, which will also lead to the growth of online training at management level. These aspects are certainly promising for this area of research, even if scientific production is currently scarce.

In terms of social listening on the topic under analysis, the mentions on the main social networks are low compared to April 2023. Social networks are becoming increasingly important, as shown by the IAB's Annual Social Networking Study, which indicates that 85% of internet users between the ages of 12 and 70 use social networks, representing around 28 million people in Spain. It is therefore important to carry out an active listening exercise in order to understand the preferences and needs of the users who form part of these communities and to be able to apply this knowledge to future improvements.

At the moment, the feeling of the users of the network, although not negative towards the concept of e-learning, is somewhere between neutrality and a feeling of happiness, which suggests that as soon as online learning is taken up again in different sectors of society, not only in universities, the number of mentions will increase again.

For the time being, we can only conclude that the rapid growth of e-learning during the pandemic has been reduced to a mere mirage, which should continue to grow in the near future, raising a possible debate about whether the networks are more conducive to this growth or to scientific research.

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