Systematic Mapping of the Social Construction of Learning (2015-2020): Challenges for Online Learning Environments

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Abstract
The purpose of this study is to identify and characterize the state of social construction of learning in virtual communities within online learning environments and to identify the advances and research challenges of social learning. The method was a systematic mapping to analyze the evidence published on the topic in 2015-2020. We automatically searched the Scopus and Web of Science databases, applying inclusion and exclusion criteria to obtain the maximum relevant information. The pre-designed search strategy resulted in 187 articles. The main research topic addressed in most of these is learning as a social construction in training contexts, primarily virtual communities. In higher education, the United States is the country with the most active researchers on this topic. In addition, the most significant findings show that in a virtual learning community, social and cognitive interactions with teaching presence are crucial for students to build knowledge and achieve a higher level of learning. This study describes challenges related to the various methodologies, geographical scope, and types of social construction learning in virtual learning communities. This research is intended to be of value to teachers, decision-makers, designers of research and researchers interested in the social construction of learning in online learning environments.

Keywords: Social construction of learning, virtual learning communities, social interaction, educational innovation, higher education.

The dynamics of learning in contemporary societies create possibilities for new scenarios and challenges in many areas of education. To overcome educational challenges, the 2030 Agenda for Sustainable Development (Sanahuja & Tezanos Vázquez, 2017) establishes goals that significantly impact the development of education (UNESCO, 2017), specifically the fourth goal is related to quality education. As a contribution to the academic field, this research analyzed the social construction of learning in online learning environments, which is essential to promote active citizenship and where people who identify with specific communities can find support for their training and respond to global challenges through learning (IESALC-UNESCO, 2021). Also, community-based organizations play primary roles in empowering education and organizing learning activities (Noguchi et al., 2018). Thus, a community approach to learning helps people redefine, reevaluate, and promote shared knowledge and learning.

As a producer of knowledge and technology, the university is called upon to make fundamental contributions to social dynamics, such as training through online courses that promote learning through social interaction. According to the International Institute for Higher Education in Latin America and the Caribbean of the United Nations Educational, Scientific and Cultural Organization (IESALC-UNESCO, 2021), the offer of training of higher education must be socially relevant and aim to form knowledge societies that are inclusive, diverse, and multidisciplinary. Furthermore, they must generate authentic correspondence among academic and social groups and create host spaces for dialogue, discussion (Quintana et al., 2021), and dissemination, focusing on sustainable human development with social vision, relevance, research and innovation (Cajiao, 2017). Therefore, eLearning must use a humanistic model with responsible interactions as an essential element of learning (García-Peñalvo & Seoane Pardo, 2015). In this way, it is possible to achieve practical online training environments that facilitate university transformations to meet the challenges of the 21st century.

Technological growth and development, which supports educational training, are constantly evolving realities in society and can promote knowledge and learning in a relevant way the knowledge society. The digital world relies on communication skills for the social construction of learning in the knowledge society (Escardíbul & Mediavilla, 2016; Souviron-López, 2018) and thus, the announcements, communication/email, evaluations, grades, debates, and other tasks or activities that promote interaction are pedagogically integrated (Haubrick et al., 2021). Therefore, ongoing reflection is necessary regarding the challenges that arise in online learning environments for the development of new pedagogical proposals based on socially constructed learning (Gonzalez & Ozuna, 2021) where technology is recognized as a resource that can promote and expand learning in a ubiquitous way (González-Sanmamed et al., 2019) and where students can improve their skills to handle multiple topics through relationships with others through dialogic interactions, collaborations, debates, and information sharing (Yulianto et al., 2016). Hence, interactive and collaborative relationships make it easier for students to carry out activities they cannot manage alone.

The persistent advance of online learning platforms has led to changes in, and reflection about, educational approaches. Online learning environments that create teaching and learning proposals by combining conventional methods with innovative methods increase the accessibility and efficiency of the education system (Shukla et al., 2020). One challenge is addressing online training needs for students aimed at large and diverse student populations (Galoyan et al., 2021). Another challenge is to develop training where students are builders of knowledge and not merely knowledge recipients of a purely instructional pedagogy (Dron & Ostashewski, 2015). In addition, in the face of unprecedented situations such as the COVID-19 pandemic, educational institutions have understood the urgency of preparing for online learning (Ensmann et al., 2021) because they were forced to implement or strengthen online

learning systems and programs (Alwafi, 2022) as a means to acquire knowledge and skills (Elshareif & Mohamed, 2021). Such considerations explain why research on the social construction of learning has become more relevant.

The social construction of learning is continuously developed through the interaction of participants, understood as learning from others, through social interaction (Johnson & Johnson, 2014; Lind et al., 2019) when the synchronous and asynchronous communication tools in online learning environments allow teachers to observe the exchanges of messages between active students, evaluate and infer whether or not the different concepts and lessons are understood, observe the discourse, and decide when to intervene to support student learning. According to a review study, high levels of collaboration and dialogue go hand in hand with social learning (Flood et al., 2018). Studies have also been carried out on open education for the democratization of knowledge (Ramírez-Montoya, 2020), where the growing number of online courses, especially Massive and Open Online Courses (MOOCs), have provoked a new interest in analyzing social learning in geographically distant classrooms with a large number of students (Hernández-García et al., 2015). Educators and research designers have integrated synchronous and asynchronous learning systems to facilitate communication and interaction and shared learning.

In the social construction of learning, interaction and collaboration are vital processes intensified for the co-construction of knowledge (Howe & Schnabel, 2012). In this sense, collaborative learning seeks common learning objectives where knowledge is socially built by the consensus of the participants in the work (Macera, 2017). Thus, learning occurs within a group or community (Villalonga Gómez & Marta-Lazo, 2015) whose members share the same objectives in terms of knowledge. A review study has indicated that learning communities facilitate the construction of knowledge, maximizing the benefits that students obtain from social learning environments due to the collective and social intelligence of their members (González Pérez, 2015). Hence, it is crucial to work in learning communities that encourage interaction and collaboration for the co-construction of knowledge.

Online learning communities provide a social framework for interactive processes, enabling a variety of pedagogical approaches based on students' needs. The concept of the learning community encompasses participatory knowledge, where effective learning requires dialogue and interaction between members active in the collective learning process (Kearney, 2015). In online learning communities, people share concerns and passions for the things they do, learning to do them better through their interactions (Long & Koehler, 2021), sustaining support in interpersonal connections, sharing ideas, engaging in reflective discourse and knowledge creation (Garrison, 2016). Learning may be the reason the community comes together or it may be a byproduct of participant interactions, where relevant information can be shared (Sekkal et al., 2019; Wenger, 2011) considered valuable sources of information. Among the benefits of an online learning community is interaction, which becomes one of the pillars of the educational process.

We searched Scopus and Web of Science (WoS) databases for related review studies to uncover similar studies. We found 11 articles where researchers were subjected to multiple evaluations of their academic production (Vasen & Vilchis, 2017). In general, these studies analyze topics such as social learning (Mansor et al., 2020); online communication and interaction (Shen, 2018); managing the social construction of knowledge in online communities (Houda et al., 2019; Liou et al., 2016); collaborative learning (Whalley & Barbour, 2020); communities of practice and research (Kozan & Caskurlu, 2018); development of pedagogical skills and practices in online learning (Acevedo, 2020); MOOCs (Sun & Chen, 2016); informal learning (Zheng et al., 2019); social networks (Luo et al., 2020); and social, cognitive, and teaching presence (Goeman et al., 2020). These studies focused on understanding learning processes from a social constructivist basis (Kaliisa et al.,

2022) as well as the analysis of new thematic domains through interaction (Moore & Miller, 2022). The analysis of social learning is emerging as a relevant trend due to the use of platforms that promote communities from interaction and collaboration in online learning environments.

To identify the challenges in online learning environment, this research used a Systemic Mapping Study (SMS) to analyze recent empirical evidence on the social construction of learning in articles published between January 2015 to November 2020. This type of study constitutes a useful tool for the contextualization of the selected topic and can complement other studies such as the systematic review of literature (García-Peñalvo, 2017). Bridging the research gap between the social construction of learning in virtual communities and doing so through systematic literature mapping has made it possible to analyze some challenges faced by online learning environments, especially when there is a vertiginous advance of technology and new societal demands for training through online learning environments.

This study first presents the design of the systematic mapping study, the definition of scope and objective, the search process and selection of articles, the inclusion and exclusion criteria, and the categorization criteria. Then, it continues with the results of the study and the respective discussion based on the research questions and the learning categories emerging from the mapping: situated, social, collaborative, problem-based, and socially constructed, as well as the virtual communities of learning, covering students, research, practice and the social construction of knowledge. It ends with the most relevant conclusions of the study regarding the challenges to the methodological trends. These have been primarily qualitative, establishing the need for more empirical research with mixed methods in the future, expanding geographically, especially in Latin America. In addition, research should focus on social learning through interactions, a sense of community and communication, and the challenges to learning communities in online environments such as social networks and MOOCs.

Systematic Mapping Study Design

The primary purpose of Systematic Mapping Studies is to provide an overview of the research area. This type of study makes it possible to identify the amount and type of research and the available results and determine the publication frequencies to see the trends in the area (Petersen et al., 2008). Therefore, the essential steps of the systematic mapping process are defining research questions, searching for and filtering relevant documents, using keywords to find abstracts, and extracting and mapping data. Each step of the process is associated with an outcome that contributes to the final systematic map.

In this study, the search process followed a systematic mapping based on the PRISMA method (Moher et al., 2009) to find primary studies of social construction of learning in virtual communities, in the existing literature (Pedreira et al., 2015) which were then analyzed and classified according to six criteria defined for social construction: collaborative learning, problem-based learning, self-regulated learning, situated learning, the social construction of learning, and social learning. In addition, five criteria were presented for communities based on earlier research (García-Peñalvo et al., 2015; González-Pérez et al., 2019; Jan et al., 2019; Overstreet, 2020; Pinto, 2016): learning community, a community of learners, a community of inquiry, a community of practice, and a community for the social construction of knowledge.

Certain studies (García-González & Ramírez-Montoya, 2019; García-Peñalvo, 2017; Kitchenham et al., 2010; Petersen et al., 2008; Velásquez-Durán & Ramírez-Montoya, 2018) were considered to help structure the methodological part of this work and thus, develop the following lines for the protocol: defining the research questions (and objectives), defining inclusion and exclusion criteria, identifying databases and search engines, defining search

terms, searching scientific databases, extracting relevant content and data (iterating the process in several stages), evaluating the quality of these results, and gathering the most outstanding results for analysis. The research protocol for this study is defined and presented in Figure 1.

Figure 1
Defined Protocol for the Methodological Mapping Process (author elaboration)
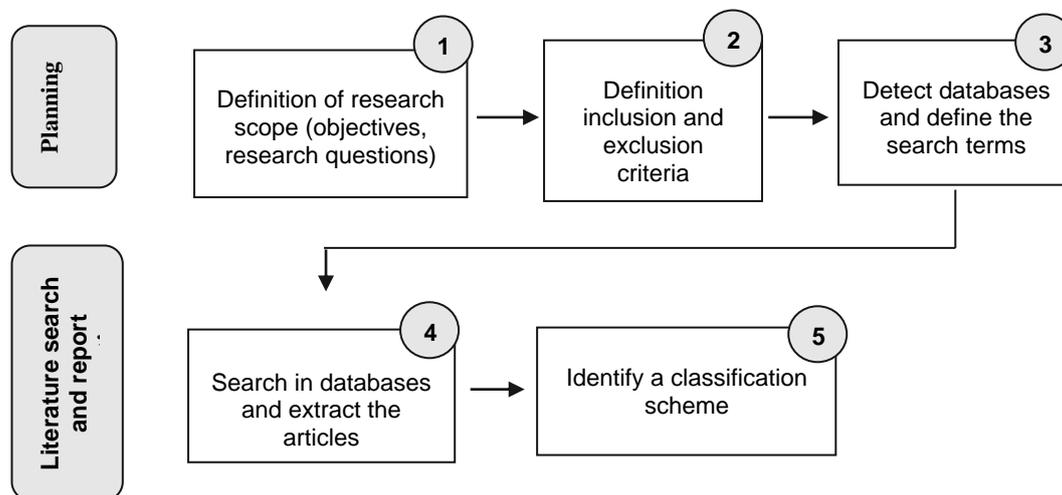
Definition of Scope and Objective (Research Questions)

      Systematic Mapping Studies (SMS) aim to find and classify primary studies in a specific subject area by including research questions that are answered by searching and extracting data from the tabulation of specific categories of primary studies. In addition, they can be used to identify the available literature before undertaking a conventional Systematic Literature Review (SLR). They use the same search and data extraction methods as conventional SLRs but rely more on tabulating primary studies into specific categories (Kitchenham et al., 2010).

      Therefore, this study aimed to identify and characterize the state of research about social construction of learning in virtual communities within online learning environments and identify their research advances and challenges as well as to determine potential gaps and opportunities for future research (Petersen et al., 2008). Table 1 presents the questions developed for this study.

Table 1
Research Questions

Question	Type of response sought
RQ1: What are the journals with the most publications in this line of research and their quartile?	Journals Most published articles in Q1, Q2, Q3, or Q4
RQ2: How many relevant studies are there in the Scopus and WoS databases from 2015 to 2020, and what is their design?	Number of articles in Scopus Number of articles in WoS Number of duplicated articles Number of mixed-method articles Number of qualitative research method articles

	Number of quantitative research method articles
RQ3: What are the most cited articles?	Most cited articles
RQ4: What is the geographical distribution of the authors?	Countries where the first authors are from
RQ5: What type of learning for social construction is present in the articles, and at what educational level?	Learning categories for social construction: Collaborative learning, problem-based learning, self-regulated learning, situated learning, the social construction of learning, and social learning. Primary school, high school, higher education, professionals
RQ6: What are the trends and topics covered in the articles?	Categories on emerging topics Scientific production trends in the topics

Inclusion and Exclusion Criteria

The mapping study requires explicit inclusion and exclusion criteria to evaluate each potential primary study (Kroll et al., 2018) and excludes studies that are not relevant to answer the research questions. In this research, the definition of inclusion and exclusion criteria (Table 2) applied in the databases included the period considered for mapping, type of document, language, and the relevance of the article for the social construction of learning. These criteria were applied in the title, abstract, keywords and full text when necessary. The inclusion terms selected were the following: studies addressing social construction, learning community and online learning, published from January 2015 to November 2020 in Scopus and Web of Science databases, scientific articles published only in journals, English and Spanish language. The exclusion criteria included articles that did not correspond to the selected period (2015-2020), duplicate articles, book chapters, and systematic reviews and papers that did not address social construction, learning community, and online learning.

Table 2
Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Studies on social construction, learning community, and online learning in the Scopus and WoS databases.	Studies that do not discuss social construction, learning community, and online learning.
Scientific articles and articles published in journals.	Documents from conferences, book chapters, books in press, and reports, series, books, reviews.
Articles published during 2015-2020.	Articles not published during 2015–2020.
Studies in English and Spanish	Studies in languages other than English and Spanish

Identification of Databases and Search Terms

In each database (Scopus and WoS), the query strings were created according to the search tool. A search string as similar as possible was defined and applied in the two databases so that the results could be comparable. First, keywords were selected for the search, followed by general terms used to ensure that most of the relevant research papers were included in the study.

The primary search terms were *social construction*, *learning community*, and *online learning*. Search strings can be constructed using the Boolean operators (Kitchenham, 2004); in this case, the Boolean expressions AND and OR were used. Finally, articles were selected with the specified search strings referencing the social construction of learning in virtual communities. Selection results were the basis for the mapping review questions. Searches were restricted to the title, abstracts, and keywords. The search strings used are shown in Table 3.

Table 3
Search Strings in Scopus and WoS

Search string in Scopus	Search string in WoS
(TITLE-ABS-KEY (("social construction" OR "learning community")) AND TITLE-ABS-KEY ("online learning")) AND DOCTYPE (ar) AND (LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015)) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish"))	TS=(("social construction" OR "learning community")) AND TOPIC: ("online learning") Refined by: TYPES OF DOCUMENTS: (ARTICLE) AND LANGUAGES: (ENGLISH OR SPANISH) Time period: 2015-2020. Indices: BKCI-S, BKCI-SSH, SCI-EXPANDED, ESCI, A & HCI, SSCI, CPCI-SSH, CPCI-S.

**Extraction of Articles Through Database Searches**

Study selection is one of the most critical processes in a systematic mapping study. Great effort is required in the selection of articles to prevent inaccuracies in the findings. If the information provided in the title of the articles and in the abstracts was insufficient, it was necessary to read the complete document (Kroll et al., 2018). We began reading the titles and abstracts of all the studies to verify that the articles were related to social construction, learning community, and online learning. Also, keywords and concepts that reflect the contribution and the topic covered were identified (Velásquez-Durán & Ramírez-Montoya, 2018).

Regarding the data extraction and classification processes, other types of studies with meta-analyses use Cohen's Kappa Coefficient as a statistical measure to determine estimates and reliability values (Hauch et al., 2017) and adjust for the effect of chance on the proportion of observed concordance for categorical variables. However, for systematic mappings, two strategies can be followed. The first recommends an additional researcher to check results or perform the extraction independently for comparison with the initial results, requiring a consensus meeting if necessary. The second strategy states that the objectivity of the criteria is assessed based on a pilot and/or post-extraction set of articles (Petersen et al., 2015). The first strategy was followed in this research, and the second researcher verified the data extraction (Brereton et al., 2007). Thus, two researchers participated in selecting and coding the responses. In the case of discrepancies, reasoned agreements were reached and a

decision was made about selecting responses. In this sense, a protocol was formulated and executed according to the guidelines for conducting systematic literature mappings (Cruz-Benito, 2016).

Subsequently, the completed search and extraction of articles were organized in an Excel sheet. The database search yielded 199 articles in Scopus and 110 in WoS. Duplicate papers were removed (from the WoS list), resulting in 216 studies. Next, the inclusion and exclusion criteria were applied, eliminating 17 papers (11 review studies and six book chapters), leaving 199 papers. Finally, 12 articles that did not address the central themes of the study were removed, leaving 187 articles in the database, as shown in Figure 2.

Figure 2
Record Selection Procedure
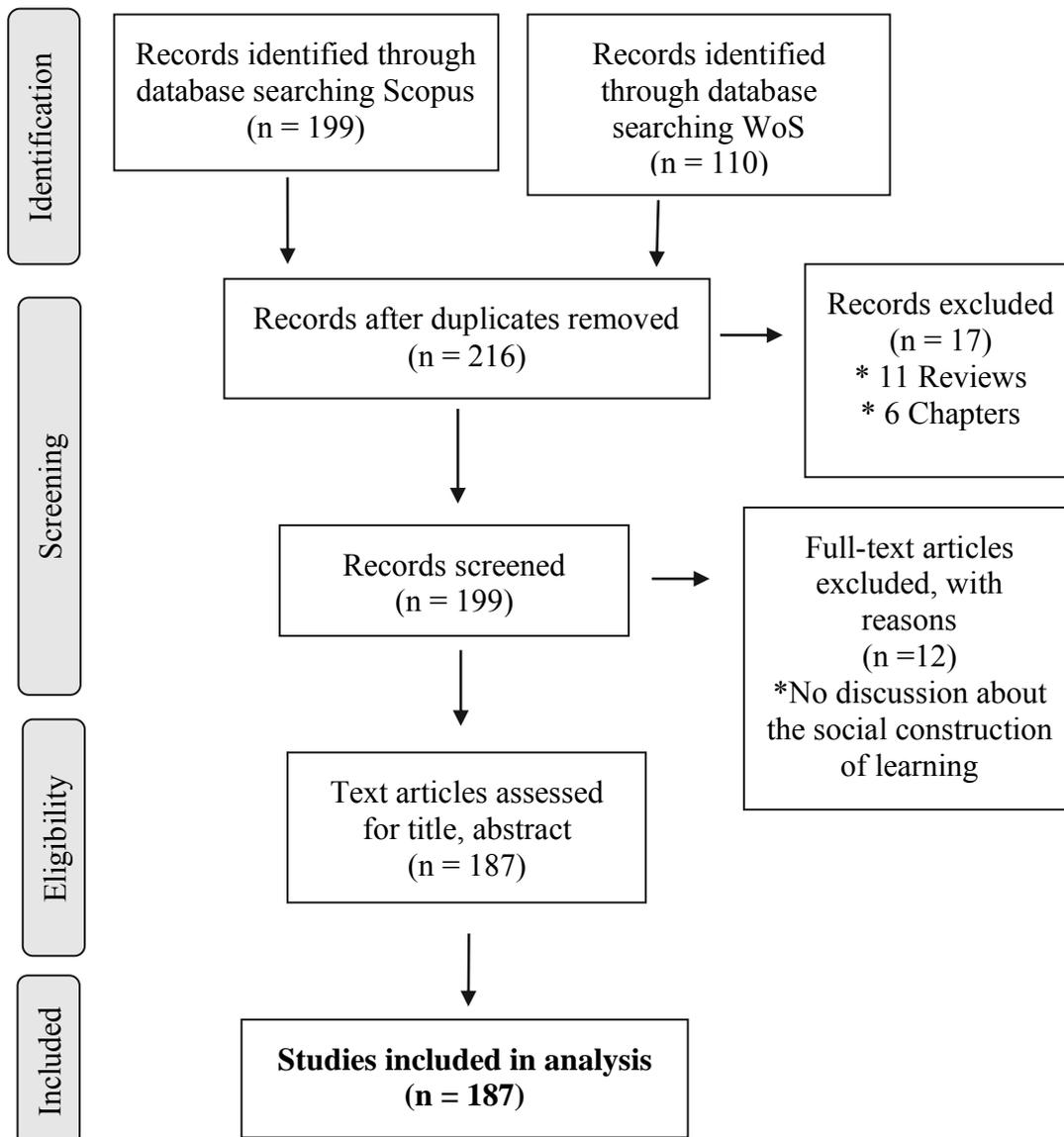
Creation of the Classification Scheme

To address the research questions, we devised a classification scheme to understand the trend of topics in the selected studies. It was a good starting point to determine the classification scheme and the distribution of articles among the identified categories (Petersen

et al., 2008). Once all the summaries were analyzed, we created the classification scheme based on keywords, concepts, and research contexts. In this research phase, six categories were used to reference social construction in virtual communities: collaborative learning, problem-based learning, self-regulated learning, situated learning, the social construction of learning, and social learning. In addition, five categories were presented for virtual communities: learning community, a community of learners, a community of inquiry, a community of practice, and a community of social construction of knowledge. Table 4 presents a brief description of these categories according to the classification scheme for this study.

Table 4
Categories to Review Studies on Virtual Communities (designed by the authors)

Categories	Description	Theoretical sustenance
Learning community	Studies that show dialogue, social interactions, and shared content for a formative purpose.	Spaces where users form digital societies to develop communication structures. Consumption patterns, specifically information and user networks, were considered broadly (García-Peñalvo et al., 2015).
Community of learners	Studies that analyze communities where students develop social interactions and share a common interest.	Communities for cognitive development through social interactions within a group of students (Overstreet, 2020).
Community of inquiry	Studies involving research communities with social and cognitive interactions and teaching presence.	Communities for learning practice and research, focusing on learning methodologies and design. It consists of three essential elements: social, cognitive, and teaching presence (Jan et al., 2019).
Community of practice	Studies that refer to communities where knowledge application is evident.	Spaces of learning and interaction, formed by a social group that builds its identity through social activity. The sense of what has been done (learning) is negotiated among the collective members, considering various levels of participation and knowledge of the activity (experts and apprentices) (González Pérez, 2015).
Community of social construction of knowledge	Studies focused on the social construction of knowledge.	Communities for knowledge transfer through active, voluntary, mutually beneficial participation to generate, acquire, implement, or facilitate access to the knowledge necessary to improve material, human, social or environmental well-being (Pinto, 2016).

Results of the Systematic Mapping Study

The methodological process of the Systematic Mapping Study (SMS) was organized systematically through a database analyzed in an Excel file containing the 187 selected articles and the corresponding information from each of these studies. The analysis made it possible to answer the research questions and present all the results in Tables and Figures.

The articles were identified with numbers and square brackets to cite them in the results. The following link is provided to access this database: https://doi.org/10.5281/ZENODO.4673838

RQ1: Which are the journals with the most publications in this line of research and their quartile?

The journals with more than three published articles are shown in Table 5, with *Computers and Education* and *Online Learning Journal* being the journals with the highest scientific production on the subject. The quartiles (Q1, Q2, Q3, and Q4), the number of articles per journal, and the identification number of each article are also indicated. Corresponding to Table 5, Figure 3 shows the graphical representation of the studies having more than three publications on the social construction of learning.

Table 5

Journals with More than Three Published Articles

Journal	Quartile	Number of articles	Article identification number
Computers and Education	Q1	12	[28] [62] [77] [84] [100] [101] [103] [152] [164] [173] [184] [185]
Online Learning Journal	Q1	12	[9] [10] [12] [13] [25] [31] [96] [119] [122] [127] [129] [187]
Interactive Learning Environments	Q1	9	[16] [42] [50] [91] [121] [149] [154] [179] [182]
Distance Education	Q1	5	[47] [114] [140] [159] [178]
Internet and Higher Education	Q1	5	[53] [116] [147] [167] [171]
Journal of Chemical Education	Q1	4	[39] [61] [69] [181]
TechTrends	Q4	4	[40] [44] [86] [105]
Educational Technology and Society	Q1	4	[19] [72] [143] [176]
International Journal of Continuing Engineering Education and Life-Long Learning	Q3	3	[60] [144] [157]
International Review of Research in Open and Distance Learning	Q1	3	[29] [43] [106]
Journal of Interactive Online Learning	Q4	3	[35] [139] [166]

Figure 3

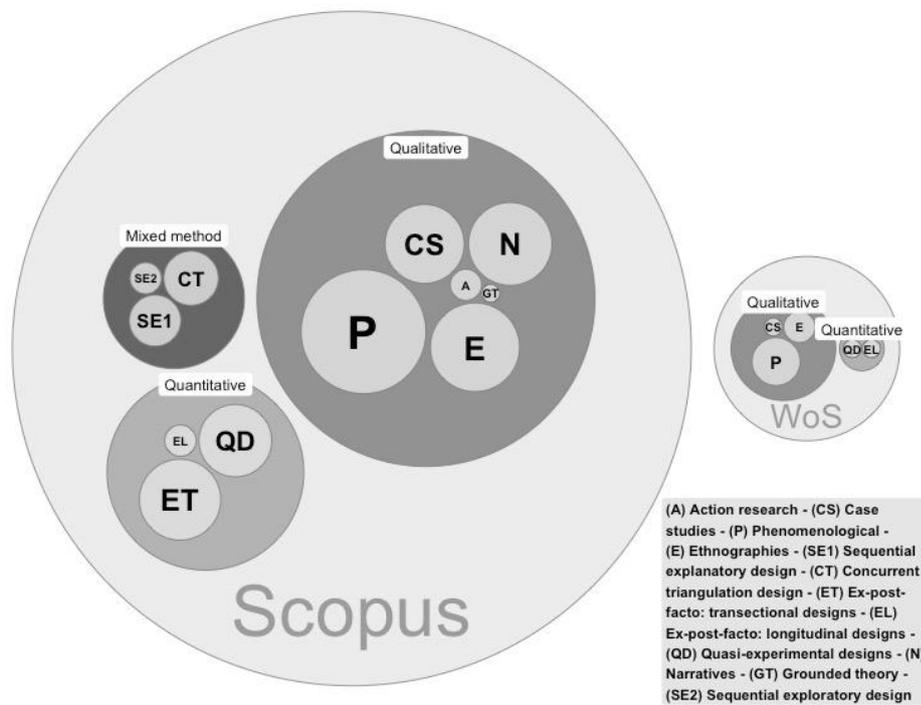*Journals with More than Three Published Articles*
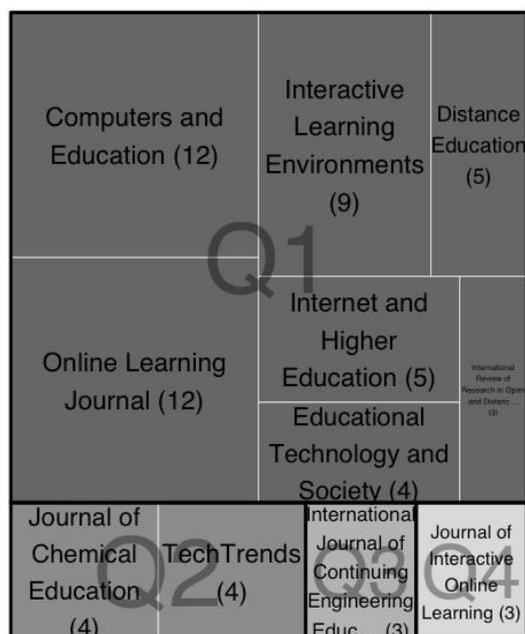
Once the journals with the highest number of publications on social construction and online learning are identified, possibilities emerge for the academic community to continue disseminating this topic, thus supporting teachers, decision-makers, designers, and researchers involved in studying the topic of learning communities.

RQ2: How many relevant studies were in the Scopus and WoS databases in the 2015 to 2020 period, and what was their design?

In the databases, a total of 187 articles were found, including 174 in Scopus and 13 in WoS. After reviewing the abstracts, the methodologies used in the studies were identified (Figure 4). Of the 174 articles identified in Scopus, 62 used a qualitative method; some examples are the articles with identification numbers [2], [3], [6]. Twenty-three employed a quantitative method, such as [27], [33], [36]. Twelve used mixed methods, such as [9], [11], [38], among others. Of the thirteen articles found in WoS, eleven used a qualitative method, e.g. [4], [7], [15], and two utilized a quantitative method [95] and [164].

Figure 4

Studies Identified in Scopus and WoS from 2015 to 2020 and Their Designs

(A) Action research - (CS) Case studies - (P) Phenomenological - (E) Ethnographies - (SE1) Sequential explanatory design - (CT) Concurrent triangulation design - (ET) Ex-post-facto: transectional designs - (EL) Ex-post-facto: longitudinal designs - (QD) Quasi-experimental designs - (N) Narratives - (GT) Grounded theory - (SE2) Sequential exploratory design

RQ3: Which were the most cited articles?

The systemic mapping study revealed that the article [73] had the highest number of citations (67), corresponding to authors Joksimović et al. (2015) in the *Journal of Computer-Assisted Learning*. This article analyzes the impact of online interactions on developing social presence and achieving learning outcomes, highlighting the quality of the social construction of knowledge. Figure 5 shows the results of the most cited articles, between 14-67 citations, ordered according to the identification number in the Excel file and the corresponding number of citations.

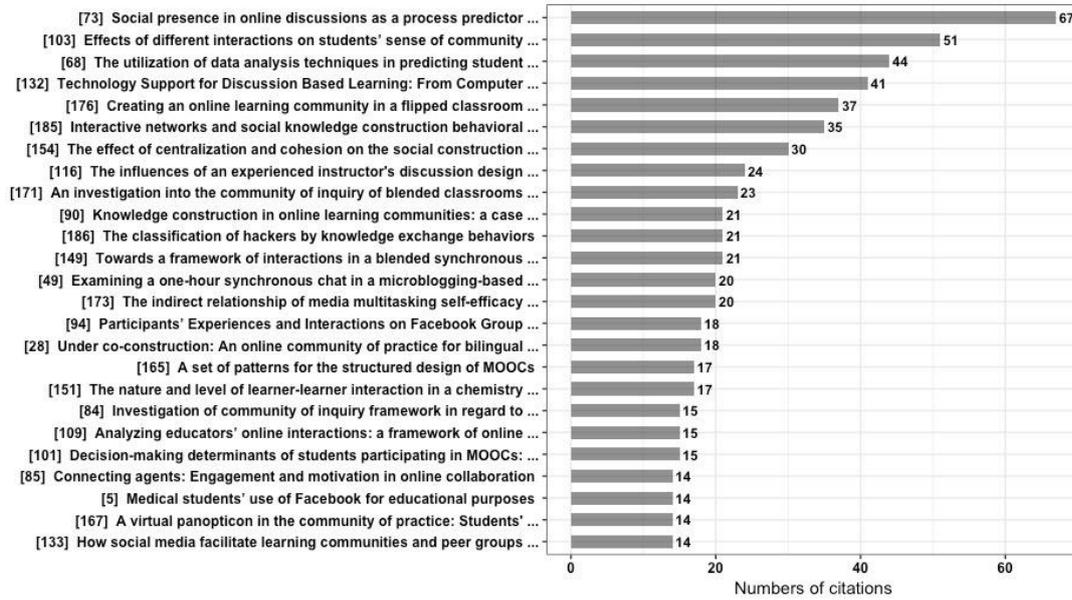**Figure 5**

Most Cited Articles

Figure 6 presents the article keywords with the highest number of citations: online learning, learning community, virtual learning community, community of practice, distance education, social networks, social presence, research community, and MOOC, among others. The keywords of the articles were extracted from the keywords of the authors.

Figure 6

Keywords of the Most Cited Articles
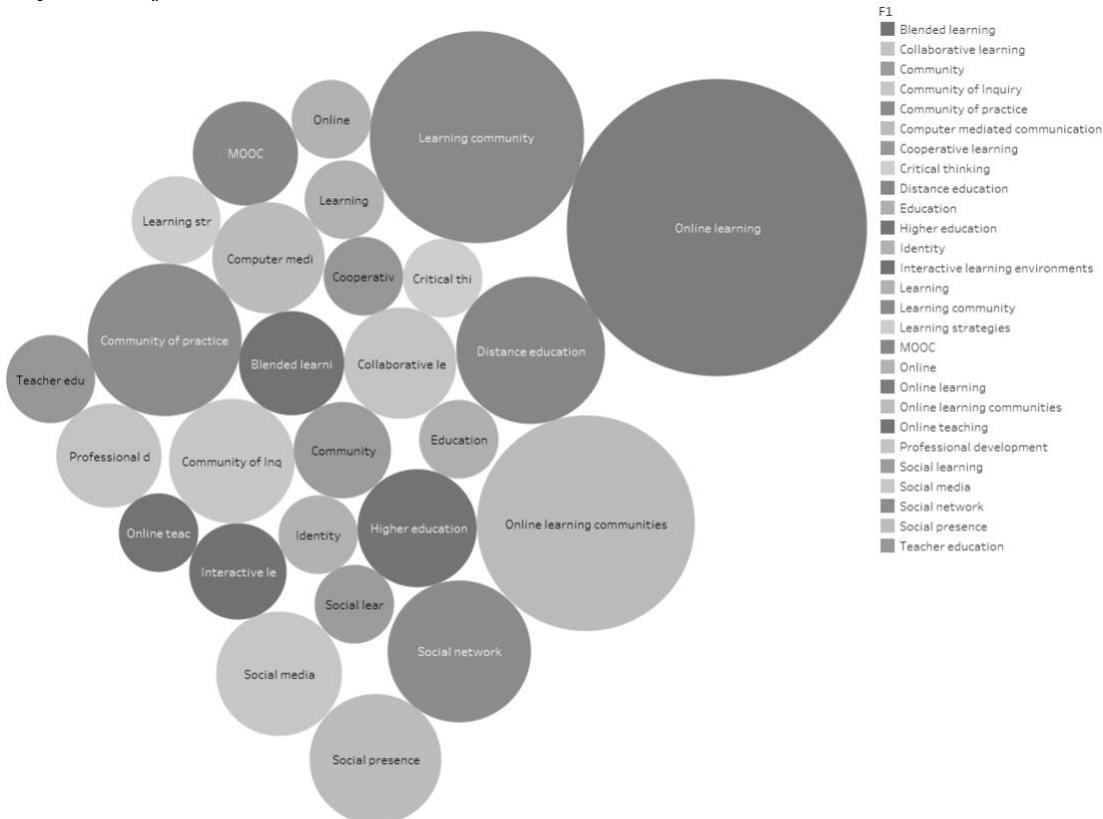
When carrying out a systematic mapping of literature on social construction of learning, it was found that the studies analyzed highlight that shared online learning is generated, mainly in virtual communities (learning, practice, research), in social networks and in MOOCs.

RQ4: What is the geographical distribution of the authors?

For the geographic distribution, the first author of the publication was considered. Thus, the most frequently published studies on social construction, learning community, and online learning (Figure 7) were the United States, with 67, Table 6 shows some examples.

Table 6

Most Frequently Published Studies in the United States

Article identification number	Citation	Title
[132]	(Rosé & Ferschke, 2016)	Technology support for discussion based learning: From computer supported collaborative learning to the future of massive open online courses
[171]	(Wicks et al., 2015)	An investigation into the community of inquiry of blended classrooms by a Faculty Learning Community
[49]	(Gao & Li, 2017)	Examining a one-hour synchronous chat in a microblogging-based professional development community
[28]	(Cho, 2016)	Under co-construction: An online community of practice for bilingual pre-service teachers
[151]	(Tawfik et al., 2017)	The nature and level of learner-learner interaction in a chemistry massive open online course (MOOC)
[109]	(Nacu et al., 2016)	Analyzing educators' online interactions: a framework of online learning support roles
[17]	(Byrd, 2016)	Understanding the online doctoral learning experience: Factors that contribute to students' sense of community
[16]	(Beth et al., 2015)	Responsibility and generativity in online learning communities
[147]	(Swaggerty & Broemmel, 2017)	Authenticity, relevance, and connectedness: Graduate students' learning preferences and experiences in an online reading education course
[152]	(Teo et al., 2017)	Analytics and patterns of knowledge creation: Experts at work in an online engineering community
[1]	(Abdelmalak, 2015)	Web 2.0 technologies and building online learning communities: Students' perspectives
[14]	(Berry, 2017a)	Student support networks in online doctoral programs: Exploring nested communities
[40]	(Delmas, 2017)	Using VoiceThread to Create Community in Online Learning
[97]	(Liu et al., 2016)	Participatory media for teacher professional development: toward a self-sustainable and democratic community of practice
[13]	(Berry, 2017b)	Building community in online doctoral classrooms: Instructor practices that support community

The United Kingdom was second with 20 publications, followed by China (19), Taiwan (12), Australia and Spain (9 each), Canada (8), New Zealand and Turkey (5 each), Malaysia (4), Saudi Arabia and South Africa (3 each), India, Italy, and South Korea and Thailand (2 each). Countries with one publication are not noted.

Figure 7
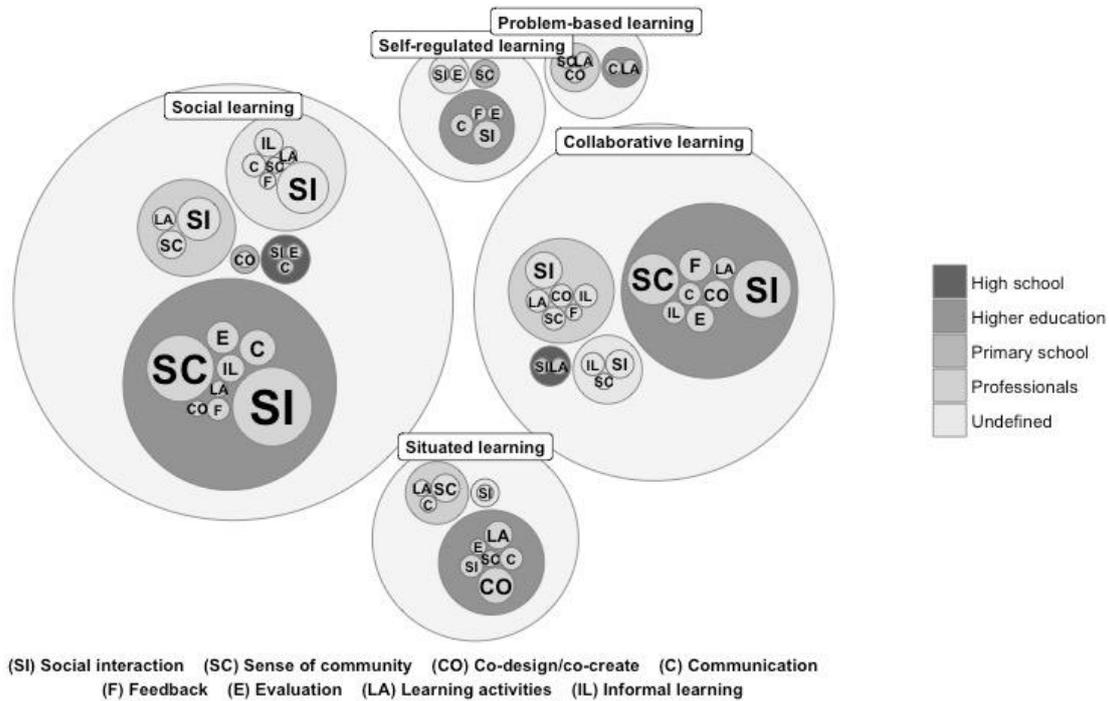*Geographical Distribution of Authors*

Consequently, the distribution of these studies on social construction denote research opportunities, especially in countries and regions where production is low, such as Latin America.

RQ5: What type of learning for social construction is present in the articles, and at what educational level?

The results of the systematic mapping indicated that research on social construction was mainly carried out in higher education and addressed various types of learning (Figure 8). Thus, 91 studies analyzed social learning where social interaction, sense of community, communication, and informal learning were highlighted. Sixty-one articles discussed collaborative learning and primarily focused on social interactions and a sense of community. Twenty articles were linked to situated learning and mainly addressed co-design/co-creation. Ten studies were associated with self-regulated learning directed towards social interactions. Finally, five studies examined problem-based learning and highlighted social construction in learning activities.

Figure 8

Types of Learning for Social Construction Present in the Articles and the Educational Level

(SI) Social interaction   (SC) Sense of community   (CO) Co-design/co-create   (C) Communication
(F) Feedback   (E) Evaluation   (LA) Learning activities   (IL) Informal learning

These results revealed that social learning is mainly evidenced through interactions; however, problem-based learning could be a critical area to foster the social construction of learning and, consequently, the growth of research.

RQ6: What are the trends and topics covered in the articles?

To analyze the articles' trends and themes (Figure 9), we identified five categories of a virtual community: learning, students, research, practice and social construction of knowledge. These communities developed online through virtual environments (e.g. social networks, massive open online courses) appeared in 90 studies; 74 were conducted in virtual classrooms, 14 in educational centers, and nine within the city or region (with blended learning).

As for the types of virtual community found, there were 105 studies on learning communities where the main themes were interactive platforms (forums, blended learning, audios, chat). Some articles addressed the presence of digital pedagogy (discussing training professionals in various areas involved in online learning and encouraging shared learning). In addition, 29 studies focused on communities of practice and were more oriented to applying learning and digital pedagogy. Twenty-four studies referred to research communities and 12 to communities of learners. In these two types of communities, the use of interactive platforms and interest in learning outcomes stood out. Finally, 14 studies on knowledge construction communities examined the application of learning and social constructivism.

Figure 9
Trends and Topics Covered in the Articles
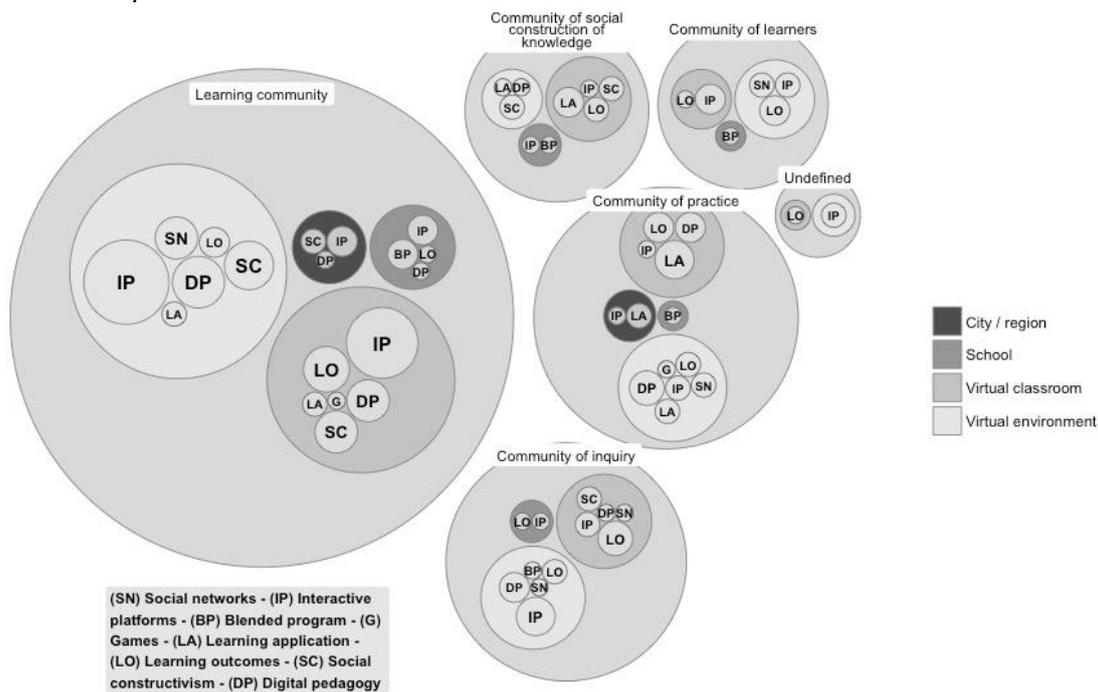
The results in Figure 9 highlight the virtual communities (classroom and environment). Most trends and topics concerned social construction, identifying learning communities and interactivity through discussion forums. These results also highlight areas of opportunity, especially in studies on knowledge construction communities and the application of learning.

Discussion

Research on the social construction of learning accounts for evidence across learning communities. Our research results were obtained based on the scientific knowledge found through articles published in academic-scientific journals constituted in one of the main channels of communication and dissemination of the results of the research. Table 5 and Figure 3 present the journals with more than three articles published on the scope of this research, the quartiles of the journals are also shown, with Q1 being the most outstanding. The scientific knowledge evidenced through the journals that have gone through a previous review of other members of the scientific community (Vasen & Vilchis, 2017) guarantees the quality of the scientific production and consequently the scientific rigor of the published articles that were the basis for the findings obtained in the present study.(Vasen & Vilchis, 2017).

Publications related to the social construction of learning in online learning environments are indexed in different databases, which show this scientific production and methodological trends in educational research. In the main academic databases, Scopus and WoS (Duart et al., 2017), educational research uses various methodological approaches, such as the qualitative approach, to understand social phenomena from the perspective and experience of participants (Ary et al., 2018). Thus, most scientific production was found in the Scopus database. Of interest is the fact that the methodological trend of greater use in the analyzed studies was the qualitative methodology with a phenomenological design (Figure 4); however, we identify fewer studies that used quantitative methods and even fewer that were conducted with mixed methods. This finding is representative because it invites the scientific community to make decisions for new studies, which may involve the mixed method, as new research questions arise about the social construction of learning.

Online learning has become an integral part of the educational landscape and an essential part of learning communities. In this research, the most cited articles (Figure 5) addressed topics (Figure 6) such as learning community, community of practice, distance education, social networks, social presence, research communities, MOOCs, computer-mediated communication, collaborative learning, higher education; these topics were discussed as promising areas for the development of online learning. Within the changes in new learning environments, community-based learning (UNESCO, 2017) distinguishes the concept of learning community as a framework with great potential to carry out interaction processes (Kearney, 2015) where its members need technological support and sustainable learning communities (Garrison, 2016) to facilitate online learning activities (Sekkal et al., 2019). Hence, it is necessary to envision new paths for training in online learning environments that support social learning from interaction in learning communities in the light of technological development and the training needs of students.The increase in scientific knowledge about the social construction of learning in virtual communities through learning environments is globally widespread. The research reflected that the United States, the United Kingdom and China have the highest number of publications on the subject, during the period considered for this research, while in Latin America, lower scientific production was detected (Figure 7). This finding reveals areas of opportunity (Ramírez-Montoya, 2020) so that researchers from other countries can contribute to the research of the social construction of knowledge (Gonzalez & Ozuna, 2021) and the analysis of interaction processes for learning (Alwafi, 2022; González-Sanmamed et al., 2019) in favor of virtual learning communities. Additionally, eLearning platforms have allowed systems and programs for online learning (Elshareif & Mohamed, 2021) to evolve beyond technology because they open possibilities to meet the needs of students as a component of the digital ecosystem (García-Peñalvo & Seoane Pardo, 2015) aimed at the management of learning and knowledge, which plays an important role in improving interaction processes.

In the realm of higher education, learning in a social context involves interaction, participation, and shared experiences, which affirm the social importance of learning. Thus, most of these investigations highlight training processes at the higher education level, where social and collaborative learning are promoted and highlighted as relevant social interaction, sense of community, communication, learning activities, informal learning and co-design/co-creation (Figure 8). This dynamic of social learning benefits when in the learning community there are processes of active collaboration, communication and community interaction (Lin & Hsia, 2019; Michailidis et al., 2018). In addition, a smaller percentage of studies highlighted learning located in the social construction of learning, from a social interaction that promotes, crucially, the participation and learning of students (Tegos & Demetriadis, 2017) by engaging in levels of activity that could not be managed individually (Yulianto et al., 2016) and that, critical moments such as the COVID-19 pandemic emphasized the urgency of preparing for online learning, cultivating relationships, and the importance of interaction (Ensmann et al., 2021b; Long & Koehler, 2021; Quintana et al., 2021). Consequently, the dynamics of learning are significantly influenced by the active social participation of the student within the learning community(Ensmann et al., 2021a) for which the importance of connections with others stands out.

Learning as a result of being part of virtual communities gives a prominent role to the active social participation of the student. In this sense, the research trends shown by the articles were framed in five categories of virtual communities (Figure 9), the most evident being learning communities, communities of practice and research communities, which contain a valuable capital of experiences, in terms of shared learning, in most cases in the form of discussions or debates (Houda et al., 2019). The relevant topics addressed in the studies were interactive platforms and shared learning through forums, blended learning,

audios and chat; therefore, peer support and continuous communication and interaction provided opportunities to create a sense of learning in community (Acevedo, 2020) and a significance of social experience (González Pérez, 2015). These formative experiences occurred (González Pérez, 2015) mainly through social networks or massive open online courses (MOOCs), where students developed their learning through the collective knowledge or intellectual capital of their members, which gradually increased the knowledge base of the community (Liou et al., 2016). In these conditions, shared social knowledge becomes very enriching within virtual communities to effectively promote the social construction of learning.

Conclusions

Research on the social construction of learning in virtual communities demonstrates several challenges for online learning environments, including the need to bring new perspectives on the subject through mixed-methods research. Another challenge is to increase scientific production, particularly in Latin America, a geographical area where less publication has been detected. On the other hand, while most studies have highlighted social interaction as a key element in the social construction of learning, it is important to continue the investigation of those interaction practices with the greatest impact to enhance social learning, collaborative learning, situated learning, problem-based learning, in online learning environments. Finally, we identify challenges in learning communities, communities of practice, research communities and communities of social construction of knowledge. These can develop social learning through forums, mixed learning, audios or chat, considering training initiatives through social networks and MOOCs that allow the social construction of knowledge and the experience of socially shared learning. The limitations of the study lie in the databases analyzed, and the time range and languages of the articles, elements that could be expanded. However, the scope of the analyses can be broadened by systematically reviewing the literature to analyse in depth the topic of interest.

The differentiating value of this study is its bibliographic contribution in the investigation of the social construction of learning in learning communities. On a practical level, this paper provides a description of the challenges facing online learning environments, which may be particularly useful in supporting teachers, decision makers, instructional designers, and researchers in their future research on this topic. We recommend that future studies advance research in this area, envisioning online learning environments that strengthen social interaction and consequently meet online learning needs in a knowledge society.

Conflict of Interests
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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