

# Competencies model for online learning in higher education: a bibliometric analysis and systematic review

## Modelo de competencias para el aprendizaje online en educación superior: un análisis bibliométrico y revisión sistemática



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### ABSTRACT

With the rise of online education, universities are seeking to optimize the experience of distance learners. To do so, it is crucial to develop key competencies in future professionals, such as transferable skills, emotional regulation, professional development, self-management, and self-efficacy. Understanding the impact of the online environment on engagement is critical for the successful implementation of online programs. This article presents a systematic literature review and bibliometric analysis of 781 articles, exploring trends in publications, high-impact journals, countries, institutions, and keyword analysis with VOSviewer. The current state of the art and the latest educational trends to boost online learning are analyzed. Finally, a model is proposed that integrates the main concepts of the VOSviewer co-occurrence map in the context of online learning in higher education for graduate students. This framework offers a concrete representation for integrating online learning tools and technologies in higher education. Furthermore, this framework will be instrumental in understanding the skills needed in online education, especially critical reflection and professional competencies. It combines innovative theoretical concepts and offers a promising vision for the future of education. While e-learning has great potential, its limitations need to be addressed and efforts made to ensure that all students have equal opportunities for development in this ever-changing educational environment.

**Keywords:** online learning; competency model; curriculum.

### RESUMEN

Con el auge de la educación online, las universidades buscan optimizar la experiencia de los estudiantes a distancia. Para ello, es crucial desarrollar competencias clave en los futuros profesionales, como habilidades transferibles, regulación emocional, desarrollo profesional, autogestión y autoeficacia. La comprensión del impacto del entorno online en el compromiso es fundamental para la implementación exitosa de programas online. Este artículo presenta una revisión sistemática de la literatura y un análisis bibliométrico de 781 artículos, explorando tendencias en publicaciones, revistas de alto impacto, países, instituciones y análisis de palabras clave con VOSviewer. Se analiza el estado actual del arte y las últimas tendencias educativas para impulsar el aprendizaje online. Finalmente, se propone un modelo que integra los principales conceptos del mapa de coocurrencia de VOSviewer en el contexto del aprendizaje online en educación superior para estudiantes graduados. Este marco ofrece una representación concreta para integrar las herramientas y tecnologías del aprendizaje online en la educación superior. Además, este marco será fundamental para comprender las habilidades necesarias en la educación en línea, especialmente la reflexión crítica y las competencias profesionales. Combina conceptos teóricos innovadores y ofrece una visión prometedora para el futuro de la educación. Si bien el e-learning presenta un gran potencial, es necesario abordar sus limitaciones y trabajar para asegurar que todos los estudiantes tengan las mismas oportunidades de desarrollo en este entorno educativo en constante transformación.

**Palabras clave:** aprendizaje online; modelo de competencias; currículum.

## INTRODUCTION

The growing demand for online education is driving universities to explore new ways of delivering course content through digital platforms. Online technology offers opportunities to optimize learning, providing students with flexibility, accessibility, and efficiency in achieving their academic goals (Chen et al., 2010; Dumford & Miller, 2018). As technology develops rapidly and more students follow the online learning route for a variety of reasons, it is important to develop more assessment techniques for the virtual university (Dumford & Miller, 2018; Ryan et al., 2013). However, evaluating online learning programs must also take into account some of the unique aspects of this type of learning environment, as using established techniques for student success in traditional classrooms does not always work in distance learning courses (Banjević et al., 2021; Peña et al., 2021).

It is crucial to explore current situations and issues of online learning in higher education to provide better context on ways in which the student experience could be improved. Online learning has several characteristics that can impact faculty implementation and course progress (Forcael et al., 2022). In the field of online learning, it is essential to pay attention to the logistical component, since technical failures in courses can generate a frustrating experience for students, negatively affecting their overall perception of the program (Yates et al., 2021). Therefore, design focused on ease of use and appropriate technological support require a differentiated approach. Adapting certain activities, such as performance assessments, continuous evaluation and supervised tests to the online format can be a challenge for teachers, without compromising content mastery or interaction between peers and/or teachers (Castro & Tumibay, 2021; Ferri et al., 2020). Therefore, the feedback between teacher and student that is taken for granted in a face-to-face environment must also be adapted, as online students may feel more isolated from their teachers if traditional assessments such as multiple-choice quizzes and exams are used too much (Tanis, 2020). In addition to cheating issues, over-reliance on summative feedback from graded tests and exams could limit the formative feedback provided to students during the learning process, which can also be problematic (Dendir & Maxwell, 2020).

The rapid pace of change in technology often outstrips the pace of scientific research on such pressing issues. The explosion of social media over the past decade has had an increasing impact on higher education, and more recent research indicates trends in the importance of incorporating social media into the classroom (Evans, 2014; Salmon et al., 2015). Additionally, there is growing evidence of the importance of adapting online education to mobile devices, citing that younger students and full-time employees are more likely to use mobile versions of learning management systems (Han & Shin, 2016). Most studies find positive effects of using mobile learning for online courses (Wu et al., 2012), although this could also be due to a bias against publishing studies with non-significant findings (Dumford & Miller, 2018; Wu et al., 2012).

It is also important to note that one must understand how the online environment affects engagement. Many elements contribute to student engagement, both in and out of the classroom (Dewan et al., 2019). Academic behaviors, including the use of strategies for self-regulated learning, quantitative reasoning, activities that promote higher-order thinking, and reflective and integrative learning, can increase content knowledge as well as general cognitive processing, and all are linked to various aspects of student achievement and success (Álvarez-Huerta et al., 2021; Li et al., 2023).

Interactions with peers through collaborative learning and discussions with other diverse people are also important elements of student engagement (Rabbany et al., 2014), along with interactions between students and teachers and effective teaching practices used by teachers (Forcael et al., 2019; Forcael et al., 2021; Garcés & Peña, 2020; Vlachopoulos & Makri, 2019). In addition, there are environmental characteristics that contribute to student engagement, such as the quality of interactions with students, faculty, and other staff, as well as a general perception of a supportive environment (Palmer & Holt, 2010).

On the other hand, in the context of the 21<sup>st</sup>-century, higher education faces a constantly changing landscape, driven by various factors such as the knowledge society, the volatility of the labor market, the accelerated impact of information technologies on society, high-performance demands in the workplace, industry-specific demands, accreditation standards, globalization and economic dynamics (Heymann et al., 2022; Humburg & Van der Velden, 2013; Garcés & Peña, 2022). Higher education institutions and their students, as well as employers, agree on the importance of developing students' employability skills along with academic knowledge and skills (Garcés, 2020b; Tomlinson, 2008, 2012; Tymon, 2013). Although employability is a complex and multidimensional construct, the key is the ability to obtain and maintain employment throughout a person's career (Bridgstock, 2009; Fugate et al., 2004). Employability, understood as a multifaceted and complex concept, requires the acquisition of skills that go beyond the mastery of specific knowledge of a discipline. In this sense, competency-based employability must include the development of generic transferable skills, the ability to regulate emotions, professional development skills, self-management and self-efficacy (Bridgstock, 2009; Chhinzer & Russo, 2018; Heymann et al., 2022).

Taking into account these previous findings, the current study presents a flow for the construction of two aspects that today require solid foundations to respond to the urgencies of online education that represent the objectives of this research. These two elements are:

- a) Establish a foundation for future research. Exploring the key connections between distance education in graduate students and the latest educational trends to boost effective online learning, closing the gaps in existing review documents.
- b) Establish a framework of effective competencies that integrates the requirements and needs of online learning and its main tools and technologies, adapting the traditional structure for the generation of competencies in virtual education.

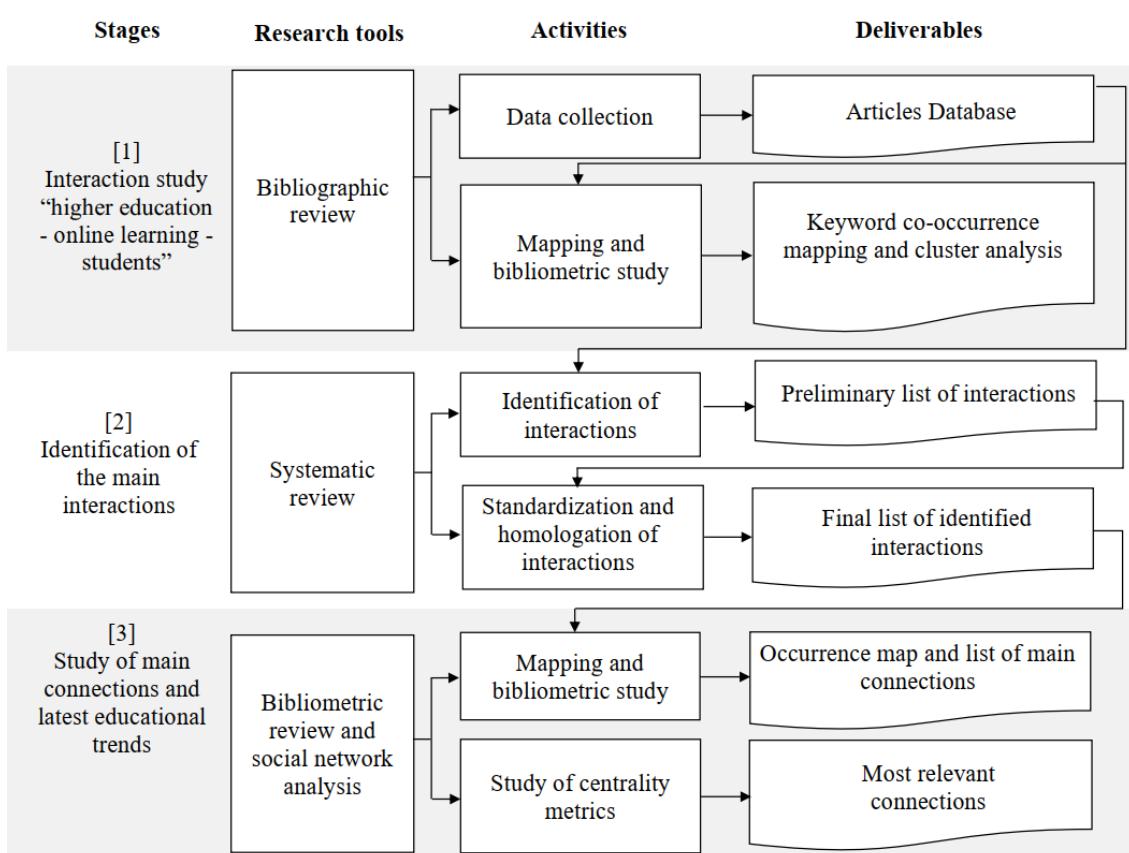
## MATERIALS AND METHODS

To achieve the objective of this research, a methodology was implemented that considers a bibliometric study followed by a systematic review of the literature. This methodology combined quantitative (bibliometric) and qualitative (systematic) approaches (Harden & Thomas, 2010; Oraee et al., 2017). Relevant scientific articles were analyzed and selected under predefined parameters aligned with the objectives of the study. This combined strategy made it possible to minimize the subjectivity inherent in manual qualitative reviewing and strengthen the understanding of the results obtained through bibliometric analysis (Galaz-Delgado et al., 2021; Harden & Thomas, 2010; Oraee et al., 2017).

In this sense, through the bibliographic review carried out, the main metrics of the linked publications were analyzed, as well as the analysis and discussion through a manual review of the variables that affect online learning in higher education for graduate students. The research is divided into three main stages: (1) the study of the interaction in “higher education - online learning - graduate students”, (2) the identification of the main interactions in the literature, and (3) the study of the main connections and latest trends. Figure 1 presents the tools, activities and deliverables for each of the stages addressed in this research.

The quantitative methodology used in this study was based on two pillars: network analysis and bibliometric study. The bibliometric study, a method of statistical analysis, enables the identification and analysis of the structural and dynamic aspects of scientific research in the area of interest (Ramírez et al., 2011). Within bibliometrics, the technique of bibliometric mapping is used, a tool within the field of bibliometrics that allows the knowledge landscape and the existing connections between scientific articles to be visualized.

**Figure 1**  
*Research Methodology*

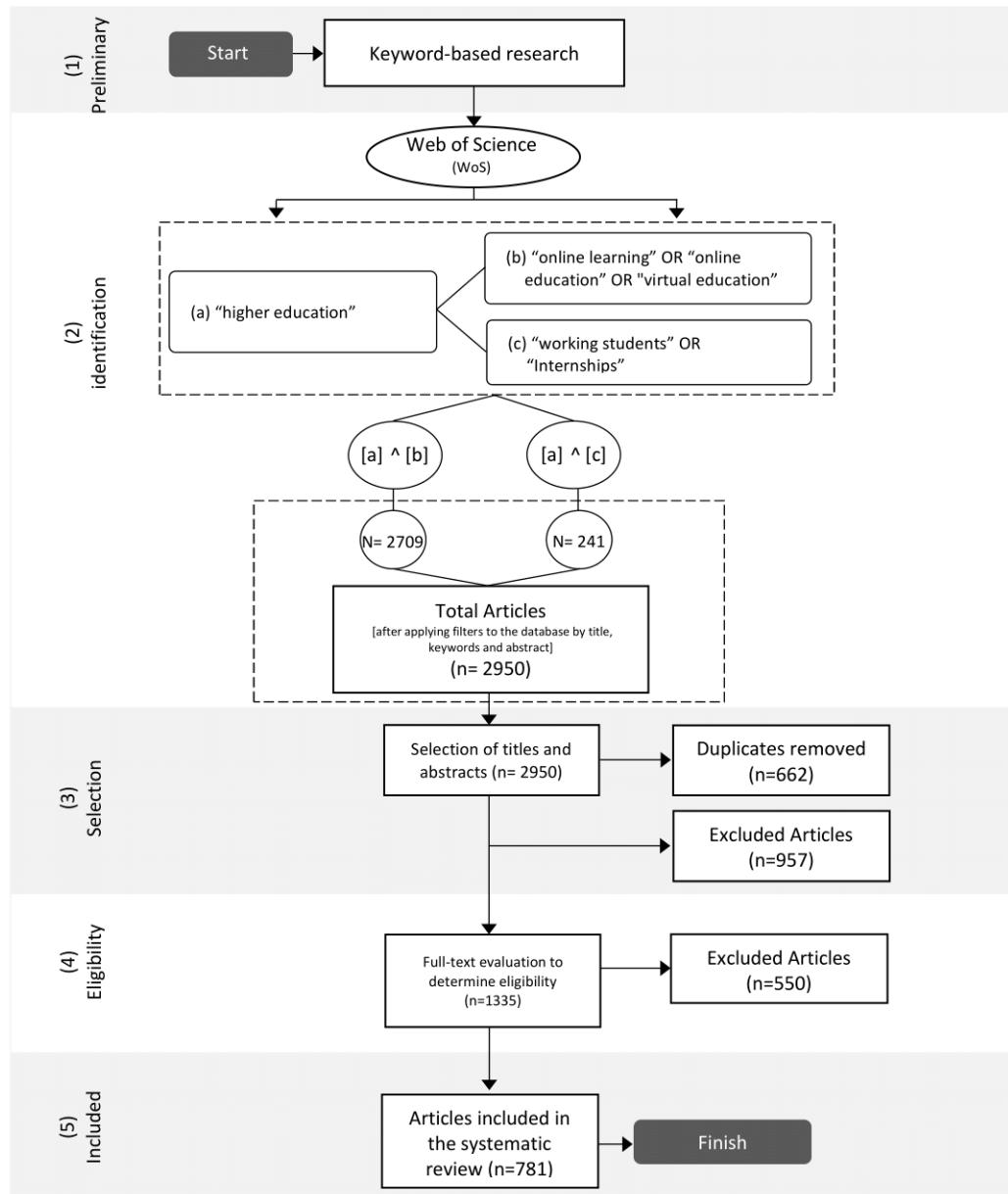


## Stage 1. “Higher education – online learning – graduate students” interaction— Literature review

To achieve a general understanding of the knowledge domain, a bibliometric study of the existing literature was conducted. This stage was executed with two main tasks: (1) data collection; and (2) mapping and bibliometric study.

- The authors then adopted the PRISMA methodology to evaluate and analyze the literature. According to this methodology, the article selection process is divided into the following stages: (1) Preliminary, (2) Identification, (3) Selection, (4) Eligibility, and (5) Inclusion. Figure 2 summarizes the article search and selection process. In the last stage, a thorough reading of the full texts is carried out, selecting only those articles whose content will be directly related to the research topic and will fit the scope of the study of “higher education - online learning - graduate students”.
- *Strategy and criteria.* Relevant keywords were defined and a suitable database was selected to obtain a comprehensive dataset. Data collection covered scientific articles and journal articles in the field of “education”. Scientific articles published in the last thirteen years were selected, in line with previous research in bibliometrics which suggests that a period of at least ten years is sufficient to analyze current trends and challenges in a specific research topic (Matarneh et al., 2019; Oraee et al., 2017; Wang et al., 2019).
- *Database and keyword selection.* To collect data in the fields related to “higher education - online learning - graduate students”, a search was conducted on the Web of Science (WoS), as it offers broad coverage in the field of educational research compared to other databases (Hosseini et al., 2018; Mongeon & Paul-Hus, 2016; van Eck & Waltman, 2014).
- *Inclusion and exclusion criteria.* The search for articles focused on the topics “higher education – online learning – graduate students”. To refine the results, the following inclusion criteria were applied: (1) articles related to higher university education, excluding preschool, basic and secondary education; (2) articles belonging to the field of education. Articles related to other areas (for example: tourism, manufacturing, automotive sector, etc.), and those published before 2010 were discarded.
- *Detection and evaluation of retrieved studies.* The WoS search yielded a total of 2950 articles, after removing 662 duplicates. The flowchart in Figure 2 illustrates the number of articles retrieved for each search combination. Following the PRISMA methodology, titles, keywords, and abstracts of the 662 excluded duplicate articles were reviewed. An additional 957 articles were removed for not meeting the inclusion criteria. The remaining 1335 articles were reviewed in detail, resulting in the exclusion of 550 articles. Ultimately, 781 articles were selected for analysis.

**Figure 2**  
PRISMA flowchart of the literature collection and selection process



To delve deeper into the central topic and area of study, the visualization tool VOSviewer was used to create a co-occurrence map of the keywords used by the authors.

## Stage 2: Identifying the main interactions: A systematic review

Complementing the bibliometric study, an in-depth qualitative analysis of the selected articles was carried out. This manual analysis aimed to identify the latest educational trends and challenges in the interactions related to "higher education – online learning – graduate students". To do so, a systematic review of the selected articles was carried out using the PRISMA methodology.

The first phase of the qualitative analysis consisted of identifying interactions or connections mentioned by the authors in the selected articles, through an exhaustive review of the documents. In addition, a process of homologation of the interactions was carried out to group educational trends and common themes, in order to carry out an additional bibliometric analysis (see Figure 1).

### **Stage 3: Interaction study— Bibliometric review and social network analysis**

Once the interactions between the authors were identified, the VOSviewer software was used to generate visualizations of the knowledge networks present in the bibliographic database. To this end, bibliometric analysis techniques, such as term co-occurrence analysis, were applied to determine which keywords or concepts were most relevant and recurrent in the documents included in WOS. In simple terms, co-occurrence analysis consists of identifying which words usually appear together in the texts, which allows for the discovery of the central themes and conceptual relationships within a specific field of study (Galvez, 2018; Miguel et al., 2018).

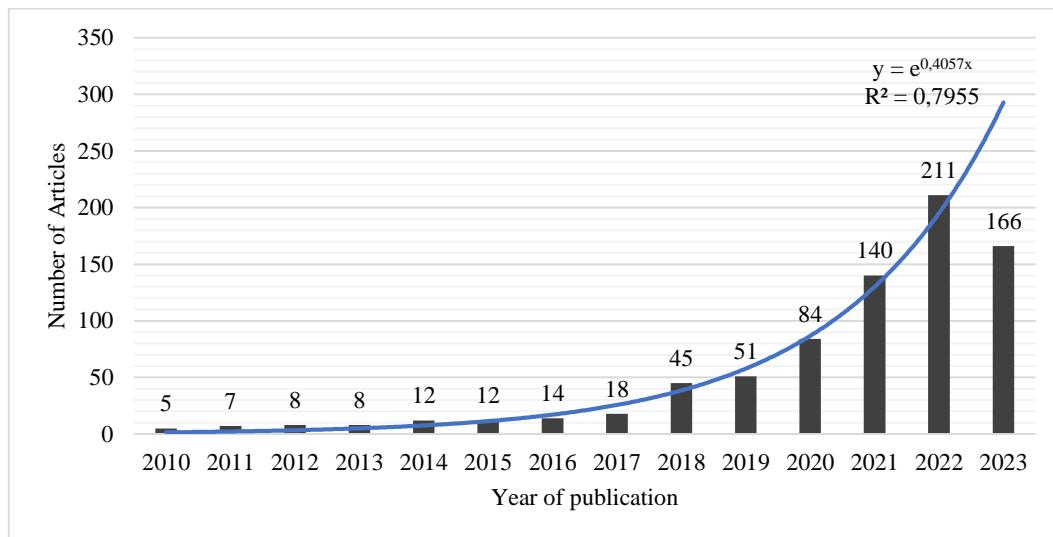
During the third stage, data visualization techniques (bibliometric maps) were used to analyze the relationships between the key concepts identified in the research. Using VOSviewer software, co-occurrence maps were constructed showing the frequency with which terms co-occurred with other terms (Al Hattab & Hamzeh, 2015; Hickethier et al., 2023). The most important terms were visually highlighted and the resulting thematic groupings (clusters) were analyzed (Esser & Fahland, 2021; Golbeck, 2013). To delve deeper into the central theme addressed and the area of study, the VOSviewer visualization tool was used to create a co-occurrence map of the keywords used by the authors.

## **RESULTS AND FINDINGS**

### **Annual Quantitative Distribution of Literature**

A total of 781 articles were selected from the knowledge base, and they were distributed chronologically between 2010 and 2023, as shown in Figure 3. It is feasible to make preliminary assumptions that relevant research on higher education interactions applying online learning in graduate students has been increasing from 2020 to date. The peak of relevant publications occurred in 2022 with 211 articles, followed in 2021 with 2140 articles. It is important to note that the articles published in 2023 were recovered in the third quarter of the year, so the total number of articles for this particular period is incomplete. It is possible to conclude that since 2018 there has been a constant development of relevant research on the interactions of these concepts, and since 2020 it has grown exponentially due to the Covid-19 pandemic.

**Figure 3**  
*Annual distribution of publications*



This expansion is due to the wider use of distance education worldwide, whose method or educational system of training is independent, not face-to-face, mediated by various technologies and where traditional schemes in the teaching-learning process change, both for the teacher and the student. Additionally, with this method of education there is no direct relationship in real time for the teacher to direct the process and the student's learning process is more flexible, as there is no physical interaction in terms of place and time, which requires greater independence and self-regulation on the part of the student. Distance education adopts various peculiarities depending on the intermediation, time and channel to be used.

### Quantitative analysis of the main countries

Table 1 lists the ten most productive countries, and based on the results obtained, 44 different countries or territories were generated. The United States is the most productive country in relevant studies on interactions with "higher education applying online learning in graduate students" with 155 publications, followed by Australia with 67 publications. In third place is Spain with 66 publications, followed by China with 64 publications.

**Table 1**  
*The ten most productive countries from the selected publications*

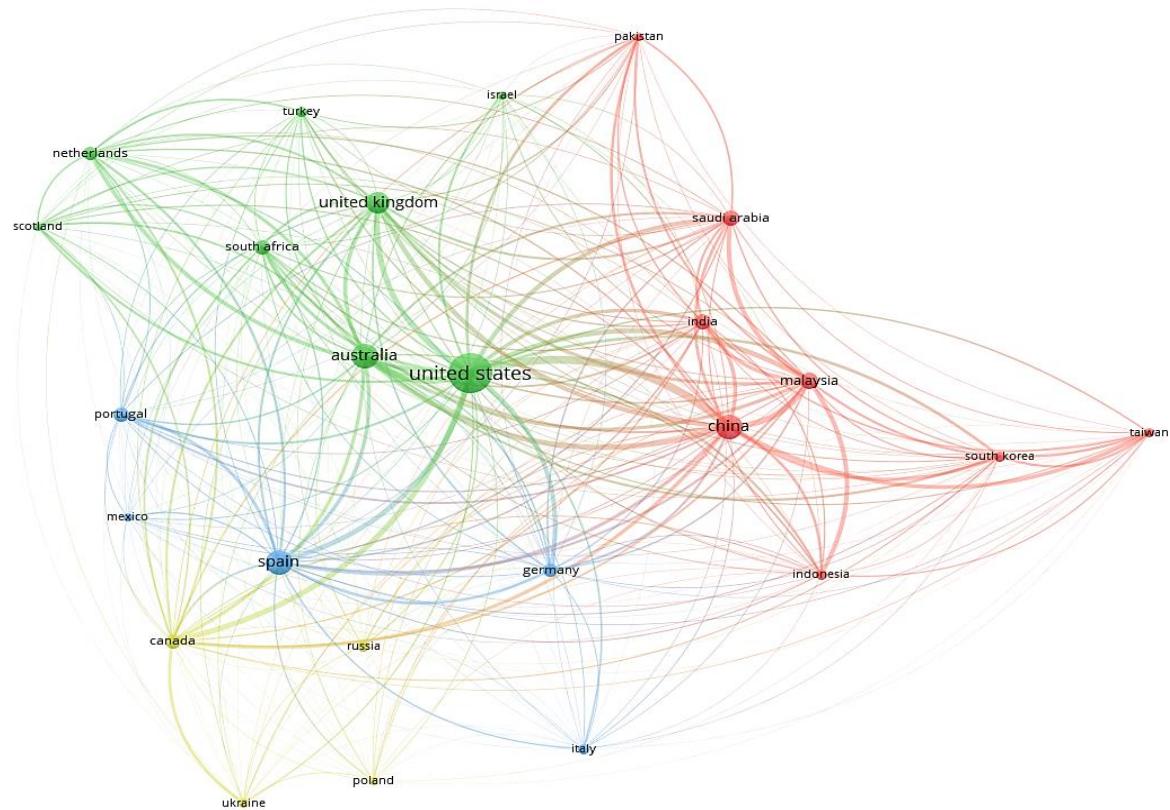
| Nº | Countries      | No. of Publications | Citations | Citations/No. of Publications | Total strength of the link |
|----|----------------|---------------------|-----------|-------------------------------|----------------------------|
| 1  | United States  | 155                 | 2051      | 13.23                         | 10217                      |
| 2  | Australia      | 67                  | 1277      | 19.06                         | 5765                       |
| 3  | España         | 66                  | 999       | 15.14                         | 3889                       |
| 4  | China          | 64                  | 701       | 10.95                         | 8009                       |
| 5  | United Kingdom | 50                  | 658       | 13.16                         | 4083                       |
| 6  | Canada         | 26                  | 494       | 19.00                         | 3519                       |

| Nº | Countries    | No. of Publications | Citations | Citations/No. of Publications | Total strength of the link |
|----|--------------|---------------------|-----------|-------------------------------|----------------------------|
| 7  | Malaysia     | 31                  | 450       | 14.52                         | 5606                       |
| 8  | Netherlands  | 23                  | 430       | 18.70                         | 2293                       |
| 9  | Portugal     | 24                  | 372       | 15.50                         | 1512                       |
| 10 | Saudi Arabia | 27                  | 350       | 12.96                         | 3101                       |

Using VOSviewer software, Figure 4 shows an international collaboration network. In this map, the size of the circles represents the frequency with which each keyword appears, and their color and cluster type indicate their thematic category (Al-Ashmori et al., 2020; Oladiprin et al., 2023). The proximity between keywords reflects their tendency to appear together, while a greater distance suggests a low co-occurrence (Van Eck & Waltman, 2013).

**Figure 4**

*Countries that invest in research in the field of higher education by applying online learning*



This study aimed to locate the main research centers worldwide. The results indicated that the United States leads the ranking, followed by Australia, Spain and China. This type of analysis allows us to discern the most prolific countries in the areas studied and to establish links between institutions, which lays the foundation for future research that identifies new actors and evaluates the academic achievements attained.

## Institutions contributing to publications

An analysis is carried out of the institutions that contribute the most to research on the integration of online learning in university programs. The results of this analysis are detailed in Table 2, which lists the twenty universities with the largest number of publications on the defined topics.

The university with the most citations is Deakin University (n= 501), followed by Purdue University (n= 216), The University of Hong Kong (n= 181) and The Open University (n= 176). The analysis reflects that research efforts in higher education applying online learning have been contributed by various institutions worldwide.

**Table 2**  
*Top 20 major contributing institutions*

| No. | University                           | Country        | Number of Publications | Citations | Total strength of the link |
|-----|--------------------------------------|----------------|------------------------|-----------|----------------------------|
| 1   | Deakin University                    | Australia      | 10                     | 501       | 634                        |
| 2   | Purdue University                    | United States  | 8                      | 216       | 336                        |
| 3   | The University of Hong Kong          | China          | 9                      | 181       | 341                        |
| 4   | The Open University                  | United Kingdom | 13                     | 176       | 194                        |
| 5   | Universitat Oberta de Catalunya      | Spain          | 11                     | 166       | 183                        |
| 6   | East China Normal University         | China          | 6                      | 118       | 311                        |
| 7   | Brigham Young University             | United States  | 5                      | 108       | 82                         |
| 8   | Indiana University                   | United States  | 5                      | 101       | 60                         |
| 9   | Central China Normal University      | China          | 5                      | 97        | 337                        |
| 10  | University of South Africa           | South Africa   | 8                      | 85        | 136                        |
| 11  | Edith Cowan University               | Australia      | 6                      | 84        | 117                        |
| 12  | Macquarie University                 | Australia      | 5                      | 74        | 246                        |
| 13  | University of New England            | United States  | 5                      | 64        | 67                         |
| 14  | Universidade Aberta                  | Portugal       | 6                      | 54        | 133                        |
| 15  | Beijing Normal University            | China          | 6                      | 53        | 450                        |
| 16  | The Hong Kong Polytechnic University | China          | 6                      | 49        | 145                        |
| 17  | Boise State University               | United States  | 5                      | 47        | 95                         |
| 18  | RMIT University                      | Australia      | 5                      | 32        | 421                        |
| 19  | Universidad Complutense de Madrid    | Spain          | 5                      | 26        | 54                         |
| 20  | Near East University                 | Türkiye        | 5                      | 15        | 23                         |

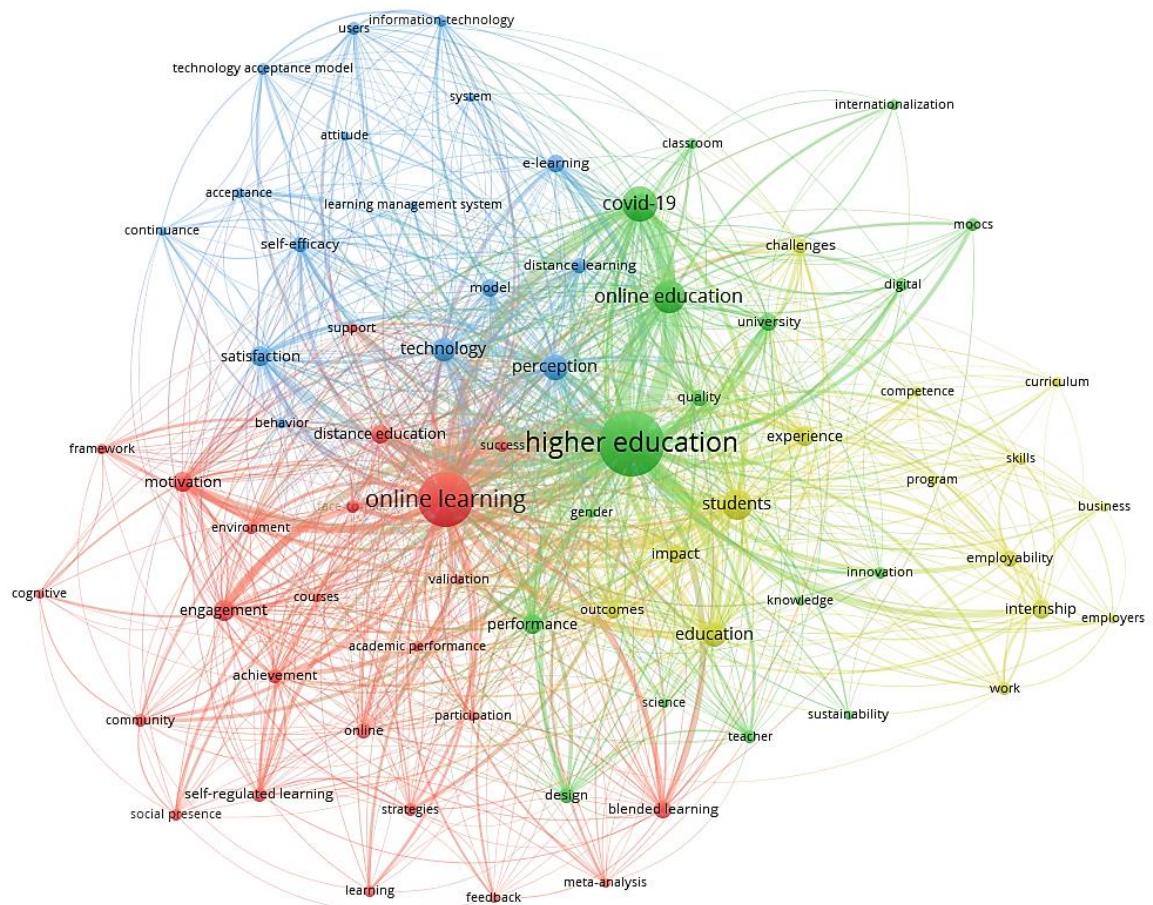
## Keyword co-occurrence analysis

Before conducting the keyword co-occurrence analysis, all existing keywords in the publications were grouped by subject. For example, “technologies” and “technology” were grouped into a single term called “technology”, thereby greatly reducing the

number of keywords. Subsequently, the bibliographic data of the selected articles were integrated into VOSviewer, applying a minimum criterion of four mentions for the keywords. Terms that were not very recurrent in the field of study were discarded. This process reduced the initial set of keywords from 2520 to 72. With this refined set, a term co-occurrence map was constructed, visualized in Figure 5. The keywords were grouped into four thematic clusters (represented by colors).

Table 3 provides a detailed quantitative analysis of the main keywords in the map, including the number of occurrences, the number of connections, and the strength of these connections.

**Figure 5**  
*Keyword co-occurrence map*



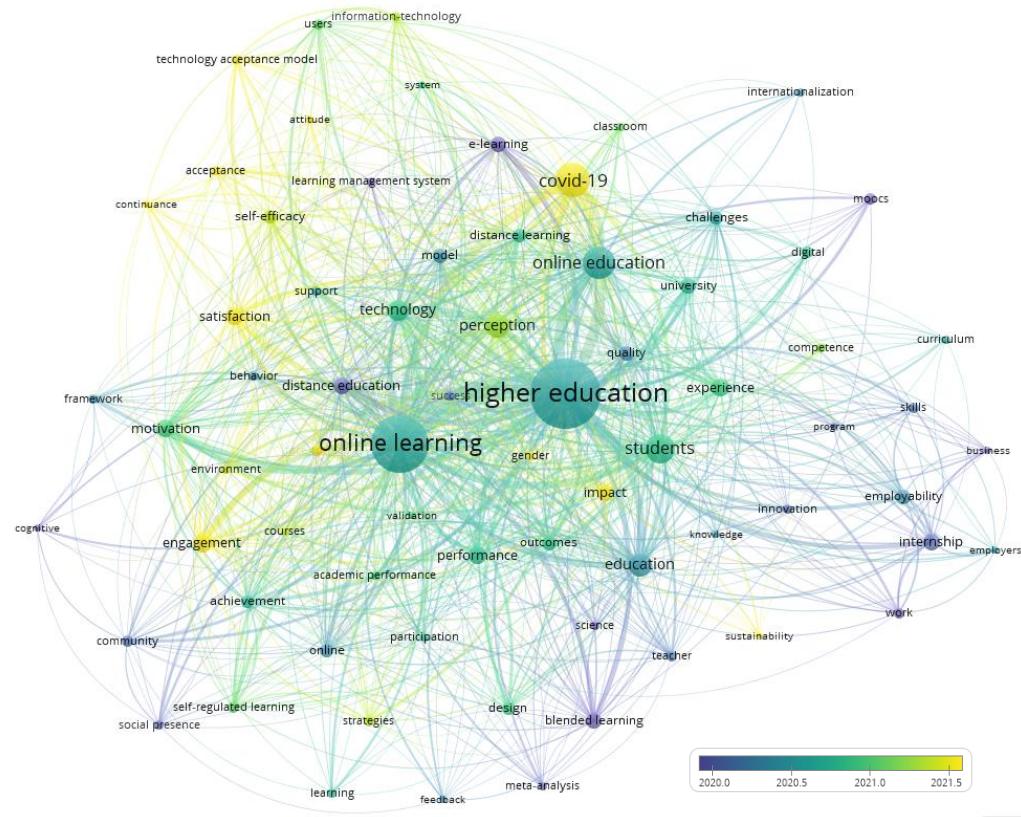
**Table 3**  
*Top 30 major contributing institutions*

| No. | Keywords         | Occurrences | Number of Links | Total strength of the link |
|-----|------------------|-------------|-----------------|----------------------------|
| 1   | Higher Education | 582         | 71              | 2167                       |
| 2   | Online Learning  | 413         | 69              | 1600                       |
| 3   | Covid-19         | 165         | 68              | 646                        |
| 4   | Students         | 123         | 69              | 591                        |

| No. | Keywords                | Occurrences | Number of Links | Total strength of the link |
|-----|-------------------------|-------------|-----------------|----------------------------|
| 5   | Perception              | 90          | 66              | 535                        |
| 6   | Online Education        | 147         | 65              | 488                        |
| 7   | Education               | 83          | 64              | 436                        |
| 8   | Technology              | 74          | 65              | 403                        |
| 9   | Engagement              | 61          | 56              | 329                        |
| 10  | Motivation              | 54          | 56              | 321                        |
| 11  | Satisfaction            | 53          | 61              | 321                        |
| 12  | Performance             | 53          | 65              | 286                        |
| 13  | Experience              | 52          | 59              | 280                        |
| 14  | University              | 44          | 58              | 240                        |
| 15  | Impact                  | 49          | 62              | 238                        |
| 16  | Outcomes                | 39          | 61              | 237                        |
| 17  | Distance Education      | 47          | 52              | 230                        |
| 18  | Self-Efficacy           | 33          | 55              | 214                        |
| 19  | Quality                 | 40          | 58              | 212                        |
| 20  | Blended Learning        | 42          | 46              | 205                        |
| 21  | E-Learning              | 45          | 53              | 202                        |
| 22  | Model                   | 41          | 53              | 201                        |
| 23  | Achievement             | 29          | 50              | 192                        |
| 24  | Internship              | 49          | 40              | 185                        |
| 25  | Distance Learning       | 34          | 52              | 180                        |
| 26  | Online                  | 35          | 50              | 178                        |
| 27  | Challenges              | 32          | 50              | 174                        |
| 28  | Self-Regulated Learning | 26          | 44              | 160                        |
| 29  | Design                  | 31          | 40              | 156                        |
| 30  | Employability           | 39          | 38              | 151                        |

It is highlighted that, in the last year, 2022, concepts such as “Technology Acceptance Model”, “Engagement”, “Self-efficacy”, and “impact” have emerged, concepts that drive the significant study of online learning in higher education. These concepts are considered essential for a quality online education.

**Figure 6**  
*Map of co-occurrence of keywords in recent years*

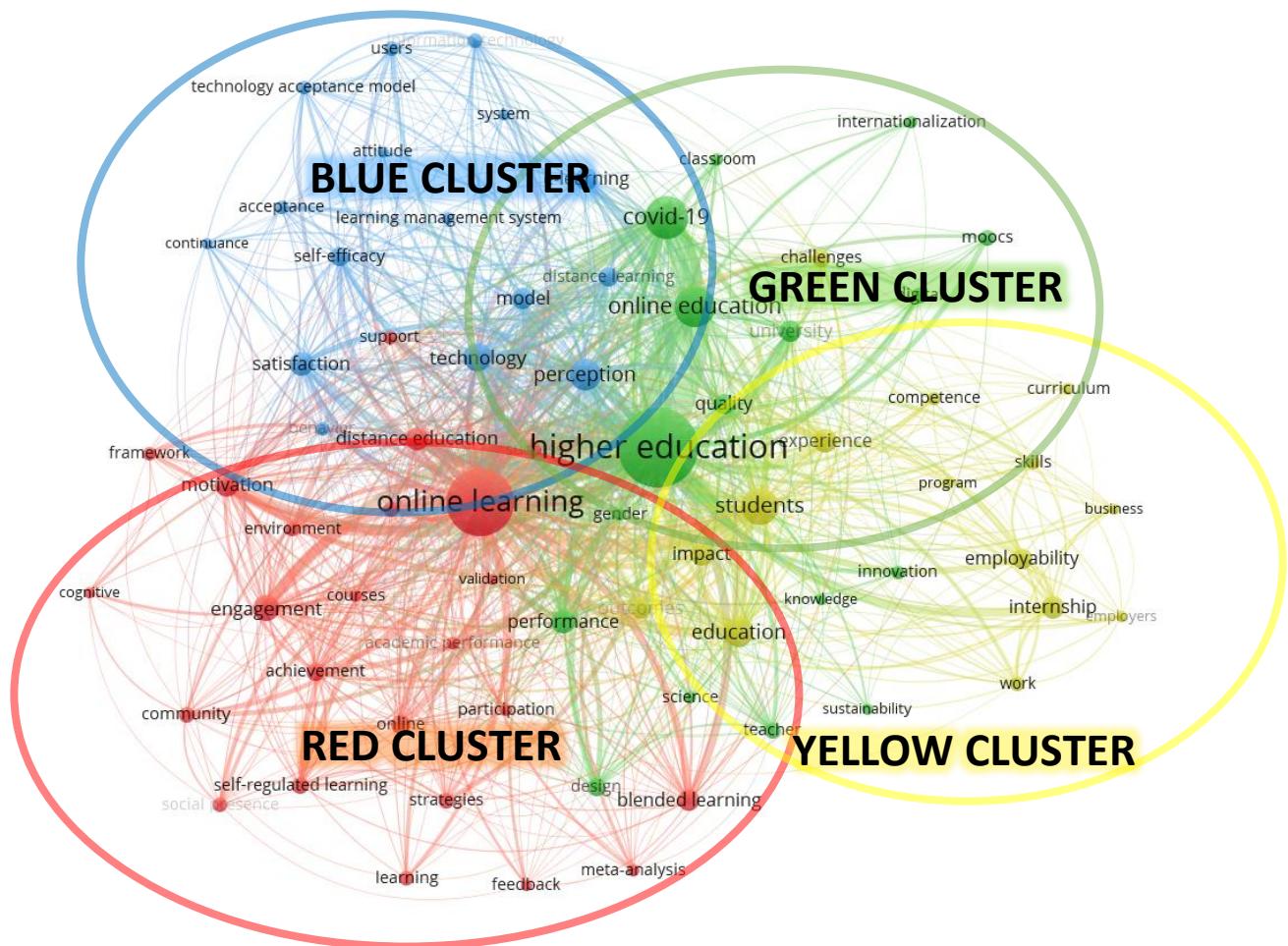


## KEY CONNECTIONS BETWEEN DISTANCE LEARNING IN STUDENTS AND THE LATEST EDUCATION TRENDS TO BOOST EFFECTIVE ONLINE LEARNING

Based on the findings from the keyword co-occurrence map, it was possible to distinguish the main groups of terms associated with the predominant lines of research, which are known as “Zones” or “Clusters”

The following Zones are: (1) perception and satisfaction of distance learning using technologies (Blue Zone); (2) Maintaining engagement, participation, motivation and course environment using online learning (Red Zone); (3) Skills and competencies of the future professionals (Yellow Zone); (4) Quality online education in higher education: a path towards internationalization through massive open online courses (MOOC) (Green Zone).

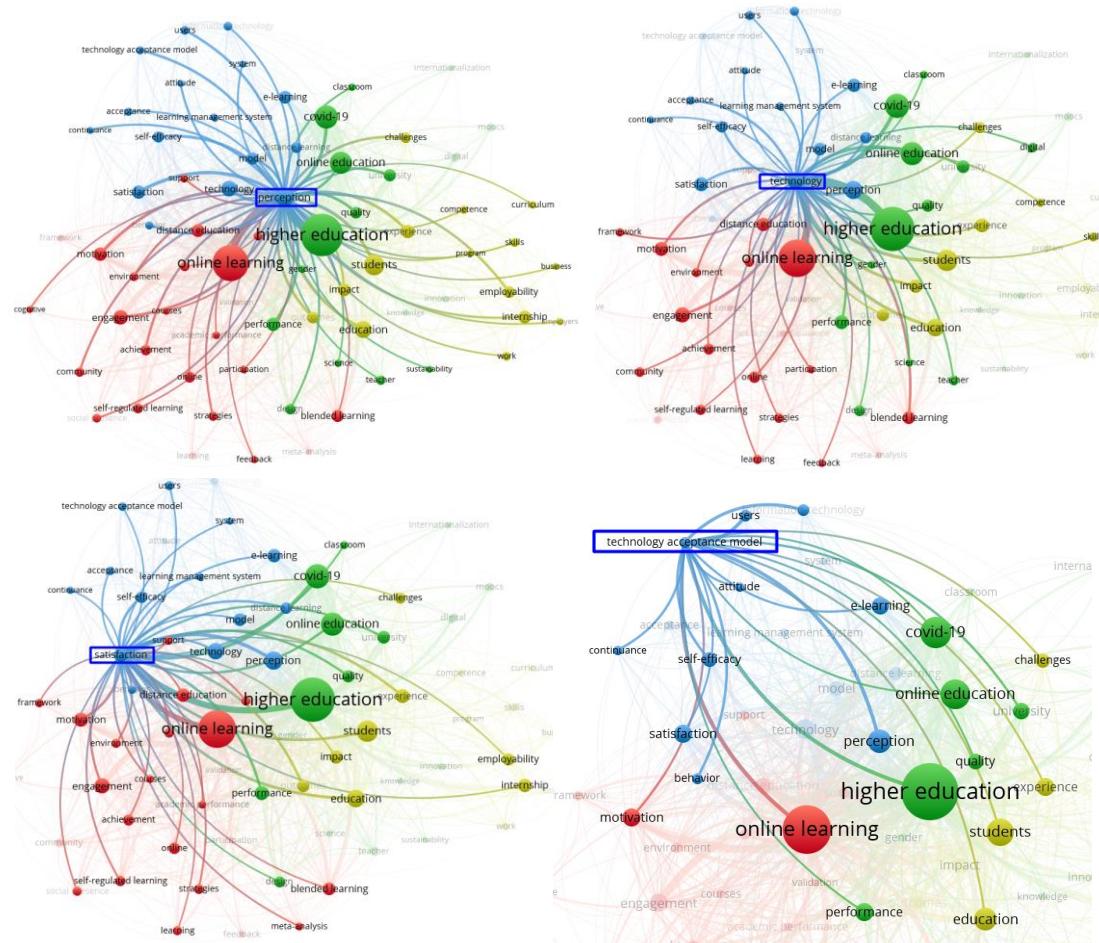
**Figure 7**  
Zones (Clusters) of the Keyword Co-occurrence Map



## Perception and satisfaction of distance learning using technologies (Blue Zone)

In the case of online learning courses, they are said to contribute to the optimal development of the theoretical component of the subject and the acquisition of digital skills, while increasing the student's independence and self-confidence (El Refae et al., 2021). Advantages cited included being able to access learning materials from anywhere, providing flexibility and convenience for students, and making learning accessible to those with busy schedules.

However, despite these advantages, students' experiences and opinions about virtual learning are diverse and vary depending on aspects such as previous experience with that educational format, requirements and disadvantages related to access to the Internet and electronic devices (computers, mobile phones, tablets) and digital illiteracy among teachers and students, including the limited experience of teachers who deliver virtual education (Sadeghi, 2019). These aspects, combined with low motivation, create a difficult situation for the development of this training modality.

**Figure 8***Blue Zone: Perception and satisfaction of distance learning using technologies*

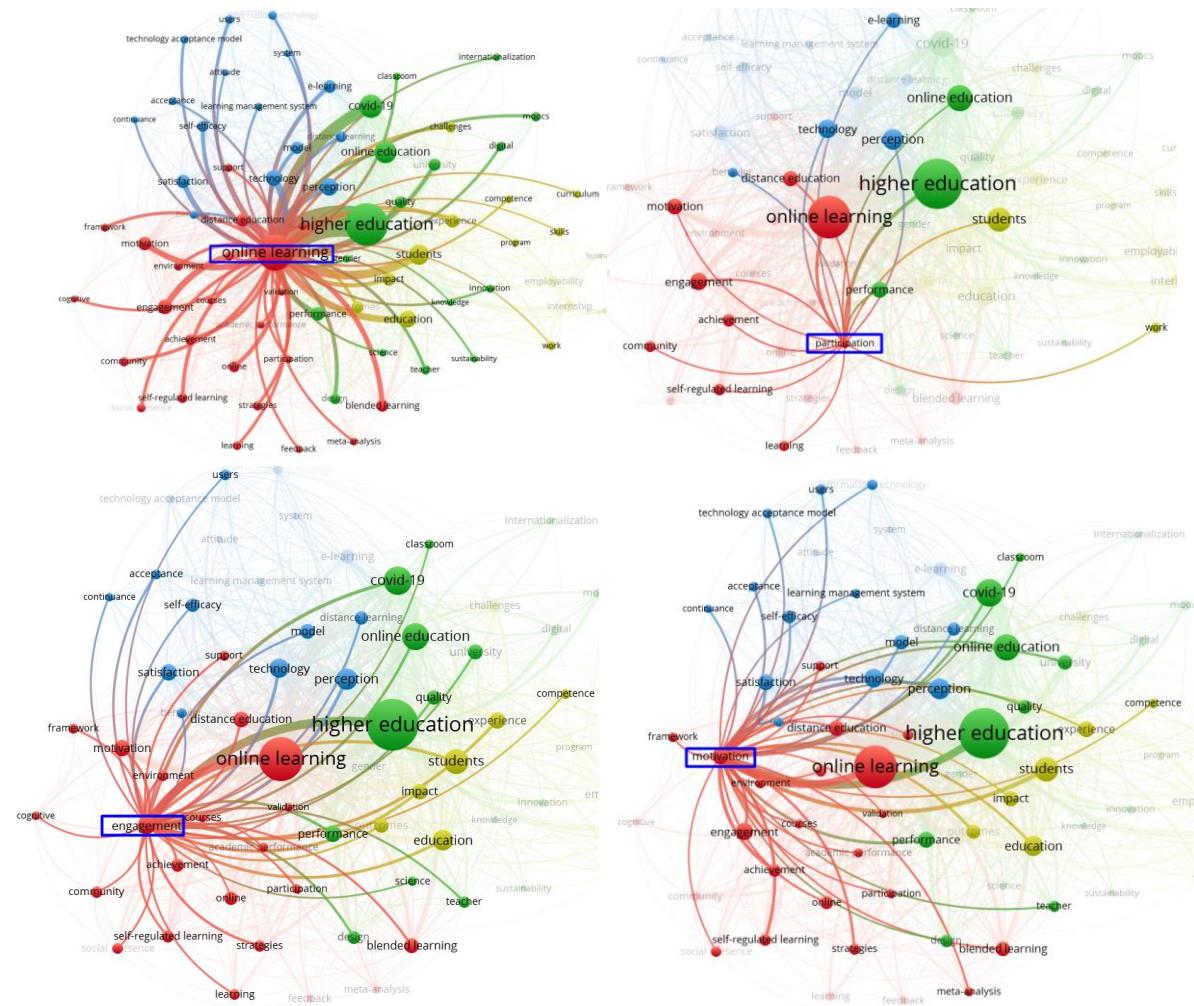
The process of acceptance and use of a virtual environment directly affects the behavior of students as users of learning products. Understanding it therefore helps to better elucidate their online behavior and perception in such environments. The most widely used behavioral adoption model about the Internet in general and specific virtual environments in particular is the Technology Acceptance Model (TAM) (Granić & Marangunić, 2019), as observed in the blue area.

### Maintaining engagement, participation, motivation and course environment using online learning (Red Zone)

Two of the main and most common barriers that arise when carrying out partially or completely online educational initiatives (blended and e-learning, respectively) are the progressive demotivation of students and their disinterest or lack of real commitment to the project (Goh & Yang, 2021).

**Figure 9**

## *Red Zone: Maintaining engagement, participation, motivation and course environment using online learning*



Low motivation means a higher risk of dropping out of courses or having a negative impact on achieving goals in a variety of subjects (Abou-Khalil et al., 2021). On the other hand, teachers must acquire not only the basic skills necessary to use technological tools and resources that facilitate communication, but also a leadership role and dynamism to provide adequate teaching for the educational needs of students (Garcés, 2020a; Zhang & Lin, 2020).

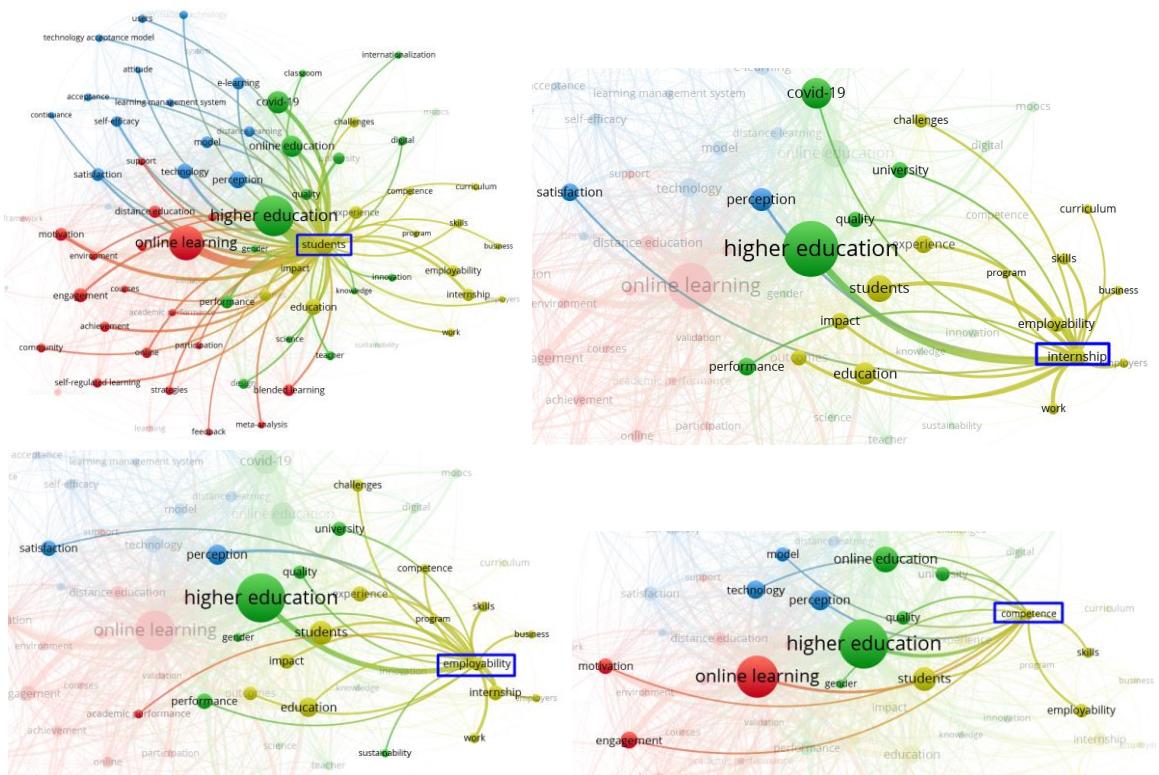
On the other hand, gamification is an effective strategy to keep employees interested and engaged in online training courses. Here are some ways you can implement it (Antonaci et al., 2019; Park & Kim, 2021): 1) Points and Levels: Points are awarded when participants complete courses or modules and set levels that unlock additional content or virtual rewards. 2) Leaderboard: Encourage healthy competition by creating a leaderboard where participants can compare their progress to other students. 3) Challenges and Rewards: Regular challenges are presented and those who complete them receive rewards such as virtual badges, certificates or tangible prizes.

## Skills and competencies required for future professionals (Yellow Zone)

Both students and teachers need to develop digital knowledge and skills (e-skills), responsibility, ethical practices and high-level critical thinking to harness the potential of online learning (Palomino-Flores & Cristi-López, 2023; Panagiotarou et al., 2020). Teachers also need to teach and use alternative methods to overcome the loss of physical interaction between key subjects. And from an institutional perspective, it requires special infrastructure, resources, and organizational models.

**Figure 10**

*Yellow Zone: Skills and competencies required for future professionals*



Online training is an appropriate tool for the professional development of many employees. We must not forget that new social needs require virtual learning models that integrate quality levels, which allow for evaluating, rationalizing and justifying costs and investments in online educational institutions (Adedoyin & Soykan, 2023). As seen in the Yellow Zone, in a rapidly evolving labor market, higher education graduates need to develop employability skills (Mittal & Raghavar, 2021), which is why there is a sector that is researching this. The key to being employable is the ability to reflect on learning experiences, both within the curriculum and in extracurricular and work placements.

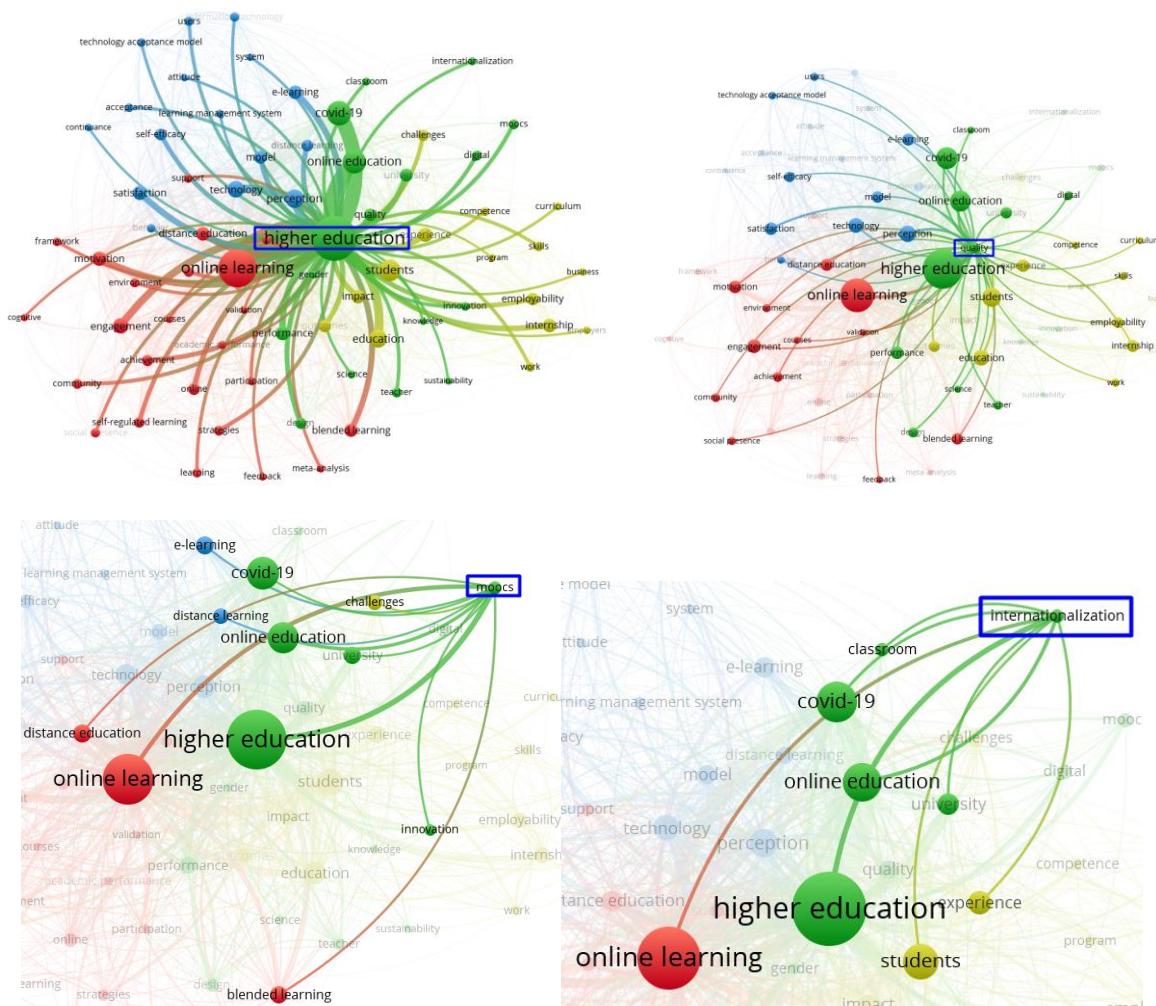
## Quality Online Education in Higher Education: Path to Internationalization through Massive Open Online Courses (MOOC) (Green Zone)

Educational institutions are increasingly discussing the quality of online learning experiences and the benefits of online distance learning (Castro & Tumibay, 2021). In this sense, evaluating the quality of education through in-person and virtual methods requires various parameters corresponding to the underlying pedagogical model, goals and objectives, as well as the entry and exit profiles that characterize students in each of the modalities (Barteit et al., 2020).

Depending on the conditions and expectations of students taking courses online, universities should develop approaches to the quality of online education and systematically evaluate them in order to achieve the highest level of quality mentioned above. Improving the quality of education at universities is one of the important tasks of participants. However, if such education is carried out online, it is questionable whether its quality should be evaluated by the same standards as those used to evaluate the quality of face-to-face education (Al-Fraihat et al., 2020; Gherheş et al., 2021).

**Figure 11**

*Green Zone: Quality Online Education in Higher Education: Path to Internationalization through Massive Open Online Courses (MOOC)*



As seen in the Green Zone, there is a strong interest in researching quality in higher education, where universities producing massive open online courses (MOOCs) and offering them on global e-learning platforms define internationalization as one of their main objectives. Empirical research testing the impact of MOOC production on international student enrollment is still scarce.

Considering these previous findings, the current study investigates and presents a flow for the construction of a competency framework integrating the requirements and needs of online learning and its main tools and technologies, adapting the traditional structure for the generation of educational competencies.

## **TOWARDS EFFECTIVE VIRTUAL EDUCATION: A FRAMEWORK OF COMPETENCES, TOOLS AND TECHNOLOGIES**

Based on the background described in the literature review, this section proposes a model that integrates, on the one hand, the keywords of the occurrence map made by VOSviewer and the skills and competencies required for future professionals.

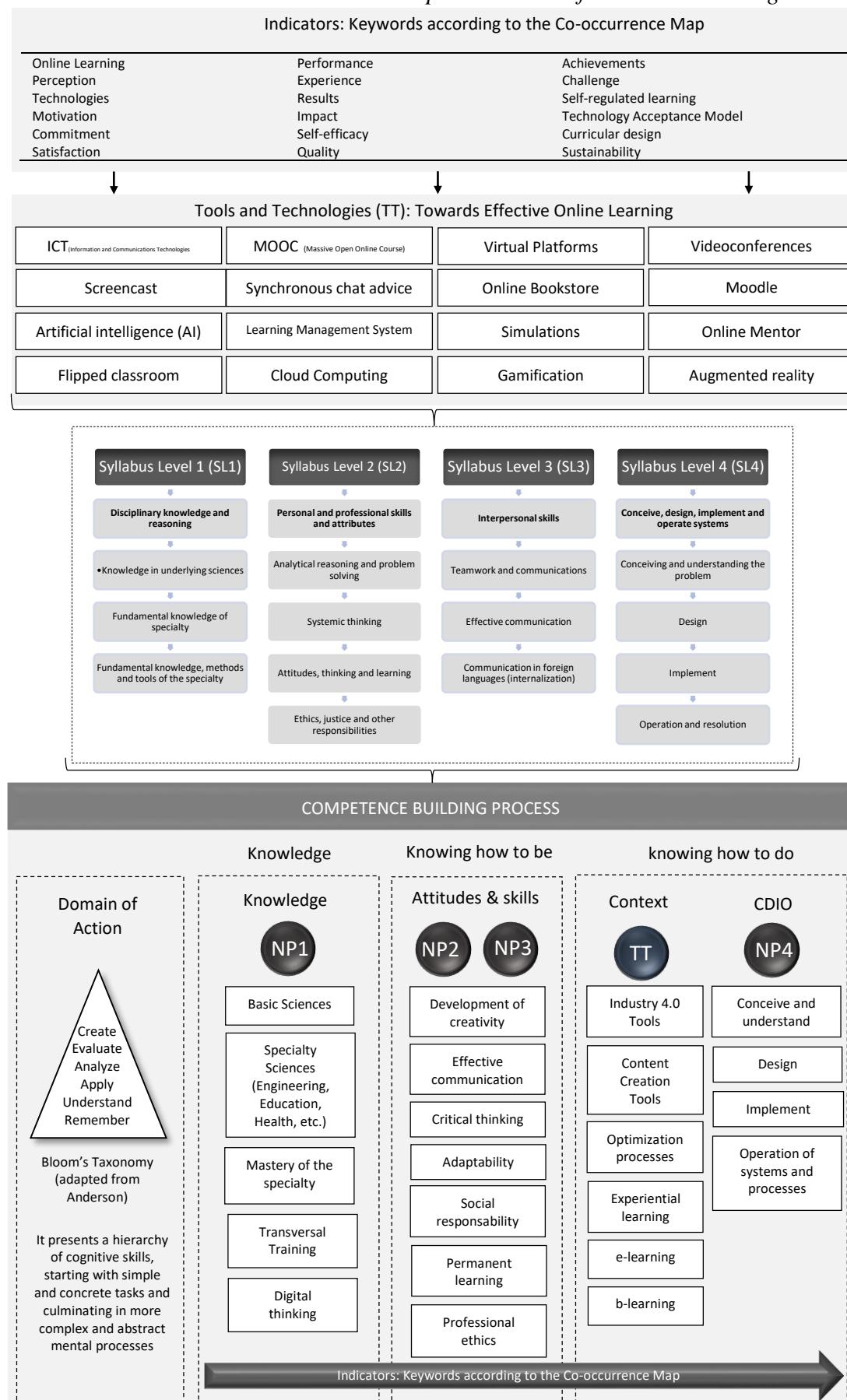
The elements that interact in the name of competence are integrated into the proposed model, allowing the connection of the aspects of knowledge construction, where “knowing” and “knowing how to be” are related to the categories identified from the graduate profile, while “knowing how to do” is related to the tools and technologies of online learning, reflecting their impact on the context and performance conditions.

It is essential to highlight that the successful implementation of this theoretical framework depends on the consideration of pre-established general guidelines. Although the focus of this study is on the design of the model, the following aspects must be considered when applying it in specific contexts: (1) The clear definition of the institutional objectives must serve as a starting point to interrelate the components of the model, assigning greater or lesser relevance to each one according to the nature and social impact of the organization; (2) Detailed planning is essential to achieve the proposed objectives, which implies establishing realistic deadlines for each task or action; (3) The identification of current competencies and those necessary to meet organizational objectives enables recognizing strengths and areas for improvement, facilitating the development of human talent; and (4) The establishment of a monitoring and evaluation system is crucial to ensure compliance with the objectives, through the definition of key indicators and the appropriate allocation of resources.

Taking Construction Engineering as an example, keywords such as “technologies”, “self-efficacy” and “impact” indicate current trends. To respond to these challenges, an innovative project-based pedagogical approach (CDIO type) is proposed, including: urban mobility simulations, the development of environmental monitoring systems with smart sensors, the application of BIM for sustainable design and, and, finally, the completion of thesis that address real campus issues.

**Figure 12**

*Theoretical-Practical Framework: Competence Model for Online Learning*



## CONCLUSIONS AND DISCUSSIONS

This study examines the challenges, current trends, and future research directions for integrating online learning into higher education for graduate students. It emphasizes the importance of understanding the limitations of online learning and the structure of the knowledge base in this field. The study makes three main contributions. First, it analyzes the current landscape and future prospects of integrating online learning with higher education for graduate students, using a bibliometric and systematic review along with social network analysis. It explores the limitations of the topic and identifies areas for future research. Second, it highlights the importance of using technology as a complement to online education, emphasizing the need to consider student satisfaction and perception. Third, it demonstrates an objective and effective method for understanding the state of research in new and rapidly developing fields.

The effective achievement of educational objectives requires a strategic combination of teaching techniques that align with the most appropriate learning styles for each case. Didactics, as a set of procedures supported by suitable teaching techniques, facilitates the development of the teaching-learning process in an optimal environment. In this sense, the evidence on best practices in e-learning concludes that it is not enough to simply provide optimal technical tools or logical repositories of materials and content on the platforms, but rather to adapt these technologies as tools to make student learning more flexible, introduce educational innovations and transform assessment processes. And, in this sense, online resources not only help to redesign the traditional lecture, but they also enable true learning and enable mixed teaching with part in-person and part remote (b-learning) and even completely distance teaching (e-learning). These tools allow students to self-organize their learning, provide consistent access to learning materials, improve flexible audience deployment, and work toward higher education when materials are distributed to everyone (Forcael et al., 2021; Garcés & Forcael, 2020). These tools make it easier to apply the “flipped classroom” technique (Forcael et al., 2022).

The authors consider it necessary to present a reflection on the most outstanding aspects of e-learning pedagogy, highlighting both its positive findings and its weaknesses. On the one hand, the positive findings: 1) Flexibility and Accessibility: it provides great flexibility in terms of time and place of learning; 2) Personalization of Learning: Online platforms and tools facilitate the personalization of learning, adapting content and activities to the individual needs and interests of each student; 3) Promotes Autonomy and Responsibility: encouraging students to be active protagonists of their learning process; and 4) Wide range of educational resources: including videos, simulations, discussion forums and interactive materials, which enrich the learning experience. On the other hand, the weaknesses of e-learning are: 1) Digital Divide: The lack of access to the Internet and electronic devices in some sectors of the population can generate a digital divide that limits online learning opportunities; 2) Social Isolation: E-learning can lead to a certain degree of social isolation as it reduces face-to-face interaction between students and teachers; 3) Motivation and Self-Discipline: Success in e-learning requires a high level of motivation and self-discipline on the part of students, who must manage their own time and effort to complete activities and achieve learning objectives; 4) Assessment and Feedback: Assessment and feedback in e-learning can be challenging as they require specific strategies to ensure fair and effective assessment of learning; and 5) Digital Skills:

Students need to develop basic digital skills to navigate virtual environments, use online tools, and actively participate in learning activities. In conclusion, e-learning pedagogy presents a promising outlook for the future of education, offering endless possibilities to improve the quality and accessibility of learning. However, it is important to recognize their weaknesses and work together to overcome them, in order to ensure that all students have the same opportunities to succeed in this ever-changing educational environment.

It is also possible to conclude that it is necessary to develop new instructional design models for hybrid or virtual education in order to minimize the impact of the identified barriers while maintaining student participation and motivation through new techniques or procedures such as gamification. Discovering the pillars that support a training proposal in instructional design, which introduces effective gamification techniques and useful methodological recommendations for educational content is also of importance. These playful strategies significantly improve participant motivation and promote a state of optimal flow or performance.

Another specific aspect, that could be revealed as a result of the study carried out, is the construction of a framework of effective competencies, which integrate the requirements and needs of online learning and its main tools and technologies, adapting the traditional structure for the generation of competencies in virtual education. In this line, the need to develop employability capabilities together with academic education is widely recognized. Employability as a result of learning is combined with parallel personal development as a result of learning experiences acquired within the curriculum through work-related experiences and extracurricular activities. The key to employability is the ability to reflect on and evaluate past learning experiences.

Technological change, especially the growth of Information and Communications Technology (ICT), affects both the skills that higher education graduates need to develop and higher education itself. Online tools and services offer valuable support to student skill development and reflection. Despite the attention paid to online learning within the curriculum, there remains a gap in exploring activities and tools that promote reflective practice in the classroom, extracurricular activities and workplace learning.

It is worth mentioning that this theoretical framework represents an important input on the skills required for online education, by showing: a) the development of reflection as a key competency for employability and the competencies of future professionals; b) a conceptual model that brings together several theoretical concepts that have not been linked before, and c) key concepts to be introduced in online learning, to support practical reflection, leading to the development of employability competencies in students.

Finally, it is possible to complement the conclusions presented by indicating that this type of study contributes with information that promotes reflection by students, teachers and institutions, on what are the key factors to which we should pay attention to improve the quality of virtual learning and how to put them into practice when teaching a virtual course, designing online assessment activities or selecting digital creation tools for 21<sup>st</sup>-century learners.

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