

Situations of Internationalization of Higher Education Under The Covid-19 Pandemic - A Scientometric Review

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To Link this Article: <http://dx.doi.org/10.6007/IJARBS/v13-i12/20362> DOI:10.6007/IJARBS/v13-i12/20362

Published Date: 27 December 2023

Abstract

The internationalization of higher education (IoHE) is currently facing numerous problems and major changes because of the COVID-19 pandemic. However, a scientometric review of IoHE during and post the pandemic crisis is necessary to guide future research trends. This study employed the CiteSpace visual analysis tool to examine and synthesize IoHE research from 2019 to 2023. Various methodologies, including co-occurrence analysis, co-citation analysis, and cluster analysis, were utilized to accomplish this task. The analysis encompassed 1568 bibliographic entries sourced from the Web of Science and Scopus databases. The results of the study indicated that a significant number of scholars emerged during this particular time frame, with the primary institutions originating primarily from China, the United Kingdom, and the United States. The research themes mostly centered around policy, English medium instruction, e-learning, and the mobility of students and academic staff. As a result, a total of 14 clusters were identified. The future trends of IoHE encompass various aspects, including the establishment of international branch campuses, the implementation of internationalization at home strategies, the development of online education models to enhance educational systems, the promotion of sustainable development through the cultivation of cultural diversity, and the enhancement of teaching quality and intercultural competence.

Keywords: Internationalization of higher education, COVID-19, CiteSpace, Scientometric, Research trends

Introduction

Internationalization of higher education (IoHE) has garnered global recognition in recent times. The concept of globalization has been widely recognized as an unquestionable phenomenon that has significantly influenced the advancement of higher education (Cai, 2021; Jian, 2019; Liu et al., 2020). The Internationalization of Higher Education (IoHE) has transitioned from a spontaneous and unplanned endeavor to a deliberate and purposeful

emphasis in universities worldwide. This shift may be attributed, at least in part, to the changing landscape caused by globalization (Knight, 2014). Nevertheless, the current outbreak has significantly impeded global collaboration and interactions. In the post-epidemic era, the international collaboration and exchange of higher education encounter the obstacle of 'anti-globalization', posing hurdles to the global advancement of IoHE (Li & Eryong, 2022). The scale of IoHE has been significantly impacted by the pandemic-induced global economic downturn. As a consequence, IoHE is currently experiencing substantial transformations. In light of the prevailing conditions, it is imperative to research the primary subjects within IoHE. This study should encompass an exploration of the prominent scholars, the principal academic journals, and the central locations for IoHE studies, as well as an analysis of the prospective research directions both during and after the COVID-19 pandemic. Such investigations are of utmost importance and demand immediate attention.

In conventional research, scholars are typically required to thoroughly review a substantial body of literature and select relevant articles to gain a comprehensive understanding of a topic before concluding. This research method has many benefits, but researchers may struggle to remain objective when assessing important academic works. This may lead to errors or incomplete findings. Writing on a wide range of topics has increased in the big data era. Hence, objective literature analysis using conventional research methods may provide challenges. Therefore, academics have recently adopted a more intuitive and comprehensive approach to analyzing large-scale data, specifically knowledge graphs.

By utilizing knowledge graphs, researchers can analyze the historical progression of knowledge and make predictions on future research frontiers. The researcher employed CiteSpace, a scientometrics-based citation visualization tool, in this study (Chen, 2016). The purpose was to visually represent prominent scholars, journals, countries, and emerging IoHE topics during the post-COVID-19 epidemic period, while also providing insights into future trends.

Method

This study aims to comprehensively examine the development of IoHE during and after the COVID-19 pandemic period. The research plan involves three components. Firstly, the co-occurrence analysis of authors, institutions/faculties, and countries/regions of studies related to IoHE will be conducted. Secondly, the co-citation analysis of literature, authors, and journals of IoHE studies will be analyzed. Lastly, future trends of IoHE will be anticipated through keyword cluster analysis.

Content analysis: Content analysis uses co-occurrence analysis. This study identifies, analyses, and connects science themes from textual content (Sedighi, 2016). Keyword co-occurrence analysis can reveal a discipline's most important research areas and their changes over time. Researchers can determine research influence by analyzing co-occurrence across authors, institutions/faculties, and countries/regions.

Co-citation analysis: This analysis is to examine the frequency at which two particular items of period research are referenced in subsequent articles (Yang et al., 2019). Many co-citations between authors directly correlate with academic relationships. Examining expert-cited papers can reveal frontier research topics in a field. According to Chen (2006), the forefront of scholarly inquiry showcases the formation of theoretical paradigms and novel subject matters. Hence, Thus, this study uses author, journal, and reference (document) co-citation

analysis to identify influential authors, journals, and IoHE references during and after the COVID-19 pandemic.

Cluster analysis: Cluster analysis is often used to compare relevant academic articles and emerging topics (Van Eck & Waltman, 2017). This technique is employed in exploratory data mining to effectively find and evaluate significant terms and their contextual relevance, as well as to examine trends and interrelationships within a specific domain. Modularity Q and the mean silhouette S indicate cluster analysis. According to Lim and Aryadoust (2022), higher Q values indicate greater reliability and higher S values indicate greater homogeneity. If the value of Q is equal to or more than 0.7, it signifies that the clustering outcome is highly dependable, and a cluster is considered acceptable if S exceeds 0.5, as stated by Chen et al. (2014) and Newman and Girvan (2004). The log-likelihood rate (LLR) was used to name each cluster due to its ability to produce optimal outcomes in terms of coverage and distinctiveness (Chen, 2006).

Data collection and processing

This study used Scopus and Web of Science core collection data. The search topic in the Web of Science Core Collection was restricted to include only articles and review articles published between 2019 and 2023. The topic focused on the intersection of internationalization and higher education or tertiary education. The search was limited to English or Chinese publications. In conclusion, a total of 198 articles were obtained. A total of 1417 articles were retrieved and exported for further use in Scopus using the search criteria TITLE-ABS-KEY=(internationali* AND ("higher education" OR "tertiary education")) AND (LIMIT-TO(PUBYEAR, 2023) OR LIMIT-TO(PUBYEAR, 2022) OR LIMIT-TO(PUBYEAR, 2021) OR LIMIT-TO(PUBYEAR, 2020) OR LIMIT-TO(PUBYEAR, 2019)) AND (LIMIT-TO(DOCTYPE, "ar") OR LIMIT-TO(DOCTYPE, "re")) AND (LIMIT-TO(LANGUAGE, "English") OR LIMIT-TO(LANGUAGE, "Chinese")). The search operations were carried out and concluded on May 31st, 2023. After eliminating 47 duplicates, 1568 articles were retained for subsequent analysis. The time frame for the CiteSpace parameter setting was established as a period spanning from January 2019 to May 2023, with each slice representing one year. Node types were classified independently based on analysis. This study used the g-index with k=25 as the selection criteria. Pathfinder was used to streamline the network. All parameters are default unless modified.

Results

Co-occurrence Analysis

Author Co-occurrence Analysis

In CiteSpace, the node type was configured as "Author", and a network representing the co-occurrence of authors was developed, as depicted in Figure 1. According to Zhao (2017), in the given network, individual authors are represented by nodes, while the connections between nodes symbolize the collaborative relationships made in the publication.

CiteSpace v. 5.8.R2 (64-bit) Java
 Date: 2023-08-26 09:50:30 (UTC+7)
 TimeSpan: 2019-2023 (01/01/2019-31/12/2023)
 Selection Criteria: g-index (k=15)
 Modularity Q=0.9844
 Weighted Mean Silhouette S=0.9844
 Nodes Labeled: 1.0%
 Pruning: Pathfinder



Figure 1: Author Co-occurrence Network

According to Figure 1, the author linkages over the past four years reveal a lack of significant collaboration among authors. Most of the authors were observed to be solitary nodes, lacking any connections to other nodes. This suggests that they were engaged in independent research on the field of IoHE. The aforementioned proposition holds merit, given the ongoing COVID-19 pandemic has hindered the aforementioned trend. Notwithstanding this hindrance, there were still authors who engaged in collaboration and established collectives. Two distinct groups can be identified based on the authors' names. The first group includes Restrepo S, Archila PA, Danies G, and Truscott de Mejia. The second group consists of Pham H-H, Dong T-k-t, Vuong Q-H, and Ho M-T. However, it has been observed that the first group consisted of individuals from various institutions inside a single university, whereas the second group was comprised of participants from three universities spanning two different countries. Moreover, most links were primarily pairwise connections. Examples of these pairwise connections include Zhu J and Chen J, Xue E and Li J, Bamberger A, and Yemini M, and Mok KH and Montgomery C. Pinto S engaged in collaboration with both Lourenco M and Araujo e sa MH, however, they did not form a group. To ascertain the most prolific contributors, Table 1 presents the top 10 authors, together with their respective publication counts, institutional affiliations, and countries of origin.

Table 1

Top 10 Most Productive Authors.

Author	Institution	Country	Counts
Li, Jian	Beijing Normal University	China	10
Zhang, Yuting	Zhejiang Normal University	China	8
William Yat Wai Lo	Education University of Hong Kong	China	7
Xue, Eryong	Beijing Normal University	China	7
Ka Ho Mok	Lingnan University, Hong Kong	China	6
Zhang, Mohan	Hangzhou Normal University	China	6
Annette Bamberger	The Hebrew University of Jerusalem	Israel	6
Kyria Rebeca Finardi	The Federal University of Espírito Santo	Brazil	6
Heath Rose	The University of Oxford	The United Kindom	5
Jin Liu	Beijing Institute of Technology	China	5

Table 1 reveals an intriguing observation that 7 of the top 10 most prolific writers are from China. This suggests that China is a major nation that prioritizes internationalization research. The IoHE has achieved an unprecedented level of prominence in China's educational landscape since the implementation of the 13th Five-Year Plan. During that period, a set of policies were implemented to promote the internationalization of universities. In a document published in 2017, the State Council of the People's Republic of China identified foreign exchange and cooperation as one of the five key functions of colleges and universities (State Council, 2017). In 2022, MOE et al. (2022) (the Ministry of Education) published a document titled "Implementation Measures to Further Promote the Construction of World-Class Universities and First-class Disciplines (the Double First-Class Initiatives)." This document emphasizes high-level openness and cooperation and improves personnel training's international competitiveness. The "Double First-Class" Initiatives aim to improve internationalization standards and boost competitiveness (Zhou & Shan, 2020). IoHE has garnered significant attention and interest from Chinese academics.

We also performed a citation burst analysis on the writers (red star in Figure 1) to identify those with the greatest influence and potential for future impact. Kleinberg (2002) coined the term "citation burst" to describe a sudden increase in citations to a scholarly publication. This metric allows researchers to investigate prevailing research patterns (Chen, 2006; Wang et al., 2019) and infer future trends (Guo, 2017). The analysis revealed that Mok, KH had a citation burst with a burst strength of 1.88, spanning from 2020 to 2021. A more thorough investigation of Mok, KH revealed six publications in 2020 and 2021. These works were cited 89 times. Hence, academics might explore novel and cutting-edge knowledge from the six articles.

Institution Co-occurrence Analysis

In CiteSpace, the node type was configured as "institution", and a network of institution co-occurrence was formed, as illustrated in Figure 2. A comprehensive analysis revealed that 203 academic institutions researched IoHE, with 106 institutions interconnected. In particular, the University of Oxford, University College London, The Education University of Hong Kong, East China Normal University, and Middle East Technical University had significant

interconnections with other institutions. The University of Oxford, for example, collaborated with seven universities. Table 2 lists the top 10 productive institutions and countries/regions.



Figure 2: Institution Co-occurrence Network.

Institutional citation analysis demonstrated that two institutions, La Trobe University and the University of Luxembourg, exhibited citation bursts from 2019 to 2020 with burst strengths of 2.85 and 2.13 respectively. The items were highlighted with red stars in Figure 2. However, a more thorough examination of these two institutions revealed that each contributed six articles in 2019 and 2020. Before 2023, no citations of the 12 papers were found in the Web of Science Core Collection. Given the limited two-year duration of the bursts and the absence of any publications after 2020, the two institutions may not continue to be the primary entities engaged in IoHE studies in the foreseeable future.

Country/region Co-occurrence Analysis

In CiteSpace, the node type was configured as "Country". Upon execution, a network depicting the co-occurrence of countries was formed, as illustrated in Figure 3. In a similar vein, each node in the network diagram represents a country or region, and the label size indicates the volume of published articles from that country.

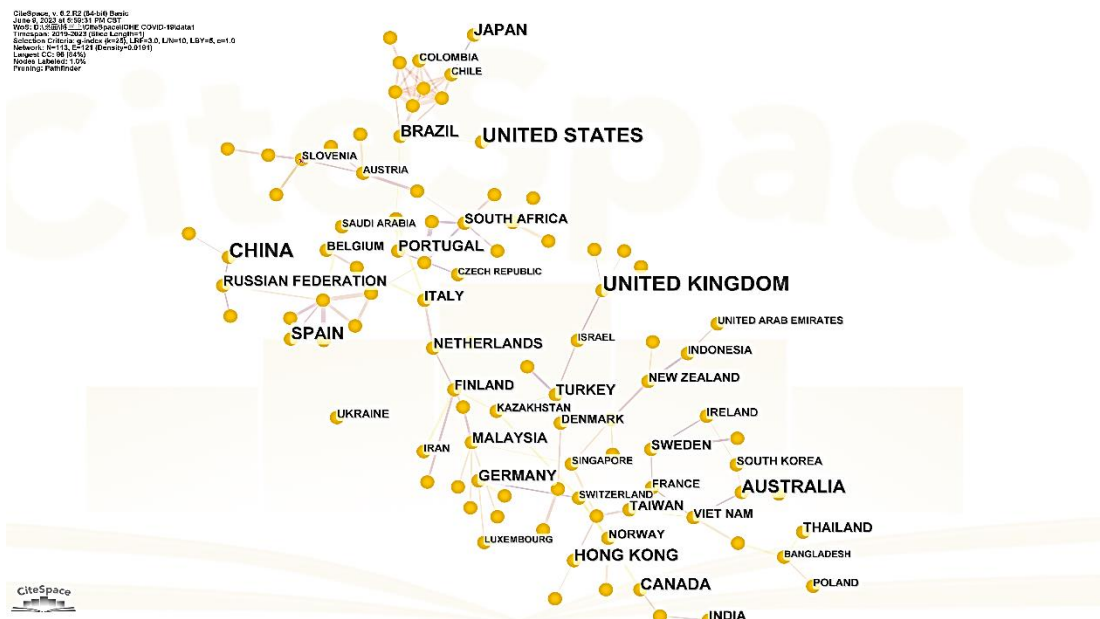


Figure 3: Country/region Co-occurrence Network.

A total of 113 nodes and 121 links were formed in Figure 3. This network represents 113 countries’ studies on IoHE during the pandemic. Despite obstacles, most countries maintained a high level of connectivity. According to Table 2 and the relative magnitude of the labels, the leading three countries/regions are the United Kingdom with 207 articles, mainland China with 180, and the United States with 169. Hong Kong (64) and Taiwan (30) publications were excluded from the tally in mainland China. Consequently, China emerged as the leading contributor with a cumulative total of 274 articles.

Table 2:
Top 10 most productive institutions and countries/regions.

Institution	Count	Country/Region	Count
The Education University of Hong Kong	20	United Kingdom	207
University of Oxford	17	Mainland China	180
Beijing Normal University	15	United States	169
Aarhus University	11	Australia	98
University College London	10	Spain	84
China Institute of Education Policy	10	Hong Kong, China	64
University of British Columbia	9	Canada	61
Deakin University	9	Japan	56
University of Bath	9	Brazil	53
Zhejiang University	9	Germany	44

Additionally, the burstiness of various countries/regions was conducted. Slovenia alone showed a citation burst from 2019 to 2022, with a burst strength of 1.97. Slovenia made a total contribution of 14 articles from 2019 to 2023. Specifically, six articles were published in 2019, five in 2020, two in 2022, and one in 2023 up till May. Nevertheless, considering the ending of the burst in 2020 and the limited number of papers published in 2021 and 2022,

Top 15 keywords with high frequency and betweenness centrality.

Keywords	Frequency	Keywords	Betweenness Centrality
internationalization	527	controlled study	0.31
higher education	497	major clinical study	0.30
internationalization of higher education	155	learning	0.27
student	136	hong kong	0.24
student mobility	101	innovation	0.21
China	96	language	0.18
university sector	90	educational development	0.16
globalization	86	Germany	0.16
education	65	content analysis	0.15
policy	59	perception	0.15
humans	55	motivation	0.14
english medium instruction	51	Spain	0.13
article	40	equity	0.12
study abroad	38	e-learning	0.12
human experiment	34	education policy	0.12

Based on the findings presented in Table 3, it is observed that studies on IoHE during and after the epidemic period encompass a wide range of topics. These areas of focus include policy, English medium instruction, study abroad, educational development, and e-learning. The COVID-19 pandemic has emerged as the most significant public health disaster since the Second World War, precipitating a global crisis of unprecedented magnitude. COVID-19 has disrupted student and staff movement in the education sector. In response to this challenge, several governments have developed various strategies. Many students, particularly those who were unable to travel due to international travel restrictions, had to take online courses. Online distance education has expanded and digitized open university models (De Wit & Altbach, 2021). Students faced pedagogical challenges, poor connectivity, and temporal disparities. Furthermore, without direct teacher guidance, students struggle to solve problems quickly, increasing their workload. Hence, it is observed that papers within the preceding four-year period often contain pertinent terms. Many IoHE topics have been discussed using these keywords. Qualitative studies of high-centrality nodes are needed to understand these discussions and predict IoHE trends.

Top 7 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2019 - 2023
internationality	2019	3.7	2019	2020	
male	2019	3.09	2019	2020	
psychology	2019	2.73	2019	2020	
female	2019	2.21	2019	2020	
mobility of students and academic staff	2019	2.12	2019	2020	
questionnaire	2020	2.17	2020	2021	
world class university	2021	2.36	2021	2023	

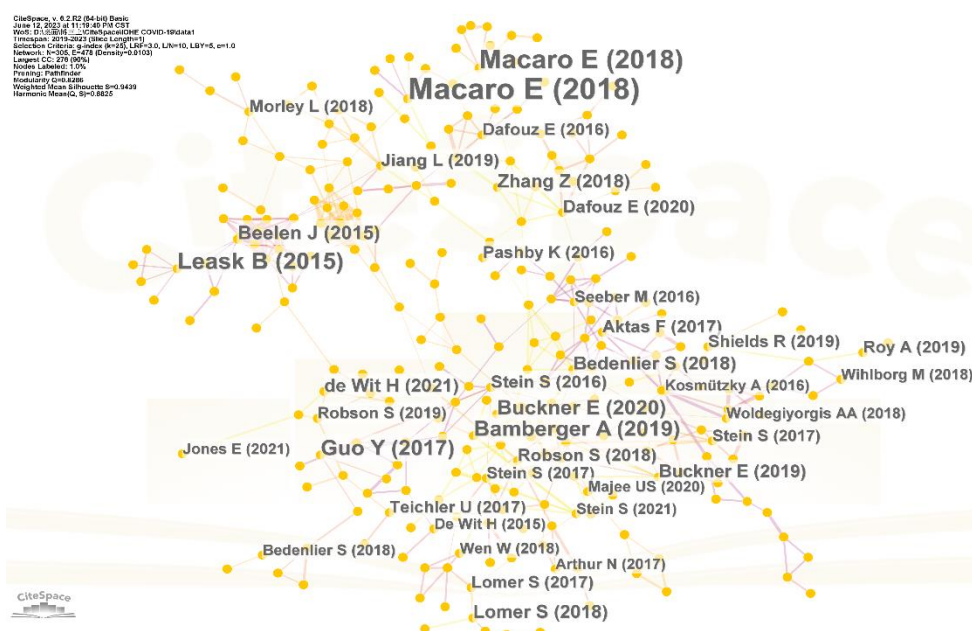
Figure 5: Keywords with Citation Bursts.

According to Figure 5, 7 keywords had the most pronounced citation bursts. The categories include internationality, male, psychology, female, mobility of students and academic staff, questionnaire, and world-class university. Five were measured from 2019 to 2020. The questionnaire category's burst strength was measured from 2020 to 2021, while the world-class university category's from 2021 to 2023. The presence of these keywords accompanied by citation bursts serves to highlight the significant subjects and ideas of IoHE. However, out of these keywords, only the term 'world-class university' remains active in a burst, while the other six keywords faded in 2020 and 2021. Henceforth, future IoHE research may focus on world-class universities rather than internationality, psychology, and mobility. Possible areas of discussion could include the conceptual framework, the assessment mechanisms, and the methodologies of renowned global universities, among other related subjects.

Co-citations Analysis

Document Co-citation Analysis

Figure 6 illustrates the network of document co-citation, the size of the label assigned to each document corresponds to the frequency of co-citations with the node article. Table 4 presents the ten most cited references and Table 5 lists the ten references with the highest betweenness centrality.

**Figure 6:** Document Co-citation Network.

According to Figure 6 and Table 4, the individual with the highest number of citations for both an article and a book is Macaro E, a distinguished scholar in the field of applied linguistics affiliated with the University of Oxford. The subject matter of both the article and the book pertained to English medium instruction (EMI). (Macaro et al., 2018) conducted a comprehensive systematic review of research on English Medium Instruction (EMI) across various geographical regions. The author's findings suggest that universities should attract international students, improve English language proficiency, offer domestic students study abroad programs, and emphasize international English. Given that the IoHE encompasses various facets such as curricular content, student and faculty mobility, technology, and

programs, there is a pressing demand for the examination of English as a Medium of Instruction (EMI) (Zhang, 2018). Furthermore, IoHE faces new challenges due to the COVID-19 pandemic. In response, numerous researchers have undertaken research on internationalization at home from various perspectives. Particularly, international curriculum and English as a medium of instruction have been the main research topics. Thus, language instruction and curriculum development were the top three references.

In addition to language education and curriculum, IoHE research covered policies, contents, problems, and other areas. Guo Y examined how international undergraduate students perceive and experience institutional internationalization policies. According to Guo and Guo (2017), students had different views of internationalization and saw it as a way to improve their academic and personal development. Furthermore, Guo Y also identified obstacles that hindered the process of internationalization, such as a lack of comprehensive foreign curriculum and discrepancies between internationalization policies and students' experiences.

Table 4
Top 10 Most Cited References.

Citation count	Reference	Title	Source
58	Macaro (2018)	E A systematic review of English medium instruction in higher education	<i>Language Teaching</i>

34	Macaro (2018)	E	English medium instruction	Oxford University Press
22	Leask B (2015)		Internationalizing the curriculum	London: Routledge
17	Bamberger (2019)	A	Neoliberalism, internationalization, and higher education: Connections, contradictions, and alternatives	<i>Discourse: Studies in the cultural politics of education</i>
16	Guo Y (2017)		Internationalization of Canadian higher education: Discrepancies between policies and international student experiences	<i>Studies in Higher Education</i>
14	Buckner (2020)	E	What counts as internationalization? Deconstructing the internationalization imperative	<i>Journal of Studies in International Education</i>
12	Beelen (2015)	J	Redefining internationalization at home	<i>The European higher education area: Between critical reflections and future policies</i>
11	Bedenlier (2018)	S	Two decades of research into the internationalization of higher education: Major themes in the Journal of Studies in International Education (1997-2016)	<i>Journal of Studies in International Education</i>
11	Zhang Z (2018)		English-medium instruction policies in China: Internationalisation of higher education	<i>Journal of Multilingual and Multicultural Development</i>
11	Lomer S (2018)		Constructing a national higher education brand for the UK: Positional competition and promised capitals	<i>Studies in Higher Education</i>

A subset of 15 articles exhibited centrality values over 0.10. These sources were essential to the intellectual foundation over the past four years. Table 4 and Table 5 identified four articles (Macaro, 2018; Guo Y, 2017; Bedenlier, 2018; Zhang, 2018) with high citation counts and significant betweenness centrality values. These findings suggest that these articles hold a central position within the field and merit further investigation to uncover crucial insights. Additionally, document co-citation showed that the first article appeared in 2014. These foundational papers are still cited, so they deserve recognition.

Table 5
Top 10 References with High Betweenness Centrality.

Between ness centrality	Reference	Title	Source
0.42	Macaro (2018)	E A systematic review of English medium instruction in higher education	<i>Language Teaching</i>
0.31	Aktas (2017)	F Institutionalizing Global Citizenship: A critical analysis of higher education programs and curricula	<i>Journal of Studies in International Education</i>
0.26	Bedenlier (2018)	S Two decades of research into the internationalization of higher education: Major themes in the Journal of Studies in International Education (1997-2016)	<i>Journal of Studies in International Education</i>
0.22	Guo Y (2017)	S Internationalization of Canadian higher education: Discrepancies between policies and international student experiences	<i>Studies in Higher Education</i>
0.18	Dafouz (2020)	E ROAD-MAPPING English medium education in an internationalized university	Springer International Publishing
0.17	Zhang (2018)	Z English-medium instruction policies in China: Internationalisation of higher education	<i>Journal of Multilingual and Multicultural Development</i>
0.16	Chankseliani M (2018)	S Four rationales of HE internationalization: Perspectives of UK universities on attracting students from former Soviet countries	<i>Journal of studies in international education</i>
0.15	Stein (2021)	S Critical internationalization studies at an impasse: Making space for complexity, uncertainty, and complicity in a time of global challenges	<i>Studies in Higher Education</i>
0.14	Egron-Polak E (2014)	S Internationalization of higher education: Converging or diverging trends?	<i>International Higher Education</i>
0.13	Seeber (2016)	M Why do higher education institutions internationalize? An investigation of the multilevel determinants of	<i>Higher Education</i>

internationalization
rationales

Five documents experienced citation bursts from 2019 to 2020. These documents include Leask B (2015) with a burst strength of 7.86, Beelen (2015) with 4.23, Seeber (2016) with 2.45, De Wit (2015) with 2.1, and Kosmützky (2016) with 1.91, which occurred between 2020 and 2021. The publication "Internationalizing the Curriculum" authored by Leask (2015) garnered the most significant citation burst of 7.86, surpassing other articles by a considerable margin. This suggests that in response to the COVID-19 pandemic, several research projects examined curriculum integration to meet internationalization needs. Consequently, online instruction emerged as a prevailing pedagogical approach in numerous higher education institutions.

Author Co-citation Analysis

In CiteSpace, the node type was configured as a cited author, and thereafter, the author co-citation network was established (refer to Figure 7). The network not only presents the writers with high citation counts and identifies significant scholars in the field of IoHE, but also aids in comprehending the disciplinary fields of the authors' study topics. According to the findings, Knight et al. emerged as the five most influential authors. Table 6 details the 10 authors with over 100 citations in the last four years. The discourse on internationalization encompassed various aspects like the definition, conceptual framework, underlying reasons, rationales, diverse methodologies, encountered challenges, constituent elements, and strategic considerations. Knight, made significant contributions to the understanding of internationalization, specifically in terms of its definition, motivations, methodologies, and rationales (Altbach & Knight, 2007; Knight, 2004). Her research has laid the groundwork for subsequent scholars, and her concept of internationalization is still widely used today. Furthermore, Knight J has established a strong collaborative relationship with Altbach PG and De Wit H. The citations of the three scholars have demonstrated their significant contributions to this discipline. De Wit and Altbach (2021) emphasized the significance of considering qualitative components of internationalization. Future scholars should conduct in-depth content analysis of articles from these scholars.

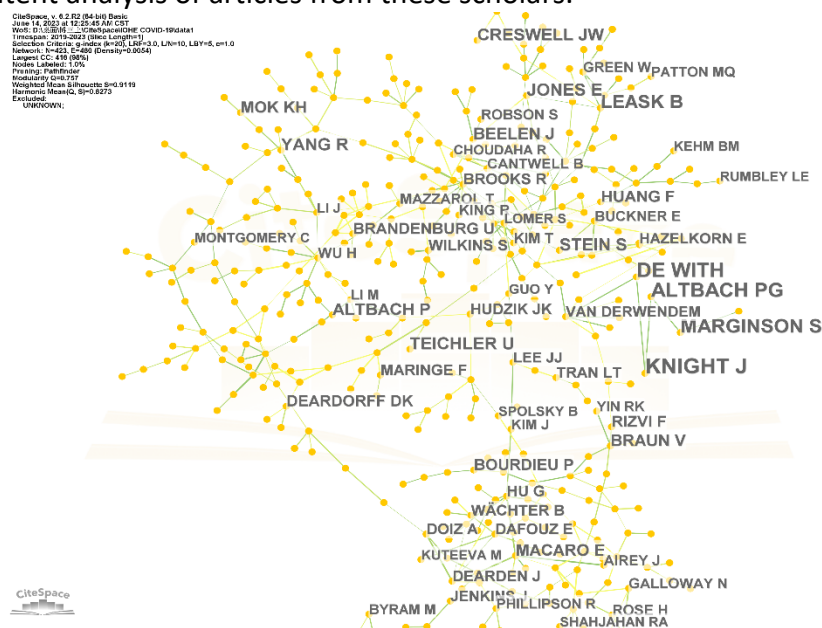


Figure 7: Author Co-citation Network.

Based on betweenness centrality, 57 writers held key positions in the co-citation network, indicating their influence and close relationships with other authors. Lomer (2018) exhibited the greatest betweenness centrality value of 0.89, having been cited 38 times over four years. The researcher focuses on international students, mobility and policies, and international student regulations (Lomer & Mittelmeier, 2021). Lee JJ ranked second with 0.47 betweenness centralities and 53 times quotations. The researcher focuses on international students, globalization, and international strategies, as highlighted by Calikoglu et al. (2022). The third individual, Guo et al. (2022) possesses a betweenness centrality value of 0.46 and 41 times of quotations in the last four years. She possesses expertise in various aspects of internationalization, including teacher education, student study abroad, policies, students' language usage, and student mobility (Guo et al., 2022). Thus, all their research areas predict loHE trends. Future research may focus on international students, policymaking, and language in internationalization.

Table 6:

Top 10 most cited authors.

Cited authors	Cited counts
Knight	472
Altbach	372
De Wit	330
Marginson	225
Leask	178
Teichler	124
Yang	113
Jones	113
Stein	113
Creswell	107

The analysis of citation patterns among cited authors identified 44 academics who received the highest number of citations. Berry JW and Turner Y followed with 4.72 burst strengths over the same period. Arkoudis et al. (2019–2020) examined all 4.36 burst strengths. The number of authors cited with citation bursts suggests that loHE studies have generated many novel and compelling themes that have caught scholars' attention during epidemics. Hence, it is imperative to undertake a qualitative study on these experts to uncover potential insights underlying their work. Furthermore, 10 of the 44 scholars remain active in the field. The individuals mentioned in the text with their burst strengths are as follows: Bedenlier (3.13), Paige (2.86), Oleksiyenko (2.6), OECD (2.47), Kim (2.34), Jackson (2.21), Harvey (2.08), Song (1.95), Zapp and Singh (1.82). Hence, it is plausible that the scholarly works authored by these individuals will continue to be highly relevant and widely discussed in the future. The multinational organization OECD has prioritized internationalization as a key focus of its reform strategy. Members of the Organization for Economic Cooperation and Development (OECD) have engaged in extensive collaborative efforts with other institutions, scholars, and organizations. Hence, the OECD will remain a prominent institution for international research.

Journal Co-citation Analysis

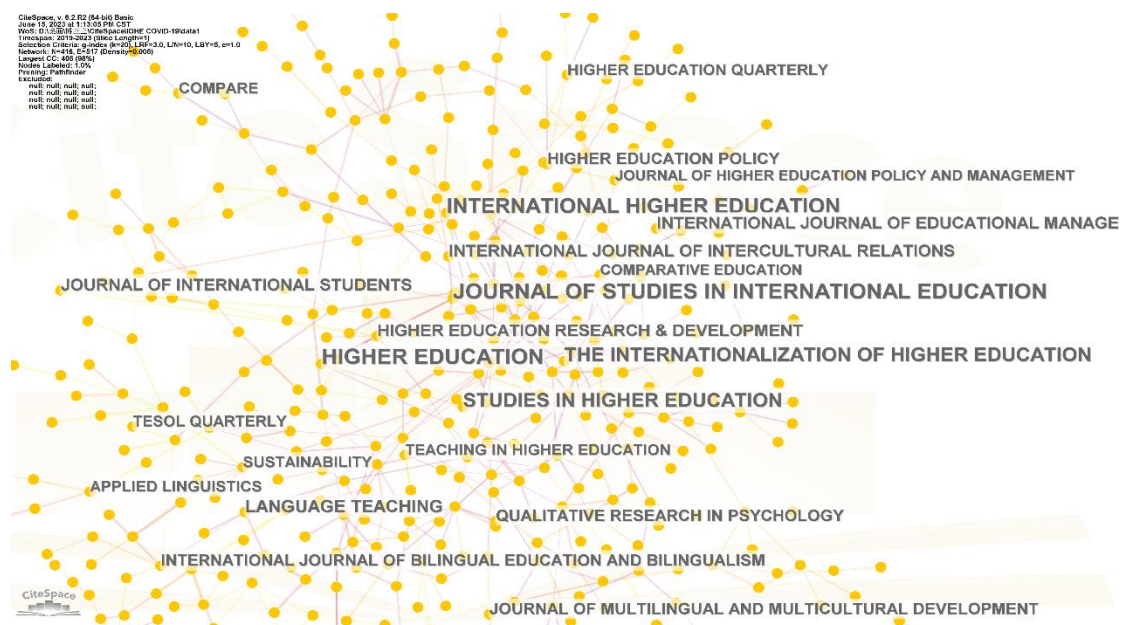


Figure 8: Journal Co-citation Network.

Co-citation analysis (Figure 8) showed that most articles were published in higher education journals like International Higher Education and the Journal of Studies in Higher Education. Additionally, a portion of the articles were published in TESOL Quarterly, Applied Linguistics, Language Teaching, and Qualitative Research in Psychology. The distribution of publications suggests a diverse range of internationalization research areas. Table 7 lists the top 10 journals with the most citations over the past four years.

Table 7:
Top 10 most cited journals.

Cited journals	Cited counts
<i>Journal of Studies in International Education</i>	355
<i>Higher Education</i>	332
<i>International Higher Education</i>	255
<i>Studies in Higher Education</i>	191
<i>Language Teaching</i>	108
<i>Higher Education Research & Development</i>	87
<i>Journal of International Studies</i>	86
<i>International Journal of Intercultural Relations</i>	85
<i>International Journal of Educational Management</i>	77
<i>Qualitative Research in Psychology</i>	72

Table 7 shows that the first five journals have citation frequencies above 100, signifying their substantial impact within the respective discipline. The betweenness centrality values for Language Teaching, Higher Education Research and Development, and the International Journal of Intercultural Relations were found to be 0.10, 0.20, and 0.10, respectively. These values indicate that these three journals have had significant network influence. In addition to the journals, it is worth noting that the Journal of Higher Educational Policy and Management, Journal of College Student Development, and International Journal of Bilingual Education and Bilingualism exhibit notable centrality and citation frequency. These journals collectively served as essential entities inside the network and can be considered as leading publications in internationalization. Conversely, scholarly articles published in these publications can be considered significant sources for IoHE research.

Cluster Analysis

Document Co-citation Cluster Analysis

A total of fourteen document co-citation clusters were constructed utilizing the LLR technique, as depicted in Figure 9. The modularity Q value is 0.757, while the total mean silhouette S value is 0.9119, suggesting a highly favorable clustering network. Additionally, Table 8 indicates that the silhouette values S for all clusters fell within the range of 0.783 to 1, suggesting high cluster homogeneity. The mean year indicates the average year that these clusters formed. International branch campuses first appeared in 2015. This signifies the initiation of discourse and research about international branch campuses. Nevertheless, the magnitude of this cluster is merely 8, indicating its small size. Nevertheless, despite its establishment in 2015, this cluster continues to be observed in the present analysis, suggesting its ongoing engagement in internationalization. This discussion will mostly focus on the three major clusters.

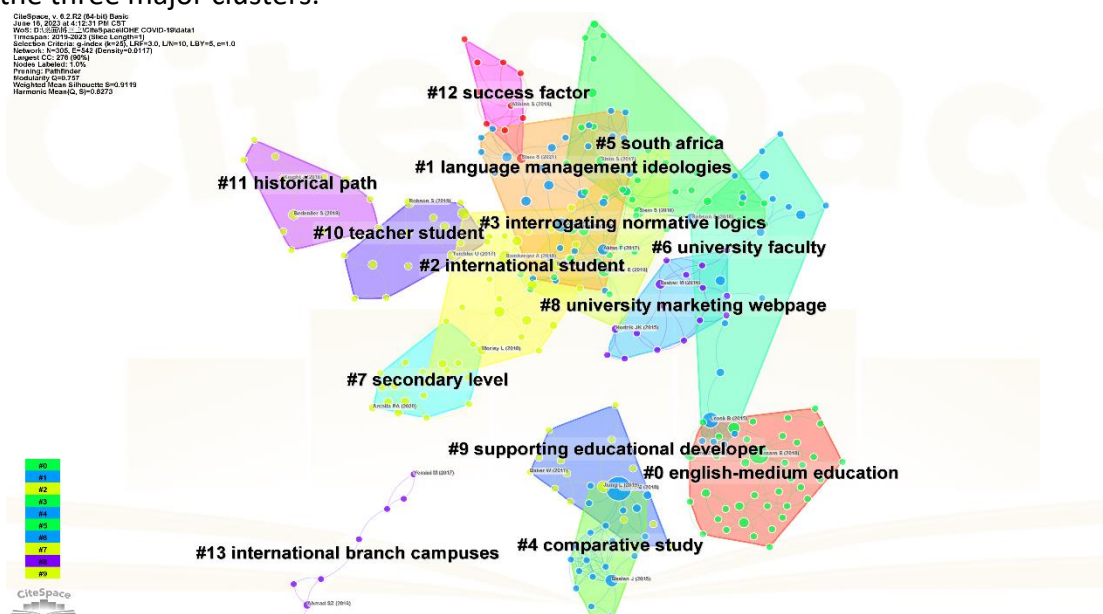


Figure 9: Document Co-citation Cluster Network.

Table 8 shows that Cluster #0 exhibits the highest number of documents, totaling 38. The label given to this cluster indicates that English-medium education was widely discussed around 2018. The primary cited piece within this cluster is Dafouz's (2021) work titled

"Crossing disciplinary boundaries: English-medium Education (EME) Meets English for Specific Purposes (ESP)." In this study, the author posits that EME is commonly associated with the expanding global phenomenon of internationalized education. English for Multilingual Education (EME) lecturers are usually well-versed in their fields and fluent in English. Additionally, they often have foreign academic backgrounds, contributing to their expertise in teaching EME courses. The author stated that EME helped instructors develop language awareness to meet their linguistic goals for all students, especially international exchange students. The cluster under consideration exhibited a notable prevalence of citations to scholarly works authored by Zhang (2018) and Macaro (2018). Beelen and De Wit (2012) claimed that English-medium instruction is closely associated with several aspects of IoHE including enhancing employment prospects, facilitating international mobility, and fostering the acquisition of international competencies.

Cluster #1 is the second largest, comprising a total of 29 texts. It is characterized by its focus on language management and ideas. Within this cluster, researchers have engaged in discussion topics such as language issues (Araújo e Sá & Pinto, 2020), global citizenship programs (Aktas et al., 2017), sustainable development (Shields, 2019), and national identity and policy (Hsieh, 2020). Globalization and internationalization have highlighted language-related challenges in higher education institutions (Araújo e Sá & Pinto, 2020). The emergence of the notion of "global citizenship" has prompted a surge in diverse interdisciplinary approaches toward the implementation of "global citizenship" initiatives. Universities can incorporate service learning, international internships, study abroad, and volunteer experiences into their global citizenship programs (Aktas et al., 2017). Shields (2019) examined the environmental impacts of international student mobility in higher education. The findings indicate that while international interaction is growing, a comprehensive examination of higher education's role in sustainable development must consider the advantages and disadvantages of international mobility, particularly its environmental impact. This emerging dimension links environmental expenses to internationalization, which may become a hot topic post-COVID-19 due to increased international student mobility.

Cluster #2 comprises a total of 27 papers with international students as the label. Scholarly works include Jiang et al. (2020) and De Wit and Altbach (2021). The above research focuses on student mobility, contentment, and problems (Singh & Kaur, 2023). The primary constituents of the IoHE are students, with a particular emphasis on international students. Thus, there is a large body of research on international students covering many topics. However, there is a predominant focus on the examination of student movement and the associated issues during and post the COVID-19 pandemic. Based on the data provided by the OECD (2019), the number of students engaged in international education is estimated to be approximately five million in 2019, and a minimum of eight million is expected during the next ten years. The various forms of student mobility encompass degree mobility, credit mobility, and certificate mobility (De Wit & Altbach, 2021). Overseas student competition is increasing and has become a more globalized and fiercely competitive sector.

Table 8

Document co-citation cluster information.

Clust er-ID	Siz e	Silhou ette	Cluster labe r (LLR)	Mea n year	Representative documents
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#0	38	0.9	English-medium education	2018	Dafouz E (2021); Zhang Z (2018)
#1	29	0.783	Language management ideologies	2017	Guo Y (2017)
#2	27	0.904	International student	2018	Bamberger A (2019)
#3	26	0.862	Interrogating normative logics	2018	Buckner E (2020)
#4	22	0.949	Comparative study	2016	Macaro E (2018); Beelen J (2015)
#5	22	0.945	South Africa	2016	Stein S (2016; 2017)
#6	21	0.981	University faculty	2016	Leask B (2015)
#7	17	0.935	Secondary level	2019	Morley L (2018); Archila PA (2020)
#8	16	0.929	University marketing webpage	2015	Seeber M (2016)
#9	15	0.907	Supporting educational developer	2018	Jiang L (2019)
#10	13	0.919	Teacher student	2018	Teichler U (2017)
#11	12	0.973	Historical path	2018	Bedenlier S (2018); Knight J (2018)
#12	10	0.972	Success factor	2019	Stein S (2021)
#13	8	1	International branch campuses	2015	Ahmad SZ (2016)

Conclusions

Internationalization in higher education is gaining global recognition and debate. This study uses scientometric methods like co-occurrence, co-citation, and cluster analysis to visualize 1568 bibliographic data. The methods helped understand IoHE's current state and trends. Author co-occurrence indicated that Li Jian, Zhang Yuting, and William Yat Wai Lo were the most productive and influential lead authors. Pandemics hampered research collaboration over the past four years. Nevertheless, despite the challenges, two distinct groups cooperated well. The first group included Restrepo S, Archila PA, Danies G, and Truscott de Mejia. The second group consisted of Pham H-H, Dong T-k-t, Vuong Q-H, and Ho M-T. A notable observation is that 70% of the top ten most productive academics have affiliations with institutions based in China. This finding underscores China's significant contribution to IoHE research. However, only Mok KH experienced a significant increase in citations during a condensed timeframe. However, scholars have extensively referenced his achievements. Thus, his articles should be examined more thoroughly.

Regarding the distribution of institutions, the investigation revealed that the Education University of Hong Kong, the University of Oxford, and Beijing Normal University contributed the most. Additionally, these institutions, along with East China Normal University and Middle East Technical University, were highly interconnected. La Trobe University and the University of Luxembourg have experienced significant citation bursts. However, this study also posits that these institutions may not emerge as the primary centers of IoHE research in the future. The analysis of nation/region co-occurrence revealed that China, the United Kingdom, and

the United States emerged as the primary locations for studying IoHE. Slovenia exhibited a citation burst, but it may not become a leading country in the future for IoHE research.

The keyword co-occurrence analysis revealed that the research on IoHE encompassed a broad range of topics and fields including policy, English medium instruction, study abroad, educational development, e-learning, mobility of students and academic staff, and the goal of becoming a world-class institution. These keywords have been widely discussed and have played significant roles in shaping the discourse surrounding IoHE. It is recommended that a subsequent qualitative investigation be conducted on the keywords. Additionally, this study posits that forthcoming research endeavors may center on topics such as internationality, psychology, mobility, and world-class colleges. Possible areas of discussion could include the conceptual framework, the assessment mechanisms, and the methodologies employed by globally renowned universities.

The results of the co-citation analysis indicated that the works of Macaro E (2018), Bamberger A (2019), Guo Y (2017), and others were the most frequently cited papers. Furthermore, the publications authored by Macaro (2018) and Leask (2015) exhibited the highest co-citation frequency within the last four years. In this field, it is noteworthy that certain documents, Aktas (2017), Bedenlier S (2018), Macaro (2018), and Guo (2017), have demonstrated a significant network betweenness centrality. This observation suggests that these documents hold pivotal positions and play crucial roles in the area under consideration. Five more documents - Leask (2015), Beelen (2015), Seeber (2016), De Wit (2015), and Kosmützky (2016) - were subjected to high citation bursts. These documents constituted the foundational knowledge for research on the IoHE. A thorough examination of these documents may aid scholars in comprehending the topic.

Prominent academics, including Knight, De Wit, Altbach., Marginson, and Leask, have received significant citation counts in their respective fields. The subjects about internationalization encompassed the definition, concept, reasons, rationales, approaches, obstacles, elements, and tactics, among others. A thorough content analysis of these scholars' articles is advised. Over the past four years, 44 academics had citation bursts, and 10 are currently experiencing them in this subject. Hence, these studies would emerge as prominent subjects of interest in the future. The OECD has demonstrated active involvement in the field of education. Consequently, this organization is expected to be actively engaged in IoHE research in the coming years. Journals like the Journal of Studies in International Education, Higher Education, International Higher Education, and Studies in Higher Education have disseminated noteworthy discoveries in IoHE study.

The application of document co-citation cluster analysis yielded a total of 14 clusters. These clusters reveal significant emerging trends and hot topics within the field of IoHE. Notable themes include English-medium education, international students, comparative studies, international branch campuses, mobility, university faculty, and success factors. The analysis of the chosen study clusters indicates that investigations on the IoHE during and post the COVID-19 pandemic mostly concentrate on the utilization of English as a medium of instruction, educational policies, student and staff mobility, sustainable development, and student challenges. Internationalization has been linked to a new dimension of environmental costs, which is expected to become a major research area in the coming years.

Limitations

Despite the identification of some results, this study exhibits certain limitations. This study only included research from 2019 to May 2023, excluding previous studies that could affect

its findings. Furthermore, this study did not incorporate books, book chapters, conference papers, and other scholarly publications. Consequently, the perspectives presented in these sources were not analyzed. Furthermore, this study exclusively focused on articles written in English and Chinese, excluding publications in other languages. Hence, the findings of this study may not be fully representative of all the documents that were published over the specified period. Additionally, this study exclusively utilized sources obtained from Web of Science and Scopus databases, thereby excluding documents from other databases. Furthermore, CiteSpace required Scopus data to be converted to Web of Science format. Regrettably, this transformation process resulted in the omission of certain data, thereby rendering the conclusions drawn from this study incomplete.

Suggestions For Future Studies

In addition to the limitations, future research in IoHE may encompass various areas of investigation, such as student and staff mobility patterns, the exploration of different forms of mobility, education policies, international branch campuses, the evaluation of English medium instruction, and online e-learning platform explorations.

International branch campuses have had a significant growth in their prevalence during and during the global pandemic, making them a crucial approach in the field of internationalization at home (IaH). Currently, there is a significant increase in the establishment of overseas branch campuses. The persistence of this trend in the future necessitates a heightened emphasis on international branch campuses.

Currently, the primary factor in achieving internationalization is the recognition and implementation of cross-cultural communication. Prior IoHE research has focused on physical mobility performance and accomplishments, neglecting its main goal. Future research should prioritize the investigation of strategies that universities might employ to enhance the provision of cross-cultural experiences for students, so facilitating their comprehension of the significance of cross-cultural communication.

According to Marginson (2020), despite the waning effects of the epidemic, the international mobility of higher education will require at least five years before it reaches the levels observed in 2019. The majority of colleges have transitioned back to in-person instruction, although a subset continue to offer online courses. Hence, the online education model and quality must be assessed in the future. Academics must devise strategies to enhance the education system to foster improved cross-cultural communication. However, it is unlikely that online education will emerge as the prevailing paradigm of education in the future.

Current research on IoHE predominantly centers around industrialized countries with a primary focus on English-speaking nations. This emphasis on English as the dominant language for academic communication, teaching, publication, and research highlights the limited extent of IoHE's reach. Hence, future research endeavors must incorporate the variable of cultural variety into their efforts to further the sustainable growth of internationalization.

Furthermore, it is recommended that future research endeavors place greater emphasis on investigating the concept of IaH. It is imperative to prioritize the enhancement of teaching quality and intercultural competence to effectively recruit a larger number of international students and personnel. Future studies may benefit from conducting qualitative research and text analysis on key documents about the IoHE. Enhancing collaboration among scholars, institutions, and various other facets is vital.

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