

Original Paper

A Bibliometric Analysis on Content and Language Integrated Learning (CLIL) via VOSviewer and CiteSpace

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Abstract

Drawing on Content and Language Integrated Learning (CLIL), this review aimed to clarify the research status and identify the research hotspots in this field using bibliometric software. Two hundred eighty-seven journal articles from the SSCI and SCI databases in WoS were imported into VOSviewer and CiteSpace to examine the number, period, authors, journals, organizations, and keywords, in order to achieve the above goals. The major findings demonstrated that, from 2009 to 2023, CLIL remained a primary phase of progress, with relatively few authors, organizations, and their collaborations on this topic. Keywords with high occurrences showed a focus on themes such as teaching effectiveness and the classroom, contributing to the discovery of research hotspots. Implications may include potential suggestions, such as focusing on the effects of early education, emphasizing learner individual characteristics about the application of CLIL, innovating new methodologies suitable for this field, and drawing contrasts between CLIL and other teaching methods.

Keywords

clil, bibliometric analysis, teaching methods

1. Introduction

1.1 Research Background

Traditional language teaching tends to treat language as an independent subject, while subject teaching stands alone from language teaching. In other words, this teaching mode of separating content and language fails to exploit adequately the potential complementary relationship between the two. As globalization continues, the demand for both mother tongues and foreign languages is increasing, making the integration of language education and subject education a necessity in the current educational environment. Under such circumstances, Content and Language Integrated Learning (CLIL) was created by Dr. David Marsh in 1994. It was developed as a pedagogical approach that emphasizes

both language and content, aiming to facilitate students' acquisition of subject knowledge and improve their language skills in a second-language environment. As a result, students are better equipped for future careers and the challenges of global competition. As the CLIL model spreads across Europe and beyond, research on language acquisition, subject learning, and pedagogical approaches is gaining increasing attention.

However, there is a natural disconnection between traditional language education and subject education, and how to integrate subject knowledge and language skills sufficiently remains a topic of discussion. This approach not only complicates the learning process but also restricts students' ability to communicate across cultures and study across disciplines to a certain extent. Therefore, the promotion of CLIL in education cannot be separated from the further exploration of the organic integration between language and content. By combining content and language, CLIL can reduce learning difficulties, enhance students' ability in intercultural communication, interdisciplinary research, and problem-solving, thereby laying a good foundation for their future academic and professional plans.

1.2 Research Status

In recent years, research on CLIL has demonstrated a rapidly expanding trend. Based on the latest bibliometric visualization data, we obtained information on 287 research articles related to CLIL. These articles cover the implementation of CLIL in various countries and regions, its impact on the development of students' language and subject competence, and its effectiveness in classroom practice. For example, Takam and Fassé (2020) explored the implementation of bilingual education policies in Cameroon, Forey and Cheung (2019) examined the influences of language teaching on subject learning in PE classes, and Olsson (2021) conducted a comparative study of the implementation of CLIL in Swedish upper secondary schools in relation to the development of students' language competence, etc. Agudo's (2019) study found that CLIL instruction can significantly boost students' oral skills compared to traditional English as a Foreign Language (EFL) instruction. These studies serve as essential references for us to understand the practical effects, influencing factors, and development trends of CLIL in depth.

1.3 Research Significance

A systematic review of CLIL research not only summarizes current research outcomes and progress but also guides and informs future research. Firstly, it can help us comprehensively grasp the practice of CLIL in different countries and regions, as well as its impact, by collating the relevant literature. Secondly, we suggest focusing on and directing future research in light of the problems and deficiencies in the existing research, thereby further intensifying the understanding and optimization of the CLIL teaching method and promoting the reform and innovation of language education.

Therefore, this paper aims to thoroughly explore and summarize the research progress of the CLIL teaching method through bibliometric visualization, offering new perspectives and insights for educational practice and research.

2. Research Instruments

The research instruments for this review are VOSviewer and CiteSpace.

VOSviewer is a Java-based literature co-citation network visualization software created in 2009 by van Eck and Waltman of The Centre for Science and Technology Studies (CWTS) at Leiden University, The Netherlands. The version used is VOSviewer 1.6.20. With various types of analysis and units of analysis, the primary function of VOSviewer is to visualize the relationships between multiple documents in a particular field through diverse visualization views. Additionally, the software facilitates data cleaning, filtering by vocabulary, and other functions. After importing the tab-delimited files of these 287 articles into VOSviewer, the software can analyze them based on dimensions such as co-authorship, co-occurrence, and citation, which enables us to sort out these articles more explicitly.

CiteSpace is also a visualization software based on Java, which was jointly developed by Dr. Chaomei Chen of Drexel University and the WISE Lab. It focuses more on the knowledge graph analysis of the literature. In particular, it can trace the past research trajectory of a specific field and cluster keywords reasonably in a more precise manner according to scientometrics and computer science. In this paper, the advanced version of CiteSpace 6.2.R4 is used. After importing the plain text files of 287 papers into this software and performing a series of input and output conversions, we can draw keyword clustering charts and keyword burst term charts to predict the potential future research tendency of a specific topic more rationally.

3. Research Analysis

3.1 Number of Research Articles and Distribution of Years

The data in this paper were obtained from the SCI and SSCI databases in Web of Science. Searching for research articles in “content and language integrated learning”, we got 371 pieces of literature. After eliminating categories other than linguistics, we finally found 287 relevant articles.

According to the trend graph of WoS, these 287 articles were published between 2009 and 2023, with the peak of paper publication occurring in 2020 and the peak of citations in 2021. The core journal articles on this topic emerged from 2009. They maintained a high research heat for an extended period, with the number of both citations and publications displaying a fluctuating but generally upward trend. Until 2020, the heat gradually decreased, but the number of citations and publications remained substantial. The academic research on the topic of CLIL still holds considerable research value and presents opportunities for further development, which require investigation by scholars.

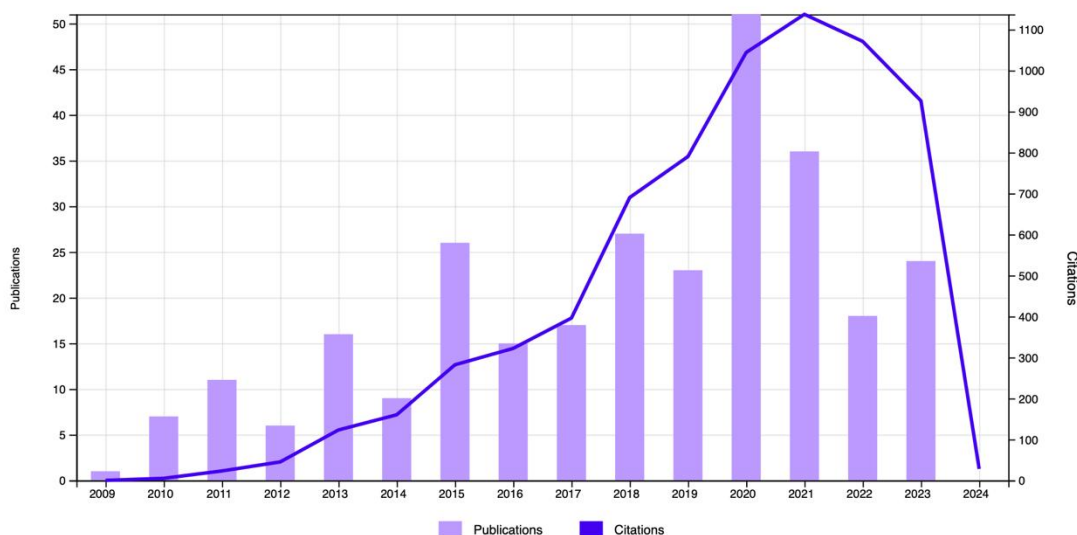


Figure 3.1 Publications and Citations of Journal Articles of CLIL in SSCI & SCI Databases

3.2 Highly-cited Literature and Journals

Citation occurrence refers to the number of times that a research article has been cited after publication, which is often used as an important indicator of the author's scientific research ability and proof of its academic value. Highly cited literature in each field indicates the influence of the literature and the recognition of scholars for their work, and to a certain extent, reflects the research focus. Setting the type of analysis to citation, the unit of analysis to document, and the minimum number of citations per document to 100, the results revealed that 14 papers matched the above conditions. As can be seen from the figure, the publication year spans 2010-2019, which essentially encompasses most stages of the publication years. This also illustrates that CLIL remains a relatively emerging research topic, currently residing in a phase of steady evolution.

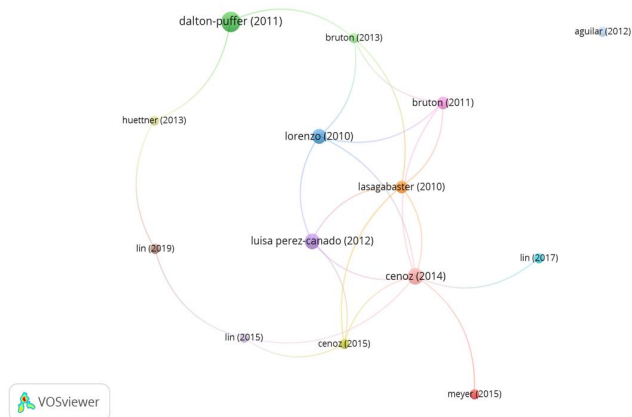


Figure 3.2 Citation-document Map of Highly Cited Journal Articles of CLIL

Moreover, the highly cited literature also demonstrates the academic recognition it has received, which strengthens its authority and guidance, and suggests the academic focus of scholars in the field. Next, we listed all the literature mentioned in the figure, ordered from the highest to the lowest number of citations, in Table 3.1. The topics of these representative literature on CLIL could be categorized into the following four: policy and implementation of CLIL (Literature 1,4,7,10), the comparison with other language teaching approaches (Literature 2,5,6,11), learning outcomes and effectiveness of CLIL (Literature 3,9,12), pedagogical practices and methodologies in CLIL (Literature 8,13,14).

Specifically, the first and second themes accounted for 28.6% each, while the third and fourth themes accounted for 21.4% each. In the first theme, Dalton-Puffer (2011) discussed the concrete policies of CLIL in Europe and how they operated at both the grassroots level of policymaking and higher levels of decision-making. This was of great value because the paper integrated the learning outcomes of CLIL to address the practical applications of CLIL in teaching and learning, as well as the outcomes from different perspectives, such as speech acts and genres. Hüttner et al. (2013) advocated for investigating the implementation of CLIL as a form of extended language policy, encompassing language management, practices, and beliefs. The findings of their interviews were of great importance because all suggested that the construction of CLIL and its success were strongly linked to the beliefs and the relative absence of language management. In the second theme, Cenoz et al (2014) noted the difference between the definition and scope of CLIL and other approaches to language teaching and learning, such as immersion, which was significant in emphasizing that if CLIL was to be systematically built upon and improved, and if CLIL educators were to benefit from other educational environments, we would require a laser-focused call for clarification of the CLIL definition. In the third theme, Bruton (2013) explored the learning outcomes of CLIL in terms of both supporting and negating its effects. This was noteworthy because it identified that the interest in CLIL has shifted people's attention to the flaws of mainstream foreign language teaching in public schools and the difficulties faced by many non-CLIL students. In the fourth theme, Lin (2015) focused on conceptualizing the function of L1 in CLIL and assisting in Content-Based Instruction, with the implication of which lay in breaking with the traditional principles of second language acquisition, suggesting a research proposal for the future of L1 in conjunction with CLIL.

Table 3.1 Authors, Article Titles, and Citations of Highly Cited Journals

Number	Authors	Article Title	Citations
1	Dalton-Puffer, C	Content-and-Language Integrated Learning: From Practice to Principles?	399
2	Cenoz, J et al.	Critical Analysis of CLIL: Taking Stock and Looking Forward	276
3	Pérez-Cañado et	CLIL research in Europe: past, present, and future	242

	al.		
		The Effects of Content and Language Integrated Learning	
4	Lorenzo, F et al.	in European Education: Key Findings from the Andalusian	216
		Bilingual Sections Evaluation Project	
5	Lasagabaster, D et al.	Immersion and CLIL in English: more differences than similarities	160
6	Bruton, A	Is CLIL so beneficial, or just selective? Re-evaluating some of the research	158
7	Hüttner, J et al.	The power of beliefs: lay theories and their influence on the implementation of CLIL programmes	121
8	Lin, AMY	Theories of trans/linguaging and trans-semiotizing: implications for content-based education classrooms	119
9	Bruton, A	CLIL: Some of the reasons why ... and why not	119
10	Aguilar, M et al.	Lecturer and student perceptions on CLIL at a Spanish university	118
11	Cenoz, J	Content-based instruction and content and language integrated learning: the same or different?	115
12	Meyer, O et al.	A pluriliteracies approach to content and language integrated learning - mapping learner progressions in knowledge construction and meaning-making	108
13	Lin, AMY et al.	Translanguaging as Dynamic Activity Flows in CLIL Classrooms	107
14	Lin, AMY	Conceptualising the potential role of L1 in CLIL	105

By importing these 287 core documents into VOSviewer, setting the type of analysis to citation, the unit of analysis to source, and adjusting the minimum number of documents of a source to 10, we obtained that of the 45 sources, 5 met the thresholds, i.e., INTERNATIONAL JOURNAL OF BILINGUAL EDUCATION AND BILINGUALISM (94 times), PORTA LINGUARUM (27 times), LANGUAGE TEACHING RESEARCH (18 times), LANGUAGE CULTURE AND CURRICULUM (14 times), and SYSTEM (13 times). The INTERNATIONAL JOURNAL OF BILINGUAL EDUCATION AND BILINGUALISM contained vastly more literature on CLIL than the other journals. Furthermore, the journal with the highest impact factor was SYSTEM with an impact factor of 6.0.

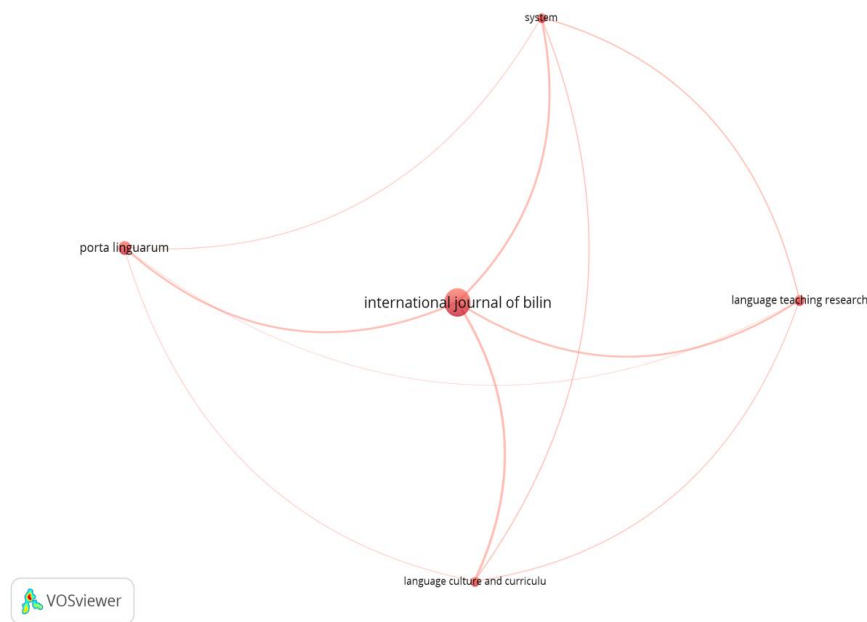


Fig 3.3 Citation-source Map of Highly Cited Journals

3.3 Authors and Organizations

Importing these 287 articles into VOSviewer, setting the type of analysis to co-authorship, and unit of analysis to authors, and adjusting the minimum number of documents per author to 3, 42 authors were found to meet the filtering criteria out of 391 authors. According to the software, these 42 authors formed 28 clusters automatically, of which 9 clusters had two or more authors. The largest cluster consisted of only four people: Luk Van Mensel and Laurence Mettewie from the University of Namur, and Philippe Hiligsmann and Benoit Galand from the Catholic University of Louvain. They investigated, respectively, whether existing CLIL programs in Europe fostered an elitist model of education, hence contradicting the original intent of CLIL, and whether CLIL had a crucial effect on socio-emotional variables such as language attitudes and motivation. These findings were critical because they clarified, respectively, that students' socio-economic status, rather than other personal variables, determined whether they were on the CLIL track (Van Mensel, 2020), and that CLIL activated pupils' motivation more than non-CLIL in the early years. However, the effect was inferior to that demonstrated by the target language (De Smet, 2023). What is ascertainable is that there are still few authors on CLIL and that there is little collaborative output both between the majority of scholars and within the academic communities.

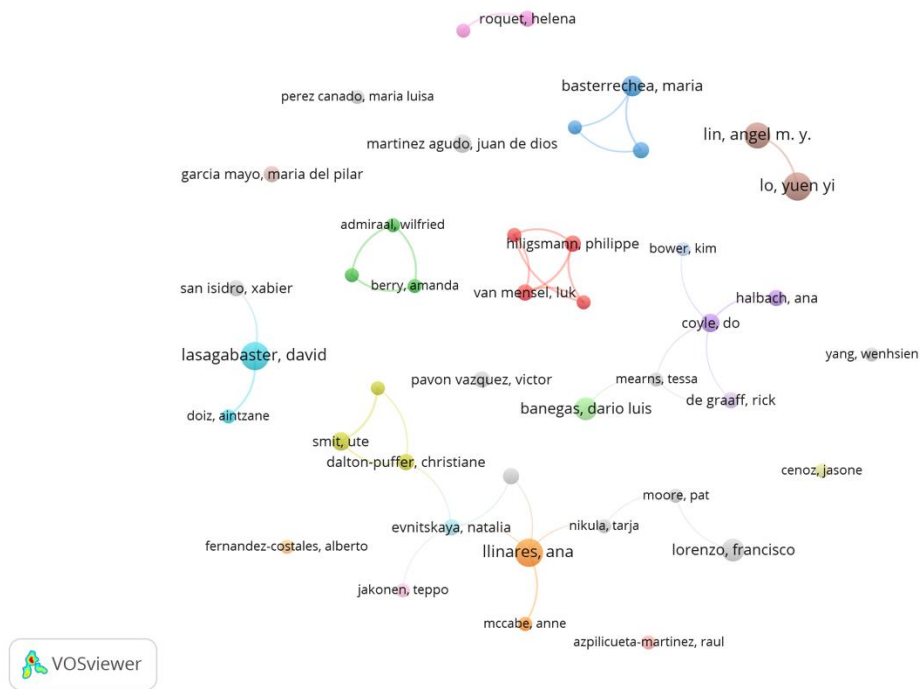


Figure 3.4 Co-authorship-authors Map of CLIL Literature

The leading publishing organizations behind a specific topic, as well as the degree of cooperation between these organizations, fully reflect the number of relevant research topics, the scale of cooperation, and the nature of the cooperation relationship, among others. Setting the type of analysis to co-authorship, the unit of analysis to organizations, and then adjusting the minimum number of documents per organization to 3, we found that of the 200 organizations, 44 met the thresholds. From the figure below, the organizations that published journal articles on the topic of CLIL were mainly European, including the University of the Basque Country, the Autonomous University of Madrid, Leiden University, and the University of Edinburgh. The only Asian institution on the list was the University of Hong Kong. Plus, the figure also illustrated that overall CLIL research was somewhat smaller, with fewer research groups in non-European regions. The institutions involved kept a distance from each other, and the subject matter of each organization was relatively dispersed.

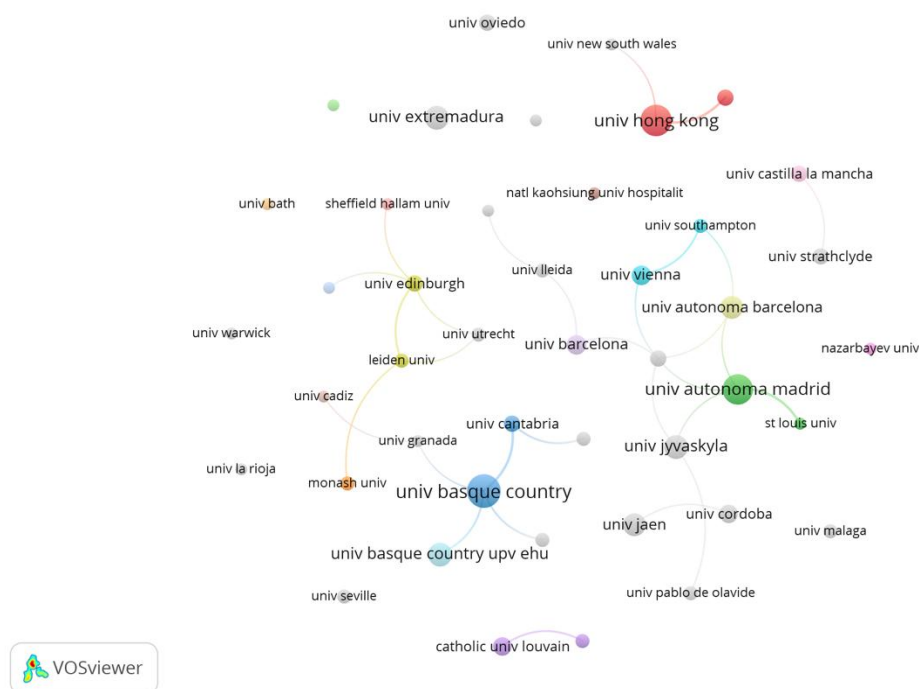


Figure 3.5 Co-authorship-organizations Map of CLIL Literature

3.4 Keywords

The keywords in the literature, as a vital element of academic search engines, can quickly lead the reader to the topic and research scope of the paper, accurately describing its central content. The collation of keyword frequency helps us judge the research focus of the academic topic. Here we selected all keywords in the unit of analysis under co-occurrence in VOSviewer and controlled the minimum number of occurrences of a keyword to 5. Thus, we selected 68 items and 843 links. The top ten occurrences of a keyword are, in descending order, CLIL (158 occurrences) and its cognate expressions such as content and language integrated learning (34 occurrences) and content and language integrated learning (clil) (49 occurrences), integrated learning (clil) (49 occurrences), language (76 occurrences), English (47 occurrences), students (42 occurrences), education (40 occurrences), bilingual education (40 occurrences), and other similar expressions such as content and language integrated learning (34 occurrences) and The table below shows that the following categories are clearly defined: education (40 occurrences), bilingual education (36 occurrences), immersion (30 occurrences), and motivation (29 occurrences). From the table below, the average publication year of these high-frequency keywords was relatively close (generally 2017-2019), implying that these fields were largely evolving in tandem. In addition, from the occurrences, we can also see that no relatively prominent research directions were identified in the keywords other than CLIL. These keywords were roughly centered on the three areas of English or bilingual teaching, students, and the connection between CLIL and other pedagogies (e.g., immersion). The only exception, the 10th keyword,

“motivation”, intuited the linkage between motivation in CLIL pedagogy and second language acquisition, and branched out into a new research direction in CLIL.

Table 3.2 Top 10 Keywords of CLIL Literature

Order	Keywords	Occurrences	Agv. pub. year
1	CLIL	158	2018.69
	content and language		
2	integrated learning	49	2018.18
	(clil)		
3	content and language	34	2019.29
	integrated learning		
4	language	76	2018.82
5	English	47	2019.02
6	students	42	2018.95
7	education	40	2019.15
8	Bilingual education	36	2019.06
9	immersion	30	2017.37
10	motivation	29	2019.07

To further understand the classification of keywords, we performed a cluster analysis of keywords using the log-likelihood ratio (LLR) in CiteSpace, generating a keyword clustering chart with nine clusters. The smaller the number, the more keywords the cluster comprises. The nine clusters, from largest to smallest, are vocabulary size, target language proficiency, bilingual education, individual differences, foreign language, conversation analysis, intercultural competence, content-based instruction, and qualitative. The modularity parameter $Q = 0.7414 (> 0.4)$ and the weighted mean silhouette parameter $S = 0.8993 (> 0.5)$ for these 287 articles indicated that our literature clustering results were evident, reasonable, and credible. Essentially, these clusters can be refined into four parts: students' abilities (clusters 0, 1, 3, 6), teaching effectiveness (clusters 2, 4, 5), CLIL research methodology (cluster 8), and the relationship between CLIL and other pedagogies (cluster 7). Each of these clusters illustrates the general direction of topic selection in existing CLIL research. However, to understand the trends in research topics among the core CLIL journals since 2009 demands the following CiteSpace burst term charts to parse them from a longitudinal perspective.

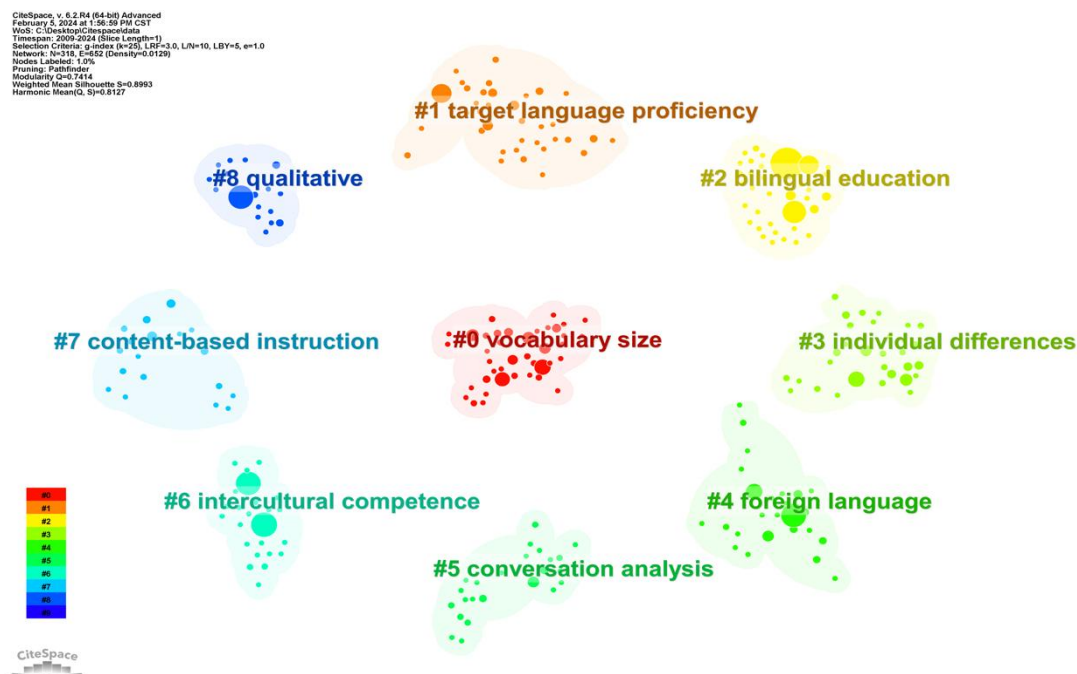


Figure 3.6 Cluster Chart of Literature Keywords According to the LLR Method

3.5 Research Hotspots

To master research hotspots, we should observe the sharp rise in the citation frequency of keywords in a short period from CiteSpace's burst term chart. This graph can help us determine the rise and fall of particular keywords over a specific period, illustrating which research content in the field of CLIL has attracted the intense attention of relevant scholars, as well as its changes and dynamics. As seen in the chart below, the typical research themes related to CLIL emerged from 2009 to 2022, and the field produced new keywords and burst terms smoothly every year. Among the earliest appearing keywords, conversation analysis, classroom, and demands also attracted attention earlier, with a concentration in the period of 2011-2015. They all belonged to the practice of CLIL pedagogy in the classroom. In contrast, classroom interaction, immersion, and education, which appeared in the same year, were later to become burst terms for a brief period respectively in 2014-2015 and 2019-2020, exemplifying the renewal of research on the application of CLIL in the classroom. Additionally, among the terms that have emerged more recently, we could identify the key research themes that have received recent attention for CLIL as literacy, impact, learners, cognitive discourse functions, and primary education, revolving around the role of CLIL for pedagogical practices, especially in early phases and learners' characteristics.

Strength also explicitly revealed that pictures (2.88), beliefs (2.85), and impact (2.81) were the three words with the highest emergent strengths, indicating that they were most likely to be major turning points in the field. The above information organizes the changing trends of CLIL research themes over the past decades. It paves the way for us to try to generalize its research frontiers and feasible future

directions.

Top 25 Keywords with the Strongest Citation Bursts

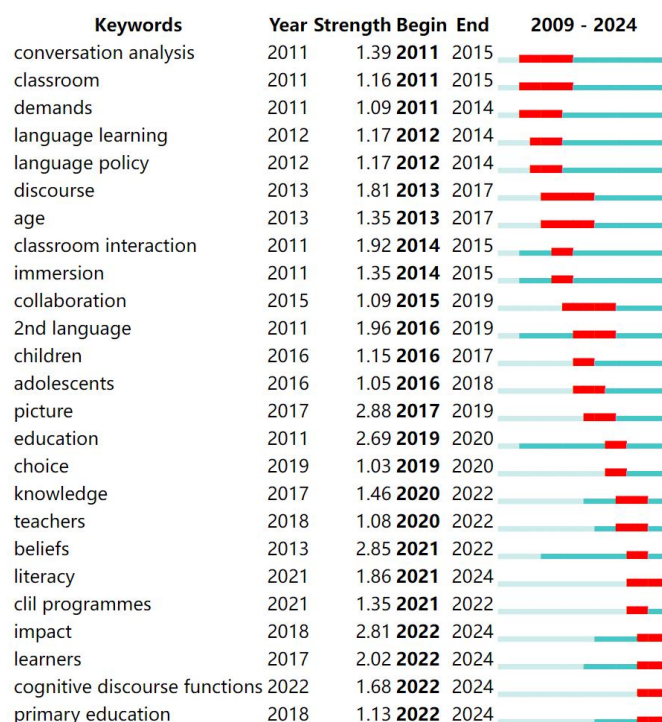


Figure 3.7 The Keyword Emergence in Important Literatures on CLIL

4. Conclusion

4.1 Summary

This review utilizes the Web of Science database as the data source and employs the bibliometric software VOSviewer and CiteSpace to interpret and explore the core journal articles on CLIL in terms of the number of research articles, distribution of years, highly cited literature and journals, authors and organizations, keywords, and research hotspots.

The findings of the review are as follows: (1) There were 287 core literatures on CLIL, published between 2009 and 2023. Among them, the peaks of paper publication and citation were respectively in 2020 and 2021, indicating that there was still plenty of upward space for this topic. (2) Among the most highly cited literature, the themes could be divided into the following four fundamental categories: policy and implementation, comparison with other language teaching approaches, learning outcomes and effectiveness, pedagogical practices, and methodologies. Among the most cited journals, the INTERNATIONAL JOURNAL OF BILINGUAL EDUCATION AND BILINGUALISM gained the top rank, surpassing all the other. (3) The number of authors and organizations working on CLIL was relatively small, and the output of academic cooperation between most authors and most organizations was low as well. The European scholarly circle dominated the output of CLIL. (4) The keywords of

high frequencies displayed no particularly salient research directions other than subject homonyms. These broadly focused on English or bilingual teaching, students, and the association of CLIL with other pedagogies. 9 cluster maps for the keywords could be summarized into four categories: individual competence, teaching effectiveness, CLIL research methodology, and the relationship between CLIL and other pedagogies. (5) The field of CLIL was generating new keywords every year and new burst terms that could last for about 1-3 years. Its recent research hotspots comprised the effects of CLIL on pedagogical practices, including primary education and learners' characteristics, etc.

4.2 Research Suggestions

According to the sorting and categorizing of CLIL literature in this review, the future research trends and research strategies of CLIL can target at the following parts: (1) Conducting research from the characteristics and learning effectiveness of the learners who receive CLIL and evaluating the effects of CLIL on different learners (especially the early learners). (2) Investigating the motivation and beliefs of language learning and exploring the impact of CLIL pedagogy on students' enhancement under its influence. (3) Comparing the effects of other pedagogical approaches, except for immersion and content-based instruction, and CLIL on students' classroom experiences and gains. (4) Combining CLIL with innovative research methods, examining the use of more multidimensional and comprehensive approaches, such as corpus analysis and mixed research methods, to broaden the feasible research perspectives of CLIL.

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