Review

Co-creation and Virtual Learning Communities: Bibliometric Analysis*

[English Version]

La co-creación y las comunidades virtuales de aprendizaje: análisis bibliométrico

Co-criação e comunidades virtuais de aprendizagem: análise bibliométrica

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Abstract

Objective: To analyze co-creation and learning communities as a teaching strategy and research field in education for exchange and knowledge generation in development of skills in innovation and learning outcomes. **Methodology**: A bibliometric analysis was carried out in Scopus between 2009 and 2023 with 91 files. The results achieved

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three specific objectives: (a) to review and analyze the current level research on co-creation; (b) to describe guidelines for virtual learning communities, of the practice and of co-creation; and (c) to identify research needs and knowledge gaps in this field. **Results**: Three future lines of research were found concerning the implications of co-creation, virtual communities and learning, and co-creation in learning environments. **Conclusions**: co-creation as a learning strategy promotes participation through virtual communities. Some of them are the resolution of specific problems with interactive experiences regarding future knowledge using digital narratives, gamification, and workshops, supported in learning ecosystems, working sessions with experts, and collaborative environments for solving challenges.

Key words: communities of practice; learning communities, co-creation; higher education, knowledge management (JEL code D8, D83, I22).

Resumen

Objetivo: analizar la co-creación y las comunidades de aprendizaje como estrategia de enseñanza y campo investigativo en educación, para el intercambio y la generación de conocimiento en el desarrollo de habilidades en innovación y los resultados de aprendizaje. **Methodología**: se realizó un análisis bibliométrico en Scopus con 91 documentos entre los años 2009 y 2023. Los resultados permitieron dar respuesta a los tres objetivos específicos: a) revisar y analizar el nivel actual de la investigación en co-creación; b) describir los lineamientos para las comunidades virtuales de aprendizaje y de práctica y la co-creación y c) identificar necesidades de investigación y brechas de conocimiento en este campo. **Resultados**: se encontraron tres líneas futuras de investigación concernientes con las implicaciones de la co-creación, las comunidades virtuales y el aprendizaje, y la co-creación en ambientes de aprendizaje. **Conclusiones**: se concluyó que la co-creación como estrategia de aprendizaje, a través de comunidades virtuales, poseen impulsores que garantizan la participación. Entre ellos, la resolución de problemas específicos con experiencias interactivas en relación con el conocimiento de futuro, haciendo uso de narrativas digitales, la gamificación y los talleres, soportados en ecologías de aprendizaje, sesiones de trabajo con expertos y ambientes colaborativos para la solución de retos.

Palabras clave: comunidades de práctica; comunidades de aprendizaje; co-creación; educación superior; gestión del conocimiento (Código JEL D8, D83, I22).

Resumo

Objetivo: analisar a co-criação e as comunidades de aprendizagem como estratégia de ensino e campo de investigação em educação, para a troca e geração de conhecimento no desenvolvimento de habilidades em inovação e os resultados de aprendizagem. **Metodologia**: foi realizada uma análise bibliométrica no Scopus com 91 documentos entre os anos de 2009 e 2023. Os resultados permitiram responder aos três objetivos específicos: a) revisar e analisar o nível atual da pesquisa em co-criação; b) descrever as diretrizes para as comunidades virtuais de aprendizagem e de prática e a co-criação; e c) identificar necessidades de pesquisa e lacunas de conhecimento neste campo. **Resultados**: foram encontradas três linhas futuras de pesquisa relacionadas às implicações da co-criação, das comunidades virtuais e da aprendizagem, e da co-criação em ambientes de aprendizagem. **Conclusões**: oncluiu-se que a co-criação como estratégia de aprendizagem, por meio de comunidades virtuais, possui impulsionadores que garantem a participação. Entre eles, a resolução de problemas específicos com experiências interativas em relação ao conhecimento do futuro, utilizando narrativas digitais, gamificação e oficinas, apoiadas em ecologias de aprendizagem, sessões de trabalho com especialistas e ambientes colaborativos para a solução de desafios.

Palavras-chave: comunidades de prática; comunidades de aprendizagem; co-criação; educação superior; gestão do conhecimento (Código JEL D8, D83, I22).

Introduction

Higher education today faces challenges such as growing institutional competition (Zarandi et al., 2022, p. 1297) due to a rapidly and permanently changing market dynamic (Robinson & Celuch, 2016, p. 20), as well as the student's demands around their academic process. It must compete in labor markets that value updating, feedback (Zarandi et al., 2022) and the acquisition of skills for continuous improvement (Chan et al., 2022), personal, professional and labor development.

To face these challenges, higher education institutions (HISs) have ventured into areas that have produced benefits in terms of marketing and value generation, in the business field. Strategies such as co-creation are aimed at strengthening collaborative paths (Dollinger et al., 2018; Han et al., 2020) and enabling open innovation (Gonzalez-Cristiano & Le Grand, 2023) to empower networks (Dong et al., 2023), that involve stakeholders addressing complex problems (O'Leary et al., 2022). This experience involves changes, advances and students' perception.

Thus, strategies such as co-creation are made dynamic by using online collaborative spaces, such as learning or practice communities (Conaldi et al., 2023) to capitalize on experience through personalization, intangible management (Pedro et al., 2022; Robinson & Celuch, 2016) and knowledge transfer for the improvement of the educational system (Dollinger et al., 2018, p. 214).

The research in this field is at an early stage (Chan et al., 2022; Zarandi et al., 2022), thus, this research aims to carry out a bibliometric analysis on co-creation in a specific context such as the education. Zarandi et al. (2022, p. 1302) mention good practices transferable to universities in the analysis of specific cases (Mandolfo et al. 2020) to identify actions, strategies and guidelines to facilitate a learning environment (Emanuel et al., 2022), supported by the benefits of co-creation (Mendolfo et al., 2020) and its relationship with the knowledge management (Magni et al., 2020).

Methodology

The bibliometric analysis was based on the guidelines proposed by Vrontis and Christofi (2021) to fulfil the following objectives: (a) to review and critically analyze the current level of co-creation research; (b) to describe guidelines for virtual learning, practice and co-creation communities; and (c) to identify potential research needs and knowledge gaps to address future research.

Conceptual Limits

Co-creation has a business origin, since it was first mentioned by Prahalad and Ramaswamy (2004) as a process that allows users to contribute with new ideas or vote for ideas from other users to evolve and improve them. It uses collaboration and improves consumer and user experiences as primary benefits.

In education, there is research on the use of analysis and interpretation of indicators and data (Somerville et al., 2006), the strengthening of public-private networks (Emanuel et al., 2022), the development of affective commitment and an emotional bond (Robinson & Celuch, 2016), the progress of collective skills (Magni et al., 2020), the evaluation of teaching and learning processes (Zarandi et al., 2022), the strengthening of the business, state and society linkage model; in addition to, the generation of students social identity (Magni et al., 2020), among others.

In fact, co-creation is defined as a collaborative process of creating new value through the interaction between companies and customers (Magni et al., 2020), and by means of two subprocesses: The first one is named "value coproduction," where the value proposition of the product or service is created with user participation in design and delivering; and the second one, "value-in-use", a value beyond production, focused on the consumption of that value.

Co-creation is supported by other concepts such as "service dominant logic" (Dollinger et al., 2018, p. 216), the user continues to explore and learn about the value of the product and service through user experience and knowledge shared with other users (Chan et al., 2022, p. 209). This influences the improvement and transfer of service-taking experiences.

In the educational context, co-creation is the process by which students' resources are integrated with the institution to promote a variety of activities and experiences that foster exchange and interaction. They improve practice and innovation (Dollinger et al., 2018) and increase the active role in their training process (Zarandi et al., 2022).

An example of this occurs when students and institutions connect and collaborate, as co-creation improves knowledge and isolated information for students or institutions, according to Zhao and Kuh cited by Magni et al. (2020). Thus, a valuable learning experience is provided by increasing student satisfaction (Schlesinger et al. cited by Magni et al., 2020).

A "virtual learning community" can be defined as a group of cooperating people from public and private organizations with a common goal: the self-initiated, informal, and proactive learning of a situated nature. This generates a broader effect by linking stakeholders, in particular knowledge institutions

(Emanuel et al., 2022, p. 293), through virtual environments to innovate from a common and exchange language (García, 2008, p. 100).

Based on the former concept, the connection between an virtual learning community and a co-creation process is direct, as collaborative interactions in active exchange of information are both beneficial as indispensable mechanisms for co-creation (Chan et al., 2022, p. 209), with results in knowledge management in educational institutions.

Literature review reveals other mechanisms for managing knowledge, such as online communities (Hogreve & Beierlein, 2023), knowledge social networks, knowledge-based learning networks, and practice communities (García, 2008). These have in common self-initiation, problem solving, and content sharing in a creative way, with flexibility, but with the purpose toward learning and sharing knowledge.

Likewise, it allows developing critical thinking using open debate (Hogreve & Beierlein, 2023), that is not limited to informational commentary, but to learning excitement and altruistic acts to share knowledge (Wang et al., 2021).

Questioning

The bibliometric research seeks to answer the following questions:

Q1. What is the advance of research in co-creation?

Q2. What are the guidelines for virtual learning and practice communities and co-creation?

Q3. What are the research needs and knowledge gaps to be addressed by future research?

Inclusion Criteria

The criterion for paper selection was the use of co-creation processes and actions within the framework of learning or practice communities, considering that both concepts for its current use allow obtaining papers related to knowledge

management for learning without limiting them to a specific area of knowledge or sector.

The search was carried out in Scopus for coverage and utility for bibliometric research (Mongeon & Paul-Hus, 2016) from 2009 to 2023. The search date was June 14, 2023.

Search Strategy

The search was carried out by *title*, *abstract*, and *keyword* in Scopus, it includes analytical categories of learning or practice communities, co-creation and knowledge management with the following search equation: ("learning communities" OR "communities of practice") AND co-creation AND "knowledge management"). Ninety-one papers were retrieved, 66 of which were research papers.

Exclusion Criteria

Papers focused on resources, technological innovation, or explanation of technological devices on methodologies such as processing to support product design processes (PDP) were excluded, as well as those focused on marketing and e-commerce practices for addressing social problems and knowledge management in the enterprise, without methodological emphasis. Papers dealing with models for professional services and organizational intermediation due to their profit-generating nature, which were not transferable to the educational context, were also excluded.

Selection of Relevant Research

The papers selection was based on the following criteria:

1. Reference to a practice or learning community;
2. Use of technological mediation;
3. Orientation toward learning within knowledge management;
4. Use co-creation strategy.

Other Search Processes

The results were contrasted with the theory of co-creation for learning to explain trends in research and advances in this field.

Extraction, Analysis and Synthesis

The quantitative analysis was carried out using *VosViewer* and *Bibliometrics* (Biblioshiny) software (Aria & Cuccurullo, 2017), in a complementary manner. The information generated by Scopus was included in a database to review and select relevant research based on 91 abstracts.

Results and Discussion

Scientific production in this field has been generated between 2009-2023 with 78 publications, an annual growth rate of 12.18%, a total of 262 authors, 34.07% with international co-authorship, an average of 3.05 authors per paper, and an average citation of 18.24, according to the meta data analysis carried out (*Biblioshiny*) (Aria & Cuccurullo, 2017).

Publication Year and Paper Type

Exponential growth is shown in Figure 1. This reflects the interest in generating a positive attitude toward learning (Emanuel et al., 2022; Lim et al., 2019), expanding the domain and reach of education beyond the classroom toward a comprehensive educational experience (Robinson & Celuch, 2016, p. 21), fostering the conditions for active learning (Emmanuel et al., 2022), and improving the absorption capacity to strengthen institutions (Rashid et al., 2019, p. 778), and reinforce the continuous bidirectional communication (Somerville et al., 2006).

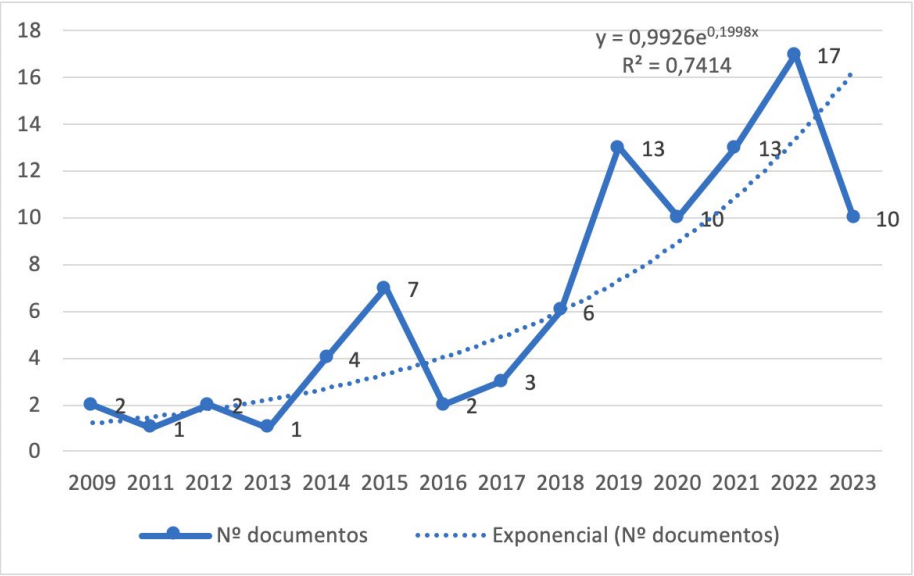

Figure 1. *Evolution of Research in Relation to Knowledge Management, Intellectual Capital and Education*

Source: Authors' elaboration based on Scopus data (2023).

The analysis from 2009 to 2013 shows the importance of the 2014-2015 cycle. The contribution of co-creation to business from the marketing approach (Laud et al., 2015), the improvement of communication in health education (Bretschneider et al., 2015), collaboration to the formulation and consolidation of models of knowledge management (Aradea et al., 2014), and the enhancement of customer service (Bone et al., 2015), among others, is evident.

In education, in 2019 there was a production growth that confirmed that research is flourishing (Mandolfo et al., 2020). Some aspects were highlighted such as the contribution of students in co-creation to participate, interact, and generate interpretative processes (Sahi et al., 2019). They also support new knowledge creation processes that include absorption and processing capacity (Rashid et al., 2019), mutual recognition of exchange and knowledge acquisition to improve learning outcomes (Lim et al., 2019), and the generation of higher education websites that enable a participatory role of students (Foroudi et al., 2019). Table 1 presents a summary of production by periods.

Table 1. *Analysis of Scientific Production by Periods.*

Year	Articles	Book	Book Chapter	Conference paper	Sources	Citation Average	Average No. of Authors
2009-2011	3	0	0	0	3	41	3
2012-2013	1	0	1	1	3	30,3	2,6
2014-2015	5	1	1	4	11	35,9	2,8
2016-2017	3	0	1	1	5	19,4	3
2018-2019	13	2	1	3	19	35,2	2,6
2020-2021	18	2	1	2	23	10,7	2,8
2022-2023	26	1	0	0	27	1,7	3,4
Total	69	6	5	11	91	174,2	20,2
%	74.1%	7.69%	4.40%	12.09%	100%		

Source: Authors self-elaboration based on Scopus data (2023).

In relation to the knowledge area, production is concentrated in business, management, and accounting 41.40%; computer science 13.38%; social sciences 12.74%; decision science 7.64%; economics, econometrics and finance 7.01%; engineering 5.73%; and less than 3% in mathematics, psychology, environmental sciences, medicine, energy, arts and humanities, earth and planetary sciences, and nursing.

Analysis of Publication Sources

The most cited journals are Technological Forecasting and Social Change, with 229 citations; International Journal of Hospitaly Management, with 195 citations; Journal of Marketing for Higher Education with 135 citations. Figure 2 shows the impact of the sources providing information on the most important journals in the field.

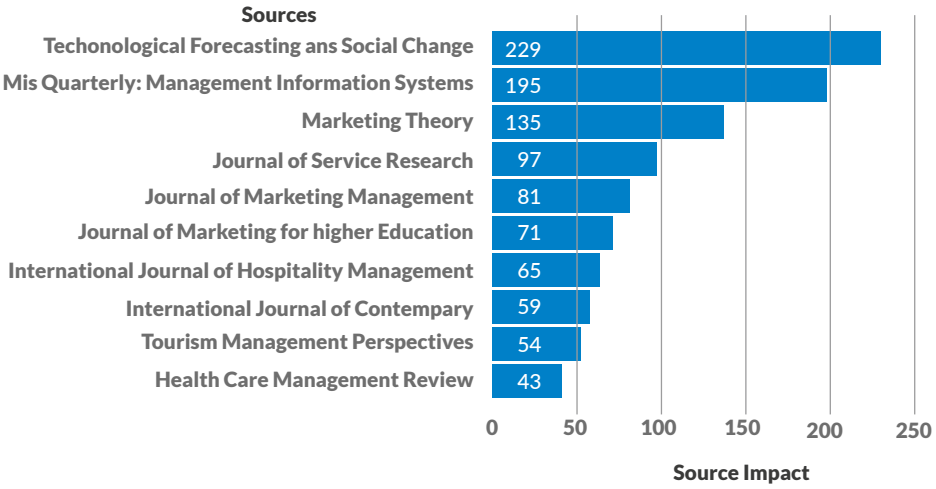

Figure 2. *Measurement of Source Impact.*

Source: Authors self-elaboration based on Scopus data (2023).

Authors and Impact

The most published authors in this field are Caputo et al. (2023) who establish some practices that can be used in education. The publications are based on the whole process of digital transformation to state that paying more attention to people than to technologies is necessary, emphasizing the need to combine technical competences and soft skills such as creativity, flexibility, and cognitive intelligence that demand greater workforce coverage and flexibility to achieve effective and adequate acceptance of technology for new challenges to the education of future professionals.

Zarandi et al. (2022) define students' roles in co-creation as costumer, partner, co-producer, product, and citizen. The authors highlight co-creation with goals associated with students' participation, cognitive commitmemnt, emotional engagement, and university affiliation. Chepurna and Rialp (2018) also focus on the profile for co-creation. This profile includes aspects such as cultural context, age, gender, and educational level that moderate the effect of dissuaders and motivators on attitudes and participation in online co-creation.

Finally, Foroudi et al. (2019) identify that university websites can contribute to co-creation, as they incorporate criteria of usability, availability, and

personalization by increasing participation and involvement in their educational process. Other authors reflect on co-creation and connection with health and tourism sectors. Figure 3 shows the authors with the highest publications per period and compares that with the most cited in this field.

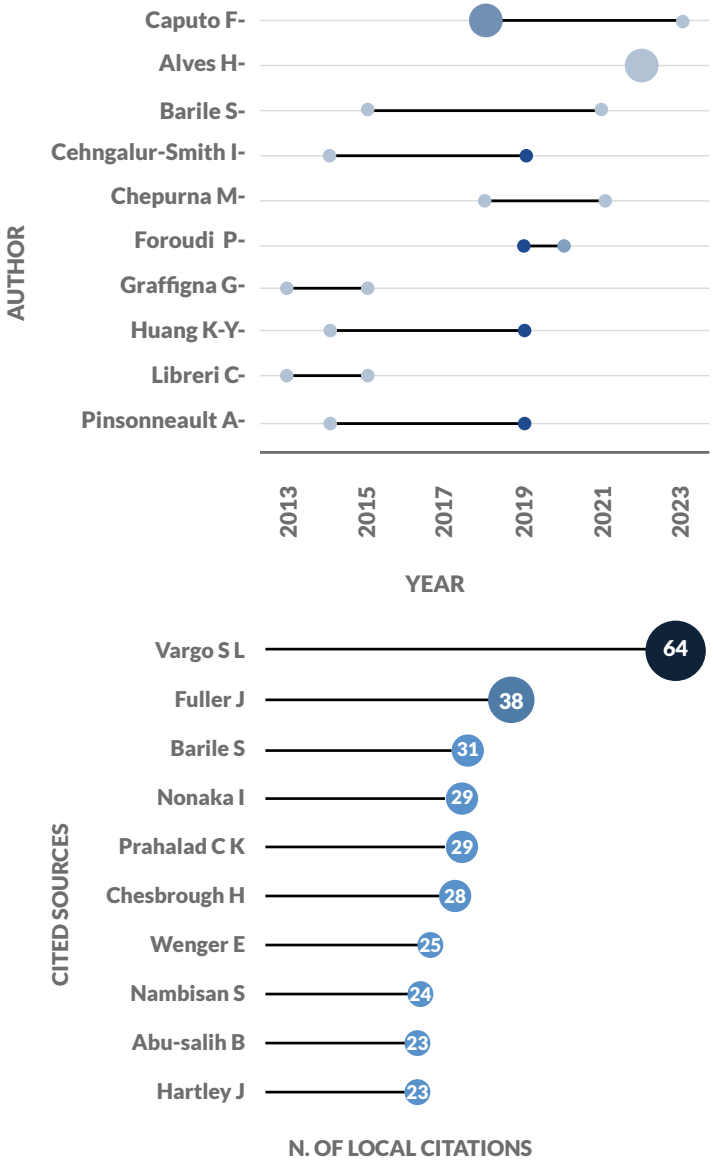

Figure 3. *Comparison of Author Publications in Relation to the Most Cited Authors.*

Source: Authors' elaboration using Bibliometrics (2023).

In contrast to the authors who publish on co-creation, the most cited authors such as Vargo with 64 citations, who (from a perspective of new logic in marketing focused on intangible resources and value of co-generation through relationships) states that value is defined and co-created with the customer through the use, maintenance, repair, and adaptation to the needs of that product. This contrasts with the idea that value is included in the product (Vargo & Lusch, 2004).

This is how contributions in education generate an openness to understanding that co-creation is not limited to product ideation. It also states that teaching marketing in universities must evolve toward the service logic, supported by knowledge and skills. This is the result of a co-creation process among parties, beyond the classic idea of being an exclusive supplier-client process.

Fuller and Loogma (2009), with 38 citations, contribute from the role of co-creation to learning communities that allow a future socially created, constructed, and negotiated for the creation of new knowledge from speech, language, and symbols. Prahalad and Ramaswamy (2004), with 29 citations, who are credited with the origin of the definition of co-creation in the business field. This definition has been taken by education to adapt and expand its marketing processes and incorporate it into teaching-learning process. It aims to generate a greater sense of belonging, student retention and, therefore, a higher value.

The authors who allow the connection between co-creation and knowledge management referred to Nonaka and Takeuchi (1995), because strategies and activities in virtual learning communities capture and improve tacit knowledge flow (Halonen et al., 2010; Somerville et al., 2006). In the same way, Wenger et al. (2002) contributed to the development of social learning theory (Wenger, 1998) and situated learning which allows the participation of periphery to develop knowledge associated with a field (Lave & Wenger, 1991). This author is also considered to be a founder of uses and gratifications theory that explains the needs and motivations of online communities (Nambisan & Baron, 2009).

Through the analysis of keyword concurrence over time shown in Figure 4, the relevance and contribution of co-creation to higher education with technologies and social networks is demonstrated (Candi et al., 2018; Rashid et al., 2019). These enable constructive horizontal communication (Emanuel et al., 2022, p. 298) of a bidirectional nature (Somerville et al., 2006, p. 4) with stakeholders and with a high degree of involvement and commitment to co-building value (García, 2008), in response to the challenges of low enrollment and desertion in higher education.

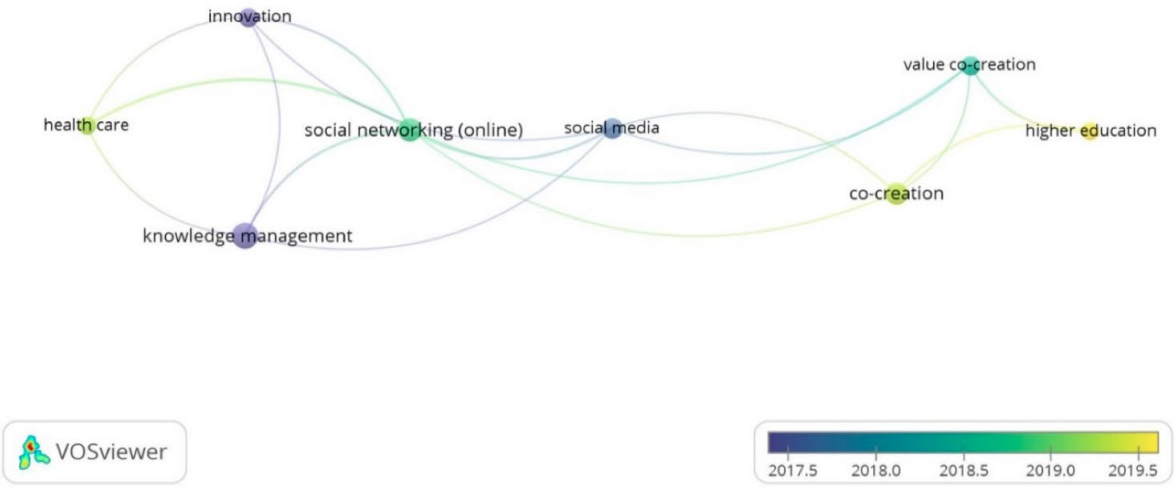

Figure 4. *Keyword Concurrence and Its Evolution Over Time.*

Collaboration and Cooperation Networks

Knowledge-publishing countries in the field are mainly Italy (12), the United States (11), China (11), the United Kingdom (11), and Australia (10), among others. At the same time, the countries with the highest citations in the topic are Australia (314), the United States (171), Switzerland (143), the United Kingdom (118), Italy (79), Korea (37), China (36), Pakistan (34), Iceland (30), and Spain (28).

From the researches carried out in collaborations between countries, we highlight some that contribute to the educational field, such as the one between the Philippines and the United States, developed by Pormon and Lejano (2023). This presents a pedagogy model through a relational approach to close the gap between the subject and the object in disaster care assistance. The authors highlighted that students are not only knowledge recipients, but coproducers (agents of knowledge), through the translation of scientific and technical knowledge into a common language to generate awareness about events and natural disasters.

From another perspective, O'Leary et al. (2022) conducted collaborative research between Denmark, Ireland, and Australia to explore types of distributive justice (justice of reward) and interactive justice (justice of treatment). This shows the importance of formal or informal recognition of individual contributions to motivate people to participate in online contributions (Wasko & Faraj, 2005).

Similar to O'Leary et al., Wang et al. (2021) collaborate between China and the United States to define emotional and informative influence on online customer

contribution based on social support theory. Lim et al. (2019) an Australia and Thailand contribution define the guidelines for co-creation using cell phones. They identified that mobile learning entails new practices and attitudes that involve students socially, overcoming classical transmission of knowledge and physical classroom limitations.

In other cases, such as Conaldi et al. (2023), research emerges from collaboration between the United States and the United Kingdom. These authors argue that geographical proximity is not a relevant aspect for collaborative innovation, while organizational proximity ensures complex interactions at intra- and inter-organizational levels to learn and use social and cognitive proximity, where organizational routine must be overcome to awaken the desire to learn.

Finally, Gonzalez-Cristiano and Le Grand (2023), researchers from Finland and Spain, contribute to the definition of "collaborative innovation" and support boundary objects to represent, understand and transform the knowledge. Boundary objects form common ground for abstract ideas on which greater understanding, creation and knowledge combination can be achieved. In these cases, mechanisms such as metaphors, dialogue and question formulation are used to land concepts or ideas. Figure 5 shows collaborative networks around the world.

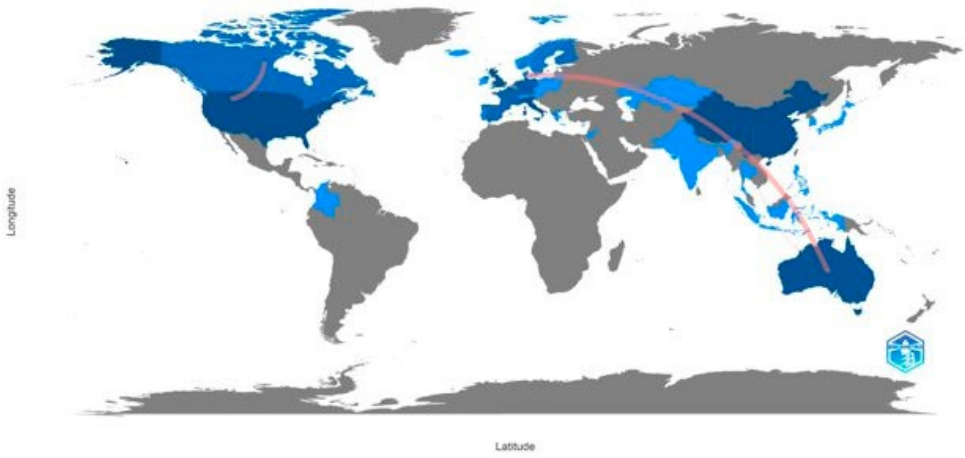

Figure 5. *Collaboration and Cooperation Networks on the Subject.*

Guidelines for Learning in Practice or Learning Communities through the Co-creation Strategy

Bibliometric review eases the detection of guidelines for the design of learning-enabling activities such as those that place students in their context and community (Pormon & Lejano, 2023, p. 3), through the arrangement of iterative stages and cycles (McEwen et al., 2022, p. 2496) to enable learning from exploration with a reflective character (Chan et al., 2022, p. 210).

Furthermore, the guidelines for the design of virtual learning communities that make possible the implementation of co-creation, can be explained from a pedagogical and technological point of view. Pedagogy establishes "learning as the result of social interactions to create a better understanding of any complex event" (Pormon & Lejano, 2023, p. 2), which has as its main driver, the questions in a directional way (Hogreve & Beierlein, 2023). These are not only limited to teacher initiatives, but, on the contrary, promote peer education (Bredl et al., 2011, p. 11) and the use of knowledge boundaries (Gonzalez-Cristiano & Le Grand, 2023, p. 12) to enable the content, routes, and format selections from personal learning interests (Dollinger et al., 2018).

Regarding technology, the goal is to develop a culture and a community environment (Jia et al., 2022) from access and transparency to the negotiation of consensus (Sugino et al., 2016); in addition, to the development of devices that improve experience and knowledge exchange (Marjanovic, 2014). This is contrary to the traditional manner of designing virtual learning objects of a unidirectional nature.

The activities are based on a consensus of content and learning outcomes (Sugino et al., 2016, p. 199), as well as proposing content with a balance between simplification and loss of conceptual depth (McEwen et al., 2022). In the same way, these activities seek decentralization, the creation of connections between networks, and allow mobility among communities that work as constellations or knowledge networks (García, 2008, p. 104).

Learning principles in learning communities through co-creation is based on a social process (Veen et al., 2009; Zahay, 2021, p. 134) to democratize knowledge (O'Leary et al., 2022, p. 4), with a relational approach (Pormon & Lejano, 2023, p. 4) for peer training (Bredl et al., 2011, p. 11). This, making use of actions such as generating questions and analyzing how others, has resolved problems.

Regarding the students' roles in promoting learning, research reveals that they need to be encouraged to take responsibility for learning (Sahi et al., 2019, p. 545) and thus, co-produce the result, i.e. their education (Robinson & Celuch, 2016, p. 21). In addition, those who use learning communities have been shown to maintain quality relationships, enabling them to have better performance in

learning outcomes (Dollinger et al., 2018, p. 218), as such communities function as communication alternatives (Pormon & Far, 2023, p. 4) to interact (Magni et al., 2020, p. 128; Pormon & Far, 2023, p. 4) and generate solutions together (Emanuel et al., 2022, p. 297).

Figure 6 shows co-creation from learning communities that provides emotional support in teaching and learning process, as it stimulates interest in playing an active role (Dollinger et al., 2018) and demonstrates the perceived ease of information and communication technologies use (Chepurna & Rialp, 2018, p. 460). This is vital for virtual and distance learning programs that enhance confidence, as it is shared and interacted among peers. This allows the satisfaction of the one who learns, and also the one who, in an altruistic way, shares knowledge for peers' benefits, described as integrative gratification sought (Qin et al., 2023).

Figure 6 also shows the connection between co-creation and higher education. This provides emotional support for collective competencies and skills competence (Somerville et al., 2006, p. 3). The generation of ties may be too weak to share new information, but strong enough to transfer tacit knowledge (García, 2008, p. 92), with improved sense of justice and community experience (Qin et al., 2023).

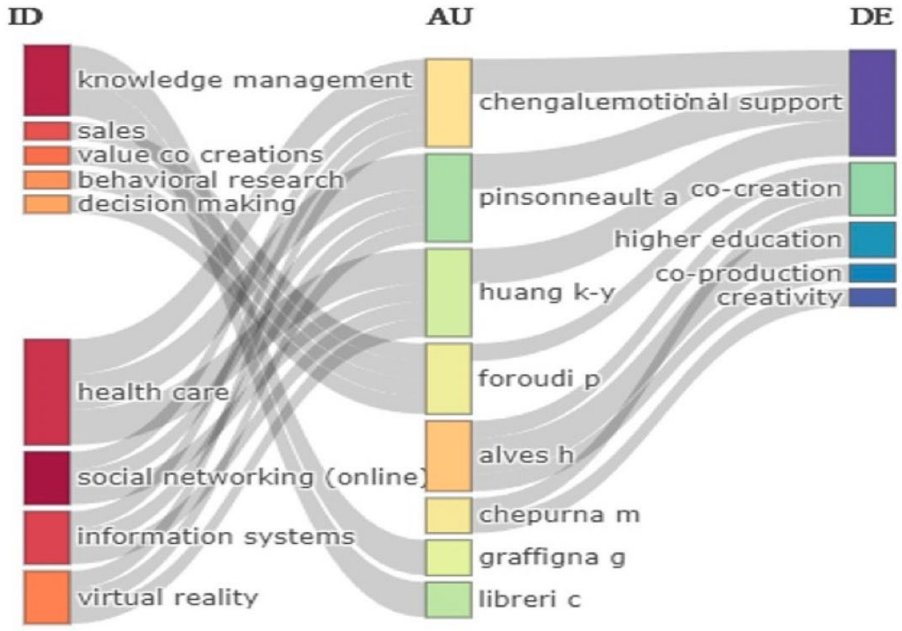

Figure 6. *Three Field Diagram on Co-creation through Learning Communities in Education as a Strategy for Managing Knowledge.*

Source: Authors' elaboration using Bibliometrics (2023).

Regarding innovation in HEI, Xie et al. (2023) state that its application is primarily in co-creation with students, in the construction and execution of curricula including the design of elective or optional lectures (Magni et al., 2020, p. 140; Zarandi et al., 2022) and, secondly, the availability of spaces in which to develop the student identity in relation to the institution (Zarandi et al., 2022).

Indeed, learning communities do not replace, but complement formal and usual strategies (Emanuel et al., 2022, p. 291) from a relational integration. These influence academic performance, satisfaction, loyalty and defence of the institution (Robinson & Celuch, 2016, p. 21), as these communities also generate student participation in teaching-learning process, leading to reflecting on the reasons for learning and participate in knowledge-sharing activities, thus influencing network behavior in the university (Magni et al., 2020).

Other elements that ensure co-creation are added, such as a participatory environment (Rashid et al., 2019, p. 779), through appropriate channels of communication and sufficient information and a platform for sharing information on a website (Foroudi et al., 2019). This is a social strategy that helps people improve and meet the need to use it as a source of knowledge and value for innovation (Candi et al., 2018).

With respect to teachers' competences and participants in general, creativity is required for the formulation and dynamization of co-creation strategies (Antonczak & Burger-Helmchen, 2020, p. 361), the definition of co-creative procedures for sharing experiences, and knowledge in fluid ways that introduce new approaches to problems (García, 2008, p. 104). This is supported by group dynamics (Zarandi et al., 2022, p. 1306), as it cannot be assumed that all participants have the skills to collaborate in knowledge-building.

On the one hand, co-creation in learning communities as a lifelong learning strategy is supported by methodologies and didactics such as the use of narratives, role-playing games, and workshops (Pormon & Far, 2023, p. 11); role-sharing (Heino & Hautala, 2021); competitions and simulations (Mandolfo et al., 2020, p. 9); informative dialogue (Gonzalez-Cristiano & Le Grand, 2023. p. 9); knowledge maps (Yeh, 2012, p. 1327); and problem-solving (Qin et al., 2023; Zarandi et al., 2022) using symbolic, communicative, and emotional elements (Pormon & Lejano, 2023).

On the other hand, bibliometric review helps to identify cases such as research in Portugal, which found that co-creation in education should include actions from dialogue, access, risk management, and transparency to knowledge sharing (Zarandi et al., 2022). This implies that information is shared from the positive, as well as from the emotional, such as communicating fears, lack of skills and ignorance.

The research by Emanuel et al. (2022) is also noteworthy, because they demonstrate the effectiveness of learning communities in supporting teaching-learning process. They use situated knowledge to connect resources of the institution, and boundary knowledge and the future from the relationship of several organizations, as a way to connect University, Company, State and Society.

Future of Field Research

Mainly three scenarios were identified in which further research was required, as shown in the "thematic map" in Figure 7: those related to co-creation, as literature reports research challenges associated with conceptualization and differential analysis of co-creation (Medina, 2006); the analysis of co-creation in context (Zarandi et al., 2022); the deepening of approaches and practices for executing co-creation (Mandolfo et al., 2020); the identification of co -creation process in HEI and the deepening of the relationship between co-creation and knowledge management (Magni et al., 2020), their respective benefits (Mendolfo et al., 2020), and, the maximization effect of co-creation, by supporting knowledge management (Chu, 2016).

More research is needed to broaden the scope of collaboration and joint creation in relation to communities and learning (Dong et al., 2023). Identifying individual features that contribute to a positive learning climate (Emanuel et al., 2022), with in-depth information on online communities is also necessary (Hogreve & Beierlein, 2023). This can establish the functioning, effectiveness, mechanisms that promote learning and knowledge in learning communities (Emanuel et al., 2022), as well as ascertaining how to manage communities for value generation (Rod, 2021).

Finally, at it is shown in figure 7, education is an emerging topic that identifies research needs to understand the dynamic nature of learning environments (Emanuel et al., 2022), the analysis of participants profile most willing to collaborate in a learning community (Mandolfo et al., 2020), as well as identifying actions for individual, community, and network learning (García, 2008).

Outside the classroom, the potential of co-creation with teaching training should be identified (Barrios et al., 2019), open innovation in the educational context for the generation of critical thinking (Yeh, 2012), risk identification, benefits and costs for students, to have an understanding of how to extend co-creation to higher education (Zarandi et al., 2022), all of the above, supported by empirical evidence (Antonczak & Burger-Helmchen, 2020).

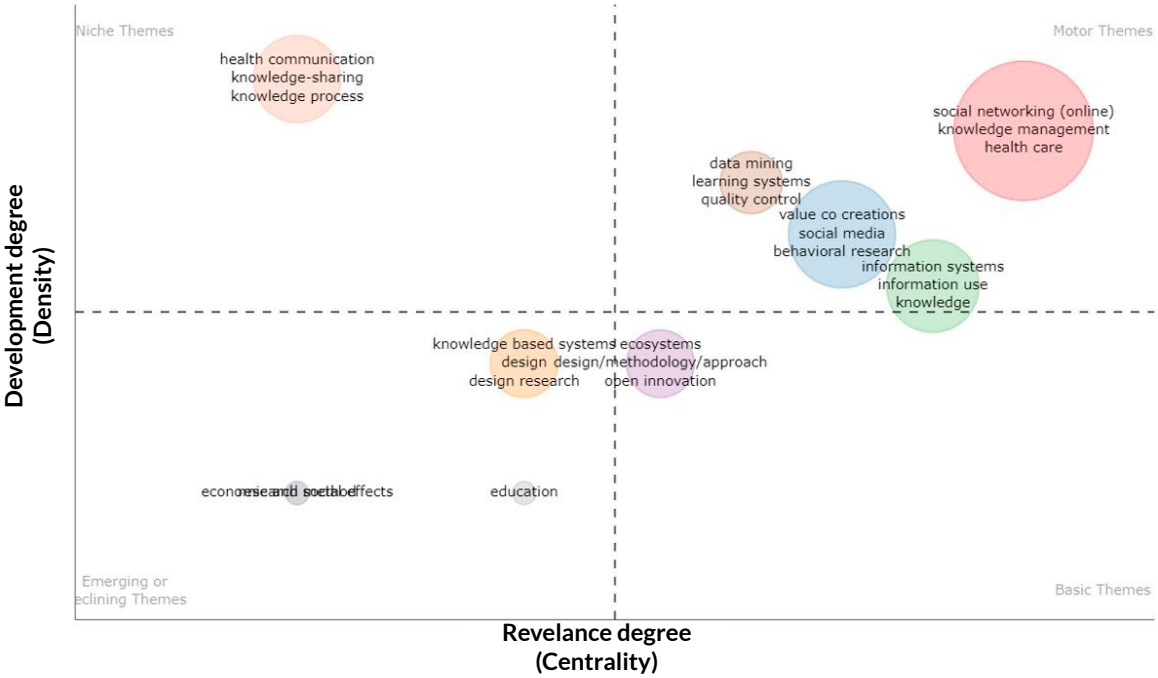

Figure 7. *Thematic Map on Learning or Practice Communities, Co-creation as a Knowledge Management Strategy in Education.*

Source: Authors' elaboration using Bibliometrics (2023).

Conclusions

Co-creation as a learning strategy through virtual communities is a topic that is on the rise as the scope of its application expands in different scenarios, including higher education. It has demonstrated great relevance, both in the classroom and institutionally, to improving the student experience, creating value, teaching training, as well as creating a greater customer focus that fosters the competitive advantage of institutions.

The first objective was to review and analyze the current research level. The year in which this research topic was promoted in business such as marketing and customer service improvement, as well as in health care was 2014. Since 2019,

the trend and growth of research has been toward higher education with papers as the predominant means of dissemination.

This area was also shown to have collaboration and cooperation networks between authors from different countries. This corroborates a learning community that fosters interaction, knowledge exchange, and learning independent of the physical location, within and outside organizations, with common topics and interests, social and cognitive proximity, and enhanced by use of information and communication technologies (ICT).

Regarding the second objective, virtual communities generate learning using the concrete principles of social interaction and knowledge democratization with a relational approach for peer interactions and learning. The student plays an important role in appropriating and being the protagonist in the process through the communication channels and participation in the generation of joint solutions as a result of training in values such as trust and altruism to share knowledge.

Through the bibliometric analysis of the topics in this research, aspects such as activity design were addressed in the learning community, the content, learning context, participants motivation, emotional support of the community, and in the use of methodologies and didactics, among others, building innovative learning ecologies that promote co-creation and enhance learning.

Learning in communities is characterized by being practical, and by being located and developed in a space that is seen more horizontally by peer collaboration, although not necessarily provided in a formal setting. However, due to its unique nature, progress is required in understanding how to generate an active learning climate that evolves over time and becomes an organizational strategy as a reservoir of social knowledge for knowledge management.

Regarding the third objective, three scenarios are highlighted in research needs and knowledge gaps. First, the deepening in approaches and practices to execute co-creation, as well as its conceptualization and relationship with knowledge management. Second, the expansion of research on virtual learning communities and how it is empowered and, third, further advancement in research on co-creation benefits in education. Finally, this bibliometric analysis is expected to contribute to the understanding the state of current research in the field of co-creation and its projection.

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