

Bibliometric Analysis of Global Research Trends on Social Presence Using Scopus Database

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ABSTRACT

This study aims to conduct a comprehensive analysis of the existing literature on social presence in order to identify significant research works, contribute valuable insights into emerging research areas, and provide an overview of global research trends. The study also aims to assist future researchers in locating relevant information aligned with their research interests. The research employs bibliometric analysis to examine 1962 journal articles published between 1958 and 2022, focusing on various aspects such as publication outputs, co-authorships among authors and affiliated countries, and co-occurrences of author keywords referenced in the Scopus database. Additionally, the study identifies the most active institutions, productive journals, and prolific authors in the field of social presence. Notably, the analysis reveals a consistent increase in cumulative publication numbers from 2014 to 2018, with an annual increment of 100 articles. More than 55% of the total publications originate from researchers based in China and the United States. Moreover, among the top 15 countries, four of their most prolific universities are ranked among the world's top 100 universities. The findings of the bibliometric study highlight that research on social presence predominantly focuses on captivating themes such as e-learning, social media, computer-mediated communication (CMC), and communities of inquiry (CoI). The primary objective of the study is to identify shifts in publication outputs, co-authorships, affiliated countries, and author keywords, thereby unveiling prevailing publication trends within the field of social presence. The scope of the study primarily centres on the identification of trends through bibliometric analysis. The study's findings indicate an upward trend in the publication of articles concerning social presence, which is expected to continue. Furthermore, co-authorship and co-occurrence investigations are undertaken to assess leading countries and frequently employed keywords in the literature.

KEYWORDS: Social presence; Bibliometric analysis; Trend; Future research.

1. Introduction

Social presence theory is believed to have roots in the social psychological theories of interpersonal communication and symbolic interactionism [7], [12], [33] are credited for developing the initial social presence theory. Social presence was defined by Short et al. as the quality or state of being present between two communicators using a communication medium. Their theory of social presence explains how communication mediums affect people's ability to communicate [27]. Generally, social presence or co-presence is defined as

feeling connected to another individual [8] and depends on one's perception of being able to "access the intelligence, intentions, and sensory impressions of another individual" [6], [12], [20]. In a Community of Inquiry (CoI), social presence refers to presenting participants as 'real people' to other participants [4], [27]. Social presence has been investigated concerning online learning quality, and the extent to which a person is perceived as real in mediated communication [11], [21]. Currently, social presence is widely discussed in the context of mediated communication, though, it is originally

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rooted in non-mediated interactions [12].

During the late 1980s and early 1990s, as computer mediated communication (CMC) became more popular [13], communication researchers applied the theory of social presence developed by Short et al. to CMC [27]. Research conducted during the mid-1990s, utilizing CMC for educational purposes, began to examine whether the characteristics of a communication medium determine its social presence [4], [21], [27].

It is important to note that social presence theory has gained new significance as a result of computer-mediated communication (CMC) and later, online learning [24]. According to [27], social presence is well established in the online education literature as a way to engage students in social connection in online courses [3-4] developed a conceptual framework for computer-mediated communication in higher education that included social presence within a model of community inquiry. [11] reported on a study that looked at best practices and social presence in a Web-based international nursing informatics pilot course. In recent years, there has been a significant increase in computer-mediated communication (CMC) growth worldwide, as more individuals are passionate about tackling social or communication problems and scaling their businesses for social impact [27], [3].

Through the 1971 search results of social presence in the Scopus database, there are 246 search results of potential literature review articles on social presence were found. These articles were reviewed on the title, abstract, and full text. In the end, nine review articles were filtered, of which six are related to education content, two articles to robots, and one to social media. Of these nine articles, only one article used bibliometric analysis, and it explored twenty-five years of Community of Inquiry (CoI) in online learning contexts [41].

Previously a bibliometric study conducted by Lin et al. (2016), focused on social presence and analysed articles from the SSCI database published from 1997 to 2013. This current study, on the other hand, distinguishes itself by spanning a broader time span, that is from 1958 to 2022 published in the Scopus database. The Scopus database is selected to conduct this review because Scopus is one of the most extensive databases in terms of global and regional coverage of journals, books, and conferences, and it contains a wide variety of articles [34], [22]. To the best of the author's knowledge, there have been no previous studies

focusing specifically on the comprehensive development of social presence research using the bibliometric analysis method on the published articles indexed in the Scopus database.

This bibliometric analysis offers valuable insights into the field of research and scholarly analysis. It quantifies research output, identifies trends and patterns, evaluates research impact, identifies collaborations and networks, and supports decision-making and resource allocation for future researchers and managers in the field of social presence. The findings of this study enhance the understanding of the scholarly landscape facilitating the identification of research priorities for scholars and practitioners. Accordingly, the following are the research objectives addressed in this paper:

- To examine the time distribution patterns of social presence journal articles to identify trends and changes in publication outputs over time.
- To highlight the contributions of prolific authors, leading countries, and the most productive academic institutions in the field of social presence research, as well as to provide insights into key contributors and their impact.
- To highlight research topics of interest in the literature on social presence, identifying areas that have received significant attention and exploration.
- To determine country/area dominance based on research topics of interest, revealing the geographical distribution of research activity.

2. Method

2.1. Bibliometric analysis

Bibliographic analyses are used to determine qualitative and quantitative changes in scientific research topics, identify publications on topics, and detect trends within a discipline [14]. Additionally, bibliometric analyses provide useful information for researchers who are seeking to evaluate scientific activity [40] since they provide insight into the status of the research on the topic [32]. The overviews consisted of bibliographical summaries of scientific publications or selections of highly cited publications. Moreover, there are sections devoted to author productions, national bibliographies, genre bibliographies, and publishing patterns as well as specialized subjects of interest [15].

Today, WoS and Scopus remain the two most

important sources of citation data. In addition, the wide range of fields covered by these databases represents a significant advantage for the study and comparison of different scientific disciplines [5], [28]. Elsevier created Scopus in November 2004 as a bibliographic database. The database contains more than 25,100 titles from more than 5,000 publishers and provides an overview of the world's research output in science, technology, medicine, social science, and arts and humanities (Elsevier,2018). The Scopus database is considered to be the most comprehensive source for abstracts and citations of peer-reviewed literature across a wide range of disciplines. There are more topics covered in Scopus than in WoS [9], [26]. The Scopus database provides several features that facilitate bibliometric analysis. These features include journal name, document type, publication year, authors and affiliations, citation metrics for documents, and h-index metrics [23], [26], [38]. In this study, Scopus was selected to accomplish the objectives.

2.2. Data source and search strategy

Using the Scopus database, data mining was conducted between November 10 and 16, 2022. This study's central theme focused on research articles containing the phrase "social presence" in their title and abstract. The oldest publication dates back to 1958, while the most recent dates back to 2022. To conduct the search, the following query string was used: TITLE-ABS ("social presence") AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (SRCTYPE, "j")) AND (EXCLUDE (PUBYEAR, 2023)). As a result of this query string, 1971 documents were returned. The query string was modified to ensure that there were no review articles included in the analysis, which resulted in 246 articles that were

potentially irrelevant to this study. Among these 246 articles, several terms were used in the title and abstract, including review, recent, progress, critical, revisit, advance, and highlight. Based on the reading of their abstracts and full texts, the study identified 9 of them as review articles. These review articles' EID, a Scopus unique article identifier, were notated and added to the next search string so that they would not appear in the results. The following query string was used: TITLE-ABS ("social presence") AND NOT EID (2-s2.0-85139811454 OR 2-s2.0-85130436394 OR 2-s2.0-85134033223 OR 2-s2.0-85126732427 OR 2-s2.0-85091689555 OR 2-s2.0-85044453323 OR 2-s2.0-85073266962 OR 2-s2.0-85018398257 OR 2-s2.0-84919916407) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (EXCLUDE (PUBYEAR, 2023)).

The best way to determine the most accurate data on a particular author's output is to use the author's ID (Scopus field code: AU-ID). In addition, an AFFILCOUNTRY field code was used to narrow down the search results to a specific country for single-country publications (SCP). Based on the year, source, author, affiliation, country/area, subject area, and document type, the search results for the central theme were analyzed. To determine the ranking, we used bibliometric indicators such as the total number of publications, the total number of citations, the Cite Score, and the h-index.

Additionally, this study proposed sub-themes (interest topics) for investigating production trends in important studies in social presence. The social presence interest topics included in this study were 1) e-learning; 2) social media; 3) computer mediated communication; and 4) community of inquiry. Fig 1 shows the process of collecting records and eliminating studies.

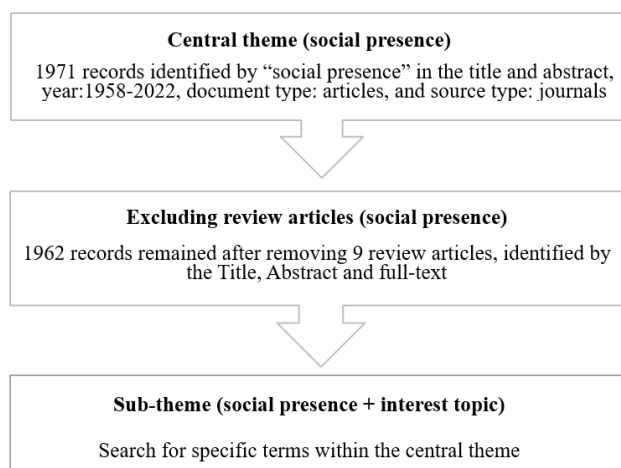


Fig. 1. Flowchart of gathering data of publications for central theme and sub-themes

2.3. Bibliometric maps

VOSviewer (version 1.6.13) is a software tool for creating and visualizing bibliometric maps using citation, bibliographic, and author keywords information (Waltman, 2018). VOSviewer creates maps that include items. This study focuses on items of interest, such as countries or author keywords. Any pair of items can be linked, which implies that they are connected or related. The strength of each link is indicated by a positive numerical value. It is important to note that the higher this value is, the stronger the link is. Co-authorship analysis indicates the number of publications co-authored by two affiliated countries in terms of link strength between countries, while total link strength indicates the total strength of co-authorship links among a given country and other countries as a whole. Furthermore, the co-occurrence analysis reveals the number of publications in which two keywords appear together based on the strength of the link between the author keywords. Details on the features of VOSviewer can be found in the user manual. This study created and visualized bibliometric maps to export citation, bibliographical, and author keyword information of 1962 articles using VOSviewer.

2.3.1. Analysis of co-authorship

Co-authorship analysis indicated that this study included 4566 authors from 85 countries/areas with one undefined author. Five continents have been clustered to understand the distribution of the affiliated countries and areas on a central theme. These are Africa, America, Asia, Europe, and Oceania.

2.3.2. Analysis of co-occurrence

This study analyzed 4653 keywords from 1962 articles for the co-occurrence of author keywords (not Scopus-indexed keywords). As a result of the lack of author keyword information available from 153 journals, 306 articles were not included. Additionally, analyzing synonymic single words and congeneric phrases before importing the author keyword list into VOSviewer was conducted. Furthermore, VOSviewer was set to analyze keywords with a minimum of five occurrences in this study. To view the average publication year, the number of occurrences, and the link strength of the keywords, overlay visualization mode was selected. Keyword colours indicate the average publication year of documents in which the

keyword appears.

2.4. Social presence topics

The search outputs between the central theme (keyword co-occurrences) and sub-theme (total publication) were compared. For example, if e-learning is the topic, thus in VOSviewer software, keywords occurrences for 'online study', 'online education', and 'e-learning' were all counted. The analysis was extended to the five countries with a high number of publications in four domains of social presence (e-learning, CMC, CoI & social media).

3. Results and Discussion

3.1. Publication output and growth of research interest

During the past 65 years, a total of 1962 research articles have been published (Fig. 2). A publication by [31] dated 1958 is the oldest known publication, and there is no reference to another publication until 1963. Research on social presence appears to have become increasingly popular since 2007. According to the data, the annual growth rate (AGR) increased by 40% in 2019 and almost doubled in 2013 and 2014. There has been a steady growth in annual publications since then, which has resulted in a rapid increase in cumulative total publications. Additionally, between 2014 and 2018, the number of publications increased by 100 per year, and from 2018 to 2022, the number increased by almost 200 per year. The annual publication is expected to continue to increase. It is important to note, however, that most of these articles are not freely available, and the user must pay to access the information they contain. In our opinion, an article published in an open access journal is likely to receive more citations. According to 2021 statistics, only 5.8% (114 articles) of articles were published under the open access model.

It is widely recognized that social presence research has a wide range of topics and that many research groups are actively engaged in these areas worldwide. According to the analysis of the subject area, the primary focus of social presence studies is on social science content as observed through the total number of publications classified under these subject areas: Social Science (1114 articles), Computer Science (798 articles), Psychology (346 articles), and Business, Management and Accounting (339 articles). The topic of social presence is multidisciplinary, and one of the

publications was classified under the category of Chemistry. Social presence was explored in Chemistry Education by [18]. This kind of educational content is an important part of social presence studies.

In addition, results showed that the articles used in this study were published in fourteen different languages. The most commonly used language

was English (1915 articles; 97%), followed by Chinese (20 articles; 1%), and Portuguese (9 articles; 0.3%). There were fewer than eight articles in other languages (28 articles; 1.4%), including French, Korean, Russian, German, Slovenian, Italian, Malay, Dutch, Catalan, and Turkish.

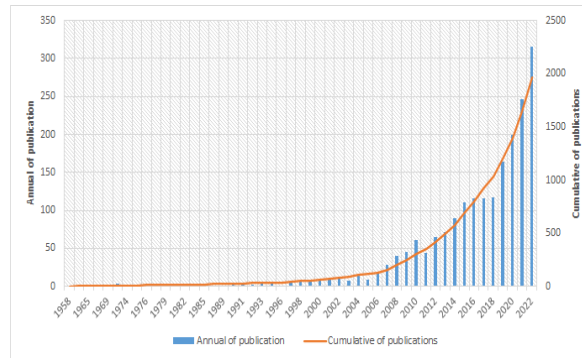


Fig. 2. The annual and cumulative numbers of research articles on social presence indexed in Scopus from 1958 until 2022.

3.2. Preferred journals

From Tab. 1, this study found that six publishers owned the top 10 most productive journals. Three of the top journals were published by Elsevier, while three others were published by Taylor & Francis. The rest of the four journals were published by Frontiers Media S.A., Athabasca University, The Online Learning Consortium, and Multidisciplinary Digital Publishing Institute (MDPI).

The most productive journal was Computers in Human Behavior with 79 articles covering 4% of the total publications, followed by Computers and Education (47 articles, 2.4%), Internet and Higher Education (40 articles, 2%), and Frontiers in Psychology (33 articles, 1.7%). The journal Internet and Higher Education, published by Elsevier, had received the highest number of citations, with 5,762, and one of their articles, published in 1999, also received the most citations, with 2,687.

Based on the CiteScore 2021 report, three

journals achieved a CiteScore of 10 or higher. The CiteScores of the highest and lowest journals (Tab. 1) were obtained by Computers and Education (19.8) and Frontiers in Psychology (4), respectively. Ranked 4th by Scopus with 33 articles, Frontiers in Psychology's total citations and CiteScore were significantly lower than those of the other journals.

In addition, it is recognized that CiteScore may also play a significant role in the choice of journals by some authors to publish the most important and novel contributions. To measure the impact of journals, Elsevier-Scopus' CiteScore, which is an alternative to Clarivate Analytics' Impact Factor, uses the Scopus database's citation data. However, CiteScore should not be considered the only metric. The author should consider CiteScore as well as how the journal can deliver the work to the correct audience and contribute to the field's advancement.

Tab. 1. The top 10 most productive journals on social presence research with their most cited article.

Journal	TP (%)	TC	CiteScore2021	The most cited article	Times Cited	Publisher
1 Computers in Human Behavior	79	5488	14.9	Online social networks: Why do students use Facebook? [10]	919	Elsevier
2 Computers and Education	47	3877	19.8	Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors [36]	640	Elsevier
3 Internet and Higher Education	40	5762	16.8	Critical Inquiry in a Text-Based Environment: Computer Conferencing in	2687	Elsevier

4	Frontiers in Psychology	33	299	4	Higher Education [19] Toward understanding social cues and signals in human-robot interaction: Effects of robot gaze and proxemic behavior [17]	81	Frontiers Media S.A.
5	International Review of Research in Open and Distance Learning	26	768	6.1	Increasing social presence in online learning through small group discussions [1]	94	Athabasca University
6	International Journal of Human Computer Interaction	26	527	7.3	Exploring multidimensional conceptualization of social presence in the context of online communities [29]	102	Taylor & Francis
7	Distance Education	24	950	7.2	Understanding social presence in text-based online learning environments [25]	237	Taylor & Francis
8	Interactive Learning Environments	23	384	7.2	Towards a framework of interactions in a 47 blended synchronous learning environment: what effects are there on students' social presence experience? [39]	47	Taylor & Francis
9	Online Learning Journal	21	482	5.7	The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence [2]	275	The Online Learning Consortium
10	Sustainability Switzerland	19	274	5	Responses to COVID-19 in higher education: Social media usage for sustaining formal academic communication in developing countries [37]	99	Multidisciplinary Digital Publishing Institute (MDPI)

TP: Total publications; TC: total citations

3.3. Leading countries, top institutions, and international collaboration

Tab. 2 provides a list of the 15 most productive countries contributing to growth in social presence research activities worldwide. In the global social presence research progress, China and the United States contributed approximately 55% of publications. The United States ranked first with 736 publications in 157 journals, taking up one-third of the total number of publications, while China ranked second in terms of publication output. While the total number of publications (TPi) from Zhejiang University was lower than that of the University of Central Florida (only 13), Sungkyunkwan University of South Korea ranked as the second most productive academic institution.

Among the 15 most productive countries (Tab. 2), only USA (76.6%), Turkey (76.6%), and Taiwan (68.8%) had more than 2/3 single-country publications (SCP). These results suggest that there is a strong level of intercountry collaboration between these countries or areas. The country with the least number of SCPs was Australia, where 33 out of 80 publications were affiliated with multiple institutions from 27 different countries. Collaboration with international partners has several advantages, including the expansion of networks, the exchange of knowledge, and the sharing of expertise, as well as an effective strategy for

ranking higher in search engine results. While Hong Kong is a part of China, 44.9% (49 articles) of its publications are international collaborative papers, affiliated with 12 countries or regions. This puts Hong Kong in the 12th place in terms of productivity.

According to the World University Rankings 2023 (Top universities, 2023), four universities were also ranked among the top 100 universities in the world, the University of Melbourne (ranking 33rd), Zhejiang University (42nd), Hong Kong Polytechnic University (65th) and Sungkyunkwan University (99th). In light of these findings, it is evident that social presence has received attention in some of the world's leading universities.

The distribution of countries and regions by region can be seen in Fig. 3. The figure depicts a network diagram in which the proximity of two countries/areas indicates their degree of relatedness, and the thickness of the line connecting them represents the intensity of their co-authorship relationships. The co-authorship analysis of the VOS viewer shows that most of the countries/areas were located in Europe (30 links), followed by Asia (13 links), America (13 links), Africa (9 links), and Oceania (2 links). Results of co-authorship showed that the United States was the most affiliated country, linked to 44 countries/areas with 211 co-authorships. This indicates a strong international collaboration in

research involving the United States. Other than the US, the United Kingdom had 39 links and 101 co-authorships, China had 31 links and 102 co-authorships, Australia had 27 links and 64 co-authorships, and Canada had 25 links and 52 co-authorships. These countries also demonstrated significant international research collaborations. Interestingly it was observed that 63 countries (over 70 percent of the listed countries) engaged in international collaborative publications with less than 10 countries. Additionally, it was found that 9 countries Georgia, Uzbekistan, Croatia,

Estonia, Malta, Argentina, Rwanda, Tunisia, and Trinidad and Tobago had no published articles on social presence and had no connections with other countries. These countries were isolated within the network, indicating a lack of co-authorship relationships with the other countries/areas in the study. This information could form the foundation for future research initiatives, collaborations, and efforts to connect these countries with the larger international research community in the field of social presence.

Tab. 2. Top 15 most productive countries and academic institutions in social presence publications.

Rank	Country/Area	TPc	SCP (%)	The most productive academic institution	TPi
1	United States	736	76.6	University of Central Florida	39
2	China	206	58.3	Zhejiang University	13
3	South Korea	140	59.3	Sungkyunkwan University	21
4	United Kingdom	130	48.5	The Open University	11
5	Canada	93	60.2	The University of British Columbia	12
6	Taiwan	80	68.8	National Chengchi University	7
6	Australia	80	45	University of Melbourne	9
8	Germany	78	46.2	FernUniversität in Hagen	6
9	Netherlands	58	53.4	Universiteit van Amsterdam	13
10	Spain	56	69.6	Universidad de Granada	7
11	Malaysia	54	61.1	Universiti Sains Malaysia / Universiti Teknologi Malaysia	11/11
12	Hong Kong	49	44.9	Hong Kong Polytechnic University	18
13	Turkey	47	76.6	Anadolu Üniversitesi	6
14	France	40	57.5	CNRS Centre National de la Recherche Scientifique	14
15	Italy	37	48.6	Università Cattolica del Sacro Cuore	6

TPc: total publications of a given country; TPi: total publications of a given academic institution; SCP: single-country publications.

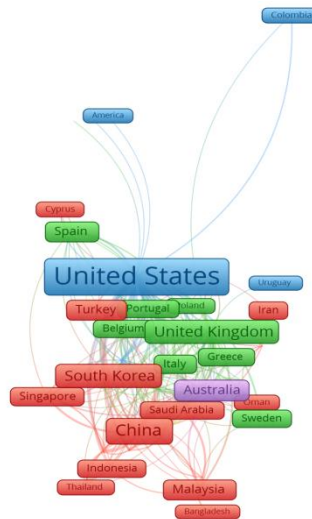


Fig. 3. A screenshot of the bibliometric map created based on co-authorships with network visualization mode.

3.4. Leading authors

Tab. 3 summarizes the ten most prolific authors in the field of social presence, who are affiliated with three different countries: the United States

(6 authors), Austria (4 authors), and Canada (1 author). It appears that the first publications of the authors ranged between the years 2000 and 2016, in which five authors were considered first

authors and five others as co-authors. According to the affiliations of the authors, social presence research is related to fields such as social science, management and business, computer and technology, and business and finance. Kim from the United States led the list with a record of 18 publications since 2016, 14 h-index, and 373 times citations. Richardson from the United States led the list with a record of 8 publications since 2003, 25 h-index, and 1874 times citations. According to the list, Kingstone from Canada ranked first with eight publications since 2011, a 64 h-index, and 315 citations. The 8th top authors, Beutl and Hlavacs are both

affiliated with the Universität Wien of Austria, and another pair of authors, Felnhofer and Kothgassner are affiliated with the Medizinische Universität Wien of Austria. This study also found that the publication dating back to 2014 in Tab. 3 refers to the same article [16], written by four prolific authors, Felnhofer, Kothgassner, Beutl and Kryspin-Exner. Tab. 3 does not necessarily contain the authors of the most cited articles listed in Tab. 1. There is only a chance that their names will appear in both tables if they have been published extensively.

Tab. 3. List of the 11 most prolific authors in the social presence research area

Author	Scopus author ID	Year of 1 st publication	TP	h-index	TC	Current affiliation	Country
1 Kim, Jihyun	36681393800	2016a	18	14	373	University of Central Florida	United States
2 Tu, Chihhsiung	7402578841	2000a	12	13	611	Northern Arizona University	United States
3 Lowenthal, Patrick R.	35782016800	2010a	11	18	294	Boise State University	United States
4 Merrill, Kelly	57205125252	2019b	9	7	53	The Ohio State University	United States
5 Edwards, Chad	55467888500	2014b	8	19	341	Western Michigan University	United States
5 Kingstone, Alan F.	7006826868	2011b	8	64	315	The University of British Columbia	Canada
5 Richardson, Jennifer C.	57074347800	2003a	8	25	1874	Purdue University	United States
8 Beutl, Leon	55637432300	2014b	7	10	157	Universität Wien	Austria
8 Felnhofer, Anna	36647500500	2014a	7	14	157	Medizinische Universität Wien	Austria
8 Hlavacs, Helmut	6506041648	2014b	7	23	157	Universität Wien	Austria
8 Kothgassner, Oswald David	36504484200	2014b	7	17	157	Medizinische Universität Wien	Austria

a First author.

b Co-author.

3.5. Author keywords

Four thousand and fifty-three author keywords were recorded, out of which 3709 (79.7%) were used only once, 483 (10.4%) twice, and 168 (3.6%) three times. Using VOSviewer, 194 keywords met the threshold of a minimum of 5 occurrences after re-labelling synonymic single words and congeneric phrases. Such as keywords *coi*, the community of inquiry (COI), were replaced by 'community of inquiry', e-learning, online learning, were replaced by 'e-learning' etc (Appendix A).

3.5.1. Topics of interest

As shown in Fig. 4, the most commonly encountered keyword was 'social presence' with 760 occurrences and 184 links to other keywords. Furthermore, this study encountered the use of terms such as 'community of inquiry' (150 occurrences, 73 links, Avg.pub.year:2017), 'e-learning' (187 occurrences, 72links, Avg.pub.year:2017), 'social media' (72 occurrences, 62 links, Avg.pub.year:2018) and 'computer-mediated communication' (67 occurrences, 64 links, Avg.pub.year:2013).

Social presence was also seen co-occurring with conceptual keywords including 'trust', 'Covid-19', 'virtual reality', and 'teaching presence'.

In addition, this study noticed several close-related social presence contents. Examples of social presence associated with social content were 'social commerce' (link strength:13), 'social influence' (link strength:6), 'social interaction' (link strength:13), and 'social media' (link strength:35). Examples of social presence associating with the education content are 'e-learning' (link strength: 99), 'distance education' (link strength:11), 'collaborative learning' (link strength:13), and 'blended learning' (link strength:12). Among social and educational terms, e-learning and social media are more strongly associated with social presence. As well as this, the link strength of two keywords can also be used to analyze the research interest in certain areas. For example, 'e-learning' had 92 links (i.e., connected to 92 other keywords), namely, 'computer-mediated communication' and 'community of inquiry'. There is an indication that research focusing on 'e-learning'– 'community of inquiry' was

stronger compared to ‘e-learning’– ‘computer-mediated communication’ as shown by the link strength which was 44 and 7, respectively. In many education contents, ‘e-learning’ appeared the most (187 occurrences). E-learning was highly related to multiple terms, including the community of inquiry, teaching presence, higher education, blended learning, and online teaching. The term 'MOOC' was less commonly

used (5 instances) as a related content of social presence and was primarily associated with studies related to e-learning. In the same way, a variety of terms was used to describe cognitive and emotion, which included ‘cognitive presence’ (52 occurrences), ‘emotions’ (20 occurrences), ‘trust’ (60 occurrences), ‘satisfaction’ (25 occurrences), and ‘loyalty’ (18 occurrences).

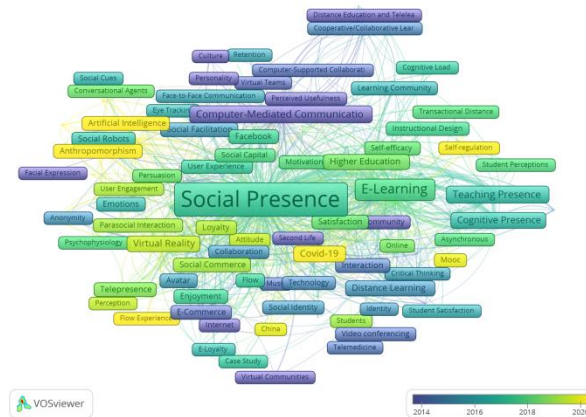


Fig. 4. Bibliometric map visualized with overlays based on author keyword co-occurrence. Minimum occurrences of a keyword are set to five.

To understand the changes in the trend of the author's keywords, this study discusses author keywords in three periods, the first stage, from the year of 1958 to 2000, the second stage, from the year 2001 to 2011 and the third stage, from the year 2012 to 2022.

During the initial stage (1958-2000), depicted in Figure 5, researchers focused on closely related areas such as perceived usefulness, media selection, system use, and collaborative virtual environments.

During the second stage (2001-2011), as Fig. 6 shows, there has been a noticeable increase in research content related to the Internet, computer-mediated communication (CMC), interaction, and learning. During this time, researchers began investigating e-learning and

the concept of a community of inquiry. During the third stage (2012-2022), as shown in Fig. 7, the research on e-learning, social media, and CMC increased significantly, and these three keywords are also high-frequency keywords in the period from 1958 to 2022. These findings are consistent with the findings of [27] who also emphasized that social presence took on new importance with the rise of computer-mediated communication (CMC) and later online learning. This means that these three keywords are closely related to the research development on social presence. Furthermore, towards the end of this stage, researchers began to look into topics like covid-19, chatbots, and artificial intelligence. These emerging areas hold the potential for future research endeavours.

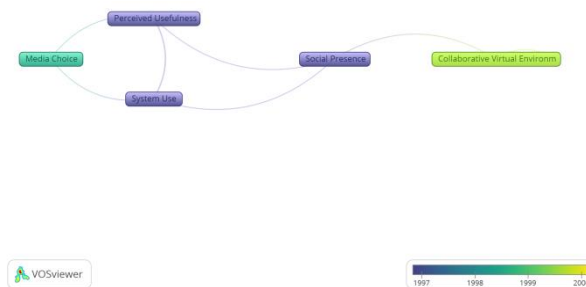


Fig. 5: Bibliometric map visualized with overlays based on author keyword co-occurrence (1958-2000). Minimum occurrences of a keyword are set to five.

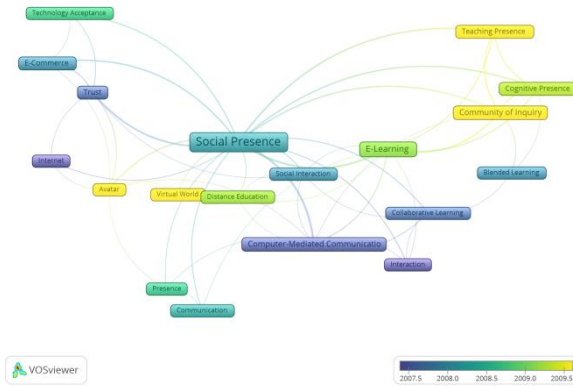


Fig. 6: Bibliometric map visualized with overlays based on author keyword co-occurrence (2001-2011). Minimum occurrences of a keyword are set to five.

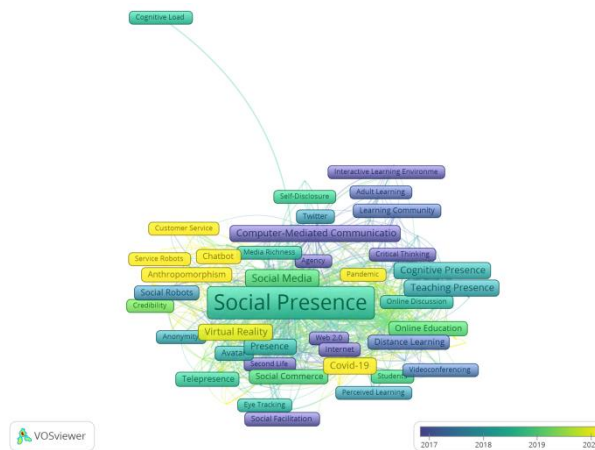


Fig. 7: Bibliometric map visualized with overlays based on author keyword co-occurrence (2012-2022). Minimum occurrences of a keyword are set to five.

While social presence is widely discussed in the context of mediated communication today, its origins lie in non-mediated interactions [12]. As CMC (computer mediated communication) became more popular during the late 1980s and early 1990s [30], communication researchers applied Short et al.'s social presence theory to CMC [27]. CMC was initially used for educational purposes during the late 1990s [4], [21], [27]. The social presence theory has gained new importance due to computer-mediated communication (CMC) and online learning [35], [27]. [4] stated that social presence in online courses is well-established as an approach to fostering social interaction. [4] developed a conceptual framework for computer-mediated communication in higher education that included social presence within a model of community inquiry. According to the findings (Fig. 4), four keywords are strongly associated with social presence: e-learning, community of inquiry, computer-mediated communication, and social media. The "ability of participants in a Community of Inquiry to project their personal

characteristics into the community, thereby presenting themselves to other participants as "real people" is referred to as social presence [19], [27]. According to the above discussion, the four keywords e-learning, CMC, CoI, and social media are important related contents in social presence studies, and this study explored these four interest topics in the following section.

3.5.2. Distribution of social presence publications based on topics of interest

The outputs of the sub-theme search and central theme search were positively correlated based on the number of articles and author keyword occurrences. Fig. 4 shows that e-learning (927 articles and 187 occurrences) connects with social presence. This was followed by computer mediated communication (CMC) (886 articles and 67 occurrences), social media generation (search phrase: "social media"), 514 articles in Scopus and 72 occurrences in VOSviewer, and community of inquiry (CoI), 478 articles in Scopus and 150 occurrences in VOSviewer.

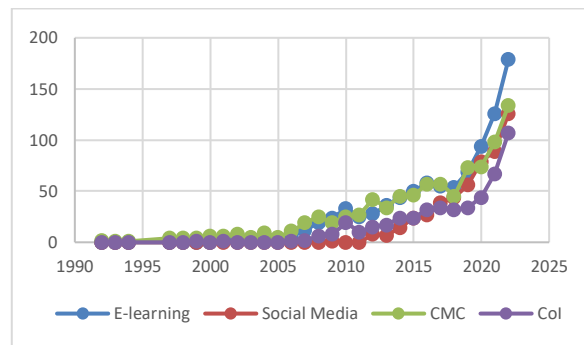


Fig. 8. Research trends of interest topics related to social presence

The term social presence was not associated with the internet until 1997. Articles attributed to e-learning, social media, CMC, and CoI were published in 2001, 2009, 1992, and 1999, respectively (Fig. 8). In this regard, it is evident that researchers are becoming aware of the possibility that internet influence may be a new factor that will play an important role in researching social presence. The findings of this study revealed that 70 percent of publications related to e-learning,

social media, CMC and CoI originated from USA and China (Fig. 9). Moreover, South Korea, the United Kingdom, and Austria were among the top 10 countries publishing articles related to social presence interest topics. Furthermore, countries or areas such as Taiwan, Malaysia, Hong Kong, and Germany were also listed in different topics of interest related to social presence and had a high level of publication production.

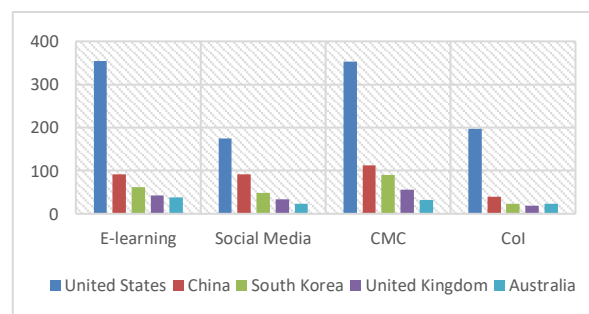


Fig. 9. Five countries with the most publications on the social presence major interest topics.

4. Conclusion

This study seeks to identify and categorise the most relevant works in the field of social presence literature in order to provide valuable insights into emerging research areas and global trends. Furthermore, the study aims to assist future researchers in locating relevant information that corresponds to their specific research interests.

Based on 1962 publications retrieved from the Scopus database, this study provides an overview of social presence research trends. Since the last 15 years, the number of publications has increased rapidly, and it is anticipated that this growth trend will continue to rise. Based on our findings, the University of Central Florida (US), Zhejiang University (China), and Sungkyunkwan University (South Korea) were identified as the top three academic

institutions with the most publications and strong international collaborations in the field of social presence. collaborating with these institutions can provide opportunities for researchers from other countries, such as Croatia and Estonia, to broaden their research networks and collaborations. Furthermore, the study identifies the most productive journals in terms of social presence publications. The top three journals were *Computers in Human Behaviour*, *Computers and Education*, and *Internet and Higher Education* with 79, 47, and 40 total publications, respectively. These journals serve as an important forum for disseminating research in the field.

In addition, the research identifies the most prolific authors in the same field. The top three authors were identified as Kim, Jihyun, Tu, Chihhsiung, and Lowenthal, Patrick R., and,

interestingly, all of them are affiliated with institutions in the United States. Their contributions indicate their expertise and influence in the field of social presence. The paper also highlights the extensively researched areas in the context of social presence, such as e-learning, computer-mediated communication (CMC), social media, and the Community of Inquiry (CoI). It also explores the recently researched areas of social presence, such as the impact of COVID-19, chatbots, and artificial intelligence. These new areas of study may provide interesting avenues for future research. Overall, this study sheds light on the leading academic institutions, influential journals, and prolific authors in the field of social presence, providing researchers worldwide with valuable insights and potential collaboration opportunities.

5. Managerial Implications

This study offers practical insights to managers in the field of social presence. It assists researchers in streamlining their efforts by identifying relevant works and research areas. This bibliometric analysis provides a comprehensive overview of publication outputs, co-authorships, affiliated countries, and author keywords, keeping researchers up to date on changing trends. The growing number of publications reflects the growing importance of social presence research, allowing managers to allocate resources wisely. Collaboration opportunities with highly productive universities and researchers from leading countries can improve knowledge exchange. Co-authorship and co-occurrence analyses assist managers in identifying potential collaborations and aligning research initiatives with current trends. Overall, this bibliometric analysis may aid managers in informed decision-making, strategic planning, and collaboration in social presence research.

6. Limitation of the Study

Searching for "social presence" within titles and abstracts may not provide complete coverage of all social presence-related studies on Scopus. Several authors did not refer to their content as social presence but rather use a different term. As a result of a lack of author keywords information in certain journals, such as Humanities and Social Sciences Communications, Scientific Report, PLOSONe, and International Journal of Human-Computer Interaction, only 84% of 1962 articles were covered by co-occurrence analysis of author keywords.

In the future, it is recommended to compare the outputs from multiple databases, such as Scopus, Google Scholar, Web of Science, and so on. Web of Science, for example, displays the most popular articles through a feature known as 'hot papers,' whereas Scopus lacks this feature. The hot paper feature highlights papers that have been cited rapidly and significantly after publication. A more comprehensive study will benefit from performing bibliometric analyses utilizing multiple data sources.

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Appendix A

Key words replace content

No.	Lable	Replace by
1	attitudes	attitude
2	avatars	avatar
3	chatbots	chatbot
4	coi	community of inquiry
5	community of inquiry (coi)	community of inquiry
6	community of inquiry framework	community of inquiry model
7	computer mediated communication	computer-mediated communication
8	computer-mediated communication (cmc)	computer-mediated communication
9	covid-19 pandemic	covid-19
10	elearning	e-learning
11	electronic commerce	e-commerce
12	emotion	emotions
13	human-computer interaction	human-computer interaction
14	human-robot interaction	human-robot interaction
15	learning communities	learning community
16	moocs	mooc
17	online learning	e-learning
18	sem	structural equation modeling
19	social interactions	social interaction
20	social presence theory	social presence
21	social robot	social robots
22	social robotics	social robots
23	structural equation modelling	structural equation modeling
24	technology acceptance model	technology acceptance
25	technology acceptance model (tam)	technology acceptance
26	uses and gratifications	uses and gratification
27	virtual environments	virtual environment
28	virtual worlds	virtual world

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