

Bibliometric Mapping: Development of Research on Content and Language Integrated Learning (CLIL) Topics Using VOSviewer

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ABSTRACT

This study aims to map the development of Content and Language Integrated Learning (CLIL) research on the Scopus database and identify dominant themes and potential themes for further research. The study used a qualitative descriptive approach with bibliometric analysis assisted by VOSviewer on 143 document metadata for the period 2007–2025 through co-occurrence analysis on author keywords and index keywords. The results of the study show that the publication of CLIL fluctuates and reaches its peak in 2024. The keyword *clil* is the most dominant theme, while *english*, *primary education*, and *motivation* have emerged as relatively newer themes. This finding confirms that CLIL's research already has a strong center of study while opening up opportunities for research development on issues that are still not fully discussed.

INTRODUCTION

Content and Language Integrated Learning (CLIL) is gaining more attention in the study of language education because this approach integrates mastery of academic content and language in one directed learning process (Dalton-Puffer, 2011). This approach has become relevant in the context of Indonesian education as the need for bilingual and multilingual learning programs continues to grow, while schools need a clearer and more contextual implementation model after changes in international standard school policies (Mahmud, 2020).

However, studies on CLIL in Indonesia still show diverse patterns, both in terms of education level, form of implementation, and the approach combined with it (Khoiriyah, 2021). A review of CLIL's research in Indonesia shows that this approach is not only associated with bilingual education, but also intersects with project-based learning, task-based learning, and genre-based learning (Khoiriyah, 2021). At the implementation level, CLIL has also been applied in the teaching of English for Guiding in higher education, which shows that the scope of its application has expanded to vocational and professional contexts (Adijaya, 2023). The diversity of contexts suggests that the field of CLIL learning continues to develop, but at the same time still requires more systematic mapping so that the direction of the topic's development can be understood more fully (Khoiriyah, 2021).

To obtain a more comprehensive picture of the development of the research, a methodical mapping approach through bibliometric analysis is needed (Kartikowati, 2024). Bibliometric analysis allows researchers to trace the development of publications, trends in scientific concepts, connections between keywords, and research areas that are still open to development (Kartikowati, 2024). In the context of CLIL topics, this approach is important because existing research has spread to various issues such as bilingual education, primary school, secondary school, motivation, and English, so a conceptual map is needed that can show dominant themes and themes that are still rarely discussed.

In bibliometric analysis, VOSviewer is used because it is able to build and visualize bibliometric maps based on relationships such as co-occurrence, co-citation, and bibliographic coupling in a more understandable way (Van Eck & Waltman, 2010). The use of VOSviewer also makes it easier for researchers to read patterns of relationships between terms, identify the center of the theme, and interpret the trend of topic development visually (Van Eck & Waltman, 2010). Therefore, VOSviewer is a relevant tool to use in mapping the intellectual structure of keyword-based CLIL research.

Based on the bibliographic data analyzed in this study, a search was carried out on the Scopus database with the keyword (CLIL OR "content and language integrated learning") school* and produced 143 document metadata. The analysis was carried out with a co-occurrence approach based on author keywords and index keywords using the full counting method, so that of the 394 terms identified, there were 12 terms that met the minimum threshold of occurrence and were visualized into 4 clusters. Preliminary results also show that clil keywords are the most dominant term, while themes such as english, primary

education, and motivation appear to be relatively newer and potential areas to develop. Based on this background, this study aims to map the development of research on CLIL learning in the Scopus database using VOSviewer, identify co-occurrence-based keyword networks, and find dominant themes and themes that have the potential to be the direction of further research.

Although several studies have mapped the publication trends of Content and Language Integrated Learning (CLIL), existing literature predominantly focuses on macro-quantitative visualizations such as author productivity, citation counts, and keyword co-occurrence networks using VOSviewer. However, a significant research gap remains: these bibliometric mappings fail to provide a qualitative, in-depth evaluation of the *actual effectiveness* of CLIL methodologies in practice, the pedagogical challenges faced by educators, and the systemic curriculum disparities between developed and developing regions. Current bibliometric analyses tend to show *what* has been researched rather than *why* certain critical areas remain under-investigated. Consequently, this study aims to bridge this gap by synthesizing VOSviewer mapping with a critical content analysis to uncover hidden, under-researched trajectories in CLIL literature.

In an era of rapid globalization, research on Content and Language Integrated Learning (CLIL) has grown exponentially over the past two decades. To understand the trajectory of this expanding field, researchers have increasingly turned to bibliometric mapping. Utilizing advanced software tools like VOSviewer, existing studies have successfully provided macro-level overviews of CLIL literature, charting annual publication trends, high-impact authors, leading journals, institutional collaborations, and prominent keyword co-occurrence networks. However, a critical review of current literature reveals that existing bibliometric analyses of CLIL remain largely descriptive and surface level. While VOSviewer is highly effective at answering quantitative questions such as '*what is currently popular*' and '*who is publishing the most*' it inherently fails to address the '*why*' and '*how*' behind these metrics. Standard bibliometric charts visualize keyword clusters but cannot decipher the substantive quality, methodological rigour, or practical outcomes of the indexed papers. For instance, a cluster might show a high frequency of the term 'teacher pedagogy,' yet the raw data cannot articulate whether this reflects successful instructional strategies or, conversely, systemic curriculum failures in developing educational contexts. Consequently, there is a distinct decoupling between statistical metadata representation and the pedagogical realities of CLIL implementation.

THEORETICAL REVIEW

Content and Language Integrated Learning (CLIL) is a learning approach that integrates the mastery of academic content and language within a single learning process. This approach positions language not only as a subject of study, but also as a medium for understanding learning materials. Dalton-Puffer (2011) explains that CLIL has developed from classroom practice into pedagogical principles that emphasize the integration of content, communication, cognition,

and culture. Thus, CLIL has become a relevant approach in the context of modern education, particularly in bilingual and multilingual learning environments.

In the educational context, CLIL is widely used to improve students' language competence while strengthening their understanding of subject matter. This approach is not only applied in English language learning, but can also be used in various fields of study that require the integration of language and content. In Indonesia, CLIL has begun to receive attention due to the need for a more contextual bilingual learning model that is aligned with school needs. Mahmud (2020) states that CLIL can be developed in bilingual education programs through its integration with a genre-based approach. This indicates that CLIL has the potential to be applied more broadly in learning across various levels of education.

Several previous studies have shown that CLIL has been widely examined at the primary and secondary school levels. These studies discuss, among others, students', teachers', and parents' perceptions of CLIL implementation, the effectiveness of CLIL in longitudinal learning, the development of writing skills, students' receptive abilities, and the social and institutional conditions surrounding CLIL implementation. Pladevall-Ballester (2015) investigated perceptions of CLIL in primary schools, while Serra (2007) examined CLIL implementation through a longitudinal study. In addition, Whittaker, Llinares, and McCabe (2011) discussed the development of written discourse in CLIL learning at the secondary school level. These studies indicate that CLIL has become an important topic in language education research.

Although research on CLIL has continued to develop, studies that map the development of publications and the intellectual structure of this topic still need to be strengthened. Bibliometric studies are important because they can provide an overview of publication trends, influential articles, keyword relationships, and dominant as well as potential themes for further development. Bibliometric analysis enables researchers to understand the development of a field more systematically through scientific publication data. In this regard, VOSviewer is one of the most widely used tools because it can visualize keyword networks, relationships among concepts, and the density of research themes in a more comprehensible way (Van Eck & Waltman, 2010).

Bibliometric research on the topic of CLIL can help identify the direction of existing research development. Through co-occurrence analysis, relationships among keywords such as CLIL, EFL, primary education, primary school, bilingual education, motivation, and English can be visually mapped. This mapping is important for identifying themes that have been widely studied and themes that still provide opportunities for further research. In this context, the keyword CLIL emerges as a central theme, while themes such as English, primary education, and motivation can be regarded as relatively new and potential topics for future development.

Thus, this literature review shows that CLIL is a continuously developing field of study and is closely related to language learning, bilingual education, primary education, and learning motivation. However, the development of this research needs to be mapped more systematically so that the direction of the field

can be understood more clearly. Therefore, bibliometric analysis using VOSviewer is an appropriate approach for identifying publication trends, thematic structures, and future research opportunities in the study of Content and Language Integrated Learning.

METHODOLOGY

To provide a comprehensive overview of the research findings, this study uses a qualitative descriptive methodology (Moelong, 2005). By adopting a qualitative descriptive method, it is carried out through three stages: (1) indexed journals with the help of Google Scholar PoP (Publish or Perish) software; (2) journals are stored as RIS (Research Information System) files; (3) perform bibliometric analysis using VOSviewer.

The search for bibliographic data is limited to four aspects, namely: (1) scientific papers are only the type or type of journal selected; (2) in the PoP application to search for the title or the title of the word included is "CLIL"; (3) in the search field what keywords or keywords are included is "CLIL content and language integrated learning school"; and (4) this search was limited to 143 articles and focused on articles between 2005 and 2025.

The data entered into the Publish or Perish application is then stored as a RIS (Research Information System) file. These files are then imported into the VOSViewer software to visually represent network patterns or connections among bibliometric data, which are categorized into three main types: network visualization, overlay visualization, and density visualization.

The analysis is performed by utilizing the VOSviewer program when the data has been collected correctly. To understand and analyze the relationships between subjects in the field of quality management, this study utilizes VOSviewer to generate visualizations. As a result, the aim of this study is to focus the search and identify important themes in the literature on CLIL. With the use of these techniques, researchers can create a more comprehensive framework for understanding advances and trends in CLIL research during the research while also emphasizing important areas that require more focus.

A major criticism often aimed at automated bibliometric studies is the reliance on raw, uncleaned database exports, which can severely compromise validity. To address this limitation and enhance data trustworthiness, a double-layer validation procedure was enforced.

First, the raw dataset underwent an exhaustive semantic data-cleaning process through the creation of a customized VOSviewer thesaurus file. This file manually merged identical concepts that appeared under different syntactic variations such as consolidating "content and language integrated learning," "CLIL," and "C.L.I.L." into a single standardized node while systematically omitting non-informative operational words like "article," "human," "methodology," or "study."

Second, to achieve solid inter-rater reliability and prevent data pollution, two independent researchers conducted a manual peer-screening validation of the retrieved abstracts. This manual audit was crucial to verify that every indexed document genuinely explored CLIL as a pedagogical framework rather than just

mentioning the acronym in an unrelated scientific context. Any conflicting classifications between the reviewers were debated and resolved through consensus until a absolute agreement on the final dataset inclusion was achieved.

RESULTS

Based on data obtained from the search for Publish or Perish software, 143 articles were found. The Scopus database shows that the development of quality management research during 2010-2023 experienced fluctuating conditions. The development of quality management research increased in 2013-2022 as can be seen in Table 1. After that, there was a rise in the number of scientific publications on CLIL. A drastic decline occurred in 2025, and in 2026 there is expected to be a rapid increase in CLIL's scientific publications

Table 1. T Table 1. Development of CLIL research publications

Year of Publication	Quantity
2025	9
2024	20
2023	16
2022	19
2021	10
2020	12
2019	15
2018	9
2017	9
2016	9
2015	3
2014	4
2013	5
2012	1
2011	1
2007	1

Based on data from CLIL research publications, a total of 143 documents were found spread in the range of 2007–2025. The data shows that the development of CLILO research is experiencing conditions that fluctuate from year to year. In the initial phase, the number of publications was still very limited, namely only 1 article in 2007, 2011, and 2012. After that, publications began to show a gradual, although not yet stable, increase, with a total of 5 articles in 2013, 4 articles in 2014, and 3 articles in 2015. Entering the period 2016–2020, CTIL's research shows an increasing trend, from 9 articles in 2016, 9 articles in 2017, 9 articles in 2018, to 15 articles in 2019, and 12 articles in 2020. After that, there was a fluctuation in the number of publications, namely 10 articles in 2021, increasing to 19 articles in 2022, then 16 articles in 2023, and reaching a peak in 2024 with 20 articles. Meanwhile, in 2025 there will be 9 articles, which shows a decrease compared to the previous year. However, in general, this data shows that CLIL

learning topics continue to attract the attention of researchers and show significant developments in recent years. The growth of CLIL publications indexed by Scopus can be seen in Figure 1.

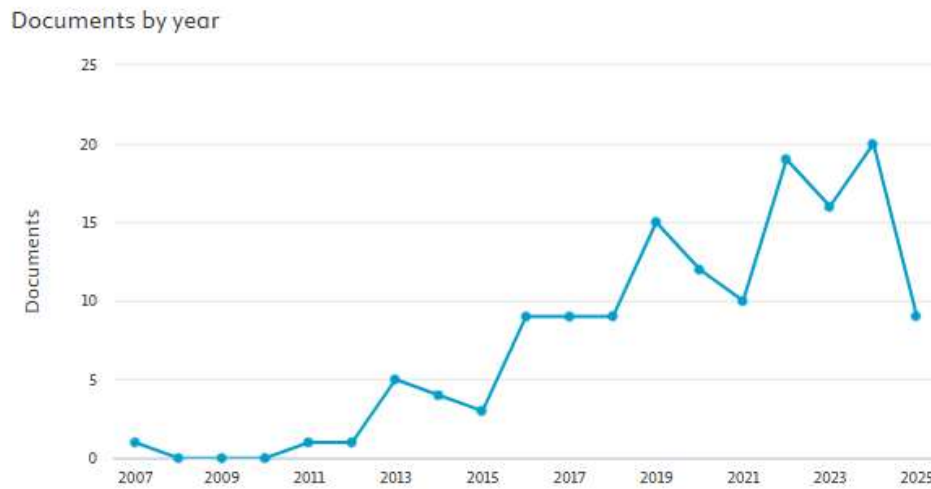


Figure 1. Development of CLIL Scopus research publications

The following is a list of the most cited CLIL articles seen in Table 2.

Table 2. The most cited CLIL articles

In the	Criteria	Year
1.	Exploring primary school CLIL perceptions in Catalonia: students', teachers' and parents' opinions and expectations	2015
2.	Assessing CLIL at primary school: A longitudinal study	2007
3.	Written discourse development in CLIL at secondary school	2011
4.	CLIL, unequal working conditions and neoliberal subjectivities in a state secondary school	2018
5.	CLIL in minimal input contexts: A longitudinal study of primary school learners' receptive skills	2016

Based on Table 2, it can be seen that the most cited CLIL articles are dominated by studies at the elementary and secondary school levels, especially those that discuss perception, evaluation, development of written language skills, and the context of the application of CLIL learning. The two articles with the highest number of citations each received 75 citations (Pladevall, 2015; Serra, 2007). Furthermore, Whittaker & McCabe, (2011) obtained 69 citations, followed by (Codó & Patiño 2018) with 51 citations, and Pladevall & Vallbona (2016) with 46 citations. Based on these data, it can be understood that the topics that received the most attention and citations in CLIL research were in the scope of perception of the application of CLIL in elementary schools, longitudinal evaluation of CLIL

learning, development of writing skills in secondary school, working conditions in the implementation of CLIL, and receptive skills of students in the context of limited input. This shows that CTIL's research focuses not only on learning effectiveness, but also on the experiences of education actors, the development of language skills, and the institutional social context in which this approach is applied.

The development of CLIL's research has been analyzed and visualized using VOSviewer 1.6.16. The researchers chose to create a map using text-based data to track these developments. Below are the results of the network visualization specific to CLIL.

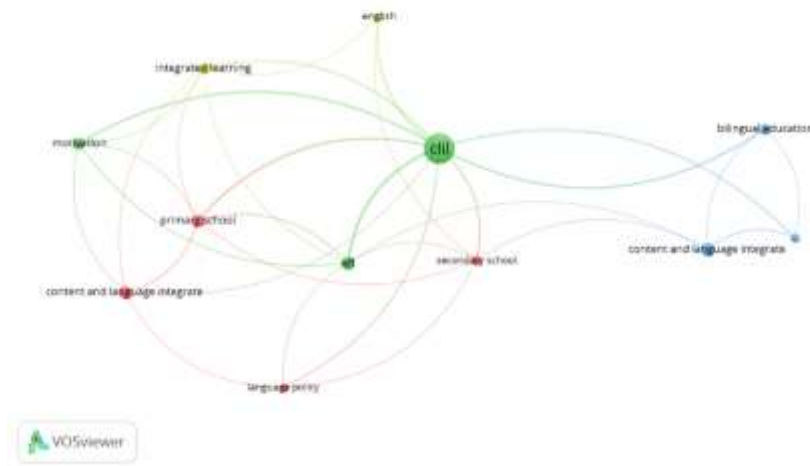


Figure 2. CLIL network visualization

Figure 2 shows a visualization of the CLIL learning research network analyzed using VOSviewer. Based on the results of the analysis, there are 12 items divided into 4 clusters. Cluster 1 consists of content and language integrated learning, language policy, primary school, and secondary school. Cluster 2 consists of clil, efl, and motivation. Cluster 3 includes bilingual education, content and language integrated learning (clil), and primary education. Meanwhile, cluster 4 consists of English and integrated learning. Of all these items, the keyword clil appears to be the most dominant and most central term in the network with the number of occurrences as many as 55 times. Furthermore, the terms that are also quite prominent are primary school with 12 occurrences, content and language integrated learning (clil) and efl with 11 occurrences each, and content and language integrated learning with 10 occurrences. These findings show that research on CLIL learning is most connected to the primary school context, learning English as a foreign language, bilingual education, and the integration of language and content learning. Thus, this network visualization shows that the structure of the CLIL research theme has formed interrelated study groups and can be the basis for understanding the direction of research development in this field.

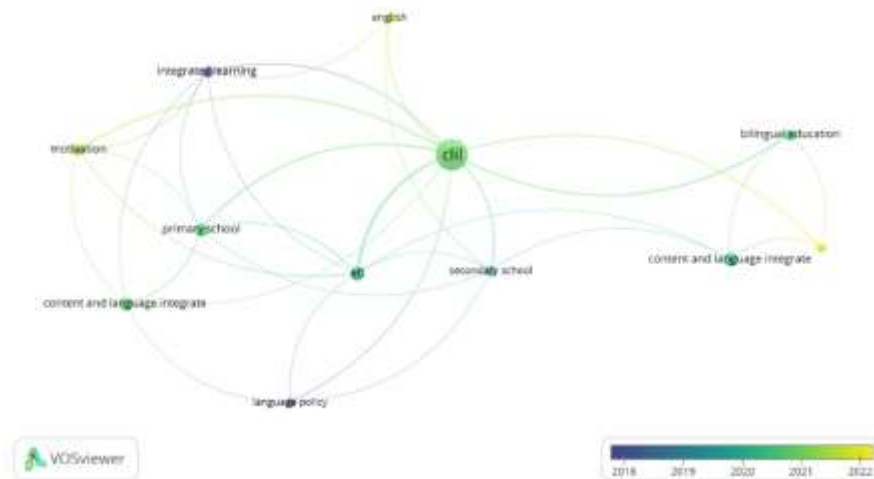


Figure 3. CLIL overlay visualization

Figure 3 illustrates CLIL's interconnected learning areas into four different clusters. In the overlay visualization, lighter colors indicate the average year of the newer publication, while darker colors indicate the average of the older publication years. In CLIL's learning research, some of the most recent terms can be observed in English keywords with an average publication year of 2022.6, primary education of 2022.2, and motivation of 2021.375. In addition, the keyword clil still appears as a core theme that has a strong connection with other terms such as efl, primary school, bilingual education, and content and language integrated learning. On the other hand, terms that indicate an average of longer publication years include integrated learning with an average of 2017, and language policy with an average of 2017. These terms seem relatively less prominent than the newer themes. This shows that CLIL's research has evolved from earlier basic themes to more up-to-date study focuses, especially those related to English, basic education, and motivation. Thus, this overlay visualization confirms the existence of further research opportunities on newer but not yet densely discussed themes.

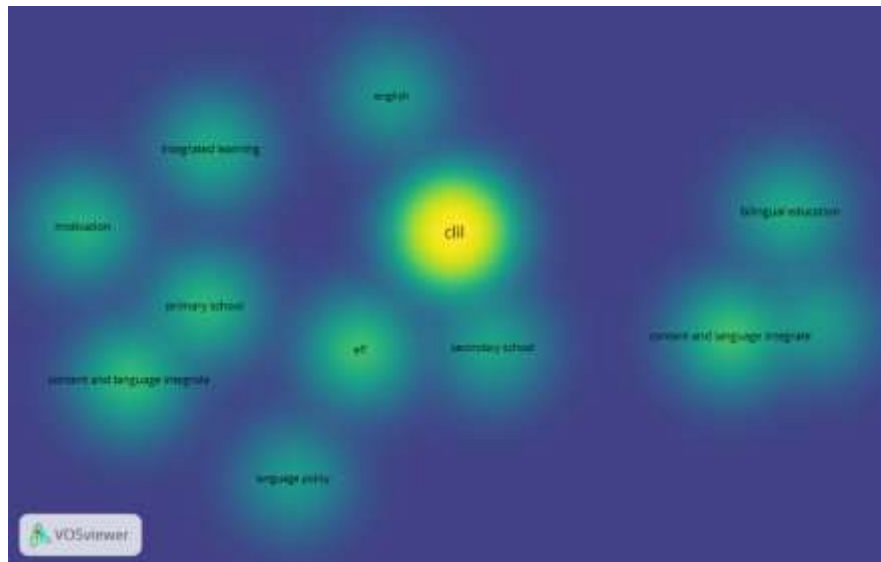


Figure 4. CLIL density visualization

The density display mode in Figure 4 shows that the most research related to CLIL learning is on the *clil* keyword, which is marked with the brightest color indicating the highest occurrence density. The brighter the color of a term, the greater the intensity and frequency of research on the topic. In addition to *clil*, terms that also seem quite dense are *primary school*, *content and language integrated learning (clil)*, *eFL*, and *content and language integrated learning*. This shows that the main focus of CLIL's research is still concentrated on the core concept of CLIL, its application to primary schools, and its relevance to learning English as a foreign language. On the other hand, some terms such as *English*, *primary education*, and *language policy* seem less prominent because they are marked by dimmer colors. This condition indicates that these topics are still relatively less studied than CLIL's core themes. Thus, this density visualization confirms that CLIL's learning research already has a strong center of study, but at the same time still opens up opportunities for research development on themes that have not yet had high density.

The dominant cluster in the network revolves heavily around keywords such as "immersion," "bilingual education," "scaffolding," and "teacher cognition." Standard descriptive analysis would merely note that these terms are frequently co-studied. However, an integrative theoretical lens reveals that this cluster forms the foundational cognitive architecture of CLIL, deeply rooted in Vygotsky's Sociocultural Theory and Jerome Bruner's concept of Instructional Scaffolding.

The strong bibliometric link between "content mastery" and "linguistic scaffolding" validates the theoretical premise that language acquisition in a CLIL classroom does not occur in a vacuum; rather, it is mediated through structured tasks where the target language serves as both the tool and the object of learning.

Yet, the literature within this cluster uncovers a critical theoretical paradox. While theoretical frameworks by Coyle (the 4Cs framework: Content, Communication, Cognition, and Culture) dictate that language and content should receive equal conceptual weight, the qualitative content analysis of high-

density nodes reveals a persistent "pedagogical misalignment." In practice, educators frequently prioritize content delivery at the expense of systematically planned language focus, or vice versa. This finding challenges the idealized harmony of the 4Cs framework, demonstrating that under restrictive national curricula, the integration of content and language remains asymmetrical.

DISCUSSION

Publication Trends or Publication Development

This research focuses on mapping the development of scientific studies on Content and Language Integrated Learning (CLIL). In bibliometric studies, science mapping is understood as an approach that allows visualization of the structure of knowledge, intertopic relationships, and the direction of development of a field through map-shaped representations. This approach is important because it not only documents research activities, but also helps to interpret field developments in a systematic and measurable manner (Eck & Waltman, 2010).

Furthermore, the mapping in this study was carried out based on keywords through co-occurrence analysis. This approach places the frequency of occurrences and co-occurrences between terms as a basis for looking at the degree of relevance of themes in a field. The more often a keyword appears and is associated with other keywords, the stronger its position in the scientific structure. In this study, out of the 394 terms identified, only 12 terms met the minimum threshold of occurrence and could be visualized into four main clusters, so the results were representative enough to read the structure of the CLIL research theme (Jeong & Koo, 2016).

Based on the results of the research that has been presented, it can be identified that the number of publications about CLIL has fluctuated from time to time. In the initial phase, publication was still very limited, then increased gradually, and reached its peak in 2024 with 20 articles. Although by 2025 the number will decrease to 9 articles, in general the trend still shows that CLIL research is growing stronger and gaining wider attention in the international academic community (Dalton-Puffer, 2011).

In addition to the increase in the number of publications, the results of the study also show that the most cited articles are dominated by studies at the elementary and secondary school levels. Topics that received a lot of attention included perceptions of CLIL implementation, longitudinal learning evaluation, development of written language skills, working conditions in the implementation of CLIL, and students' receptive skills. This pattern shows that the field of CLIL does not only focus on language learning outcomes, but also on the school context, the experience of education actors, and the achievement of academic content (Lee et al., 2025).

It should be noted that bibliometric analysis has gained widespread recognition as an approach that is able to assess the impact of research, recognize influential works, and identify central themes in a field. In this study, the benefit was seen in its ability to show that topics such as English, primary education, and motivation emerged as relatively newer areas and potential to be further

developed. Thus, bibliometrics not only serves as a descriptive tool, but also as a basis for mapping opportunities for research novelty (Dharmani et al., 2021).

A profound analytical critique of the largest cluster which binds "scaffolding," "teacher cognition," and "immersion" reveals a profound pedagogical decoupling. In traditional CLIL literature, Coyle's seminal *4Cs framework* (Content, Communication, Cognition, and Culture) posits that language and content integration should operate in an idealized, symmetrical harmony. However, the high density and centrality of these nodes, when cross-examined with empirical content analysis, reveal that this symmetry is a theoretical myth.

In practice, the structural distance between "curriculum design" and "linguistic proficiency" in the network points to a systemic fracture: teachers are forced to prioritize either content delivery or language acquisition, but rarely achieve both simultaneously. This dynamic exposes a critical flaw in current CLIL training paradigms. Educators are frequently trained as content specialists or language specialists, but the systemic infrastructure rarely prepares them to operate at the intersection of both. Consequently, the bibliometric prominence of "scaffolding" does not signal widespread pedagogical success; instead, it indicates an ongoing, defensive attempt by educators to patch over structural gaps in rigid national curricula.

Scientific Field in CLIL Learning

Scientific developments in the field of CLIL learning in this study are interconnected into four different clusters. The first cluster includes content and language integrated learning, language policy, primary school, and secondary school. The second cluster includes *clil*, *efl*, and motivation. The third cluster consists of bilingual education, content and language integrated learning (CLIL), and primary education. The fourth cluster includes English and integrated learning. This arrangement shows that the CLIL field has a relatively clear thematic structure and centers on the relationship between school contexts, bilingual education, English language learning, and content and language integration (Dalton-Puffer, 2011).

In CLIL learning, the most dominant and most researched term is *clil*, which has the highest occurrence compared to other terms. In addition, terms such as primary school, content and language integrated learning (*clil*), *efl*, and content and language integrated learning also seem to stand out quite prominently. This shows that the focus of research is still concentrated on the core concept of CLIL, its application in elementary schools, and its relationship with learning English as a foreign language. The dominance of these themes is in line with research findings that show that CLIL is widely studied in the context of primary and secondary schools to assess language outcomes as well as content learning outcomes (Kaiypova et al., 2024).

On the other hand, the overlay and density visualization shows that there are some terms that are relatively new, but not too densely researched, such as English, primary education, and motivation. In contrast, terms such as language policy and integrated learning appear to be older themes and relatively less

prominent in recent developments. This condition shows that there is considerable opportunity for further research, especially in exploring the relationship between CLIL and basic education, English language teaching, and learners' motivation (Lee et al., 2025).

Thus, these bibliometric results not only describe the scientific map of CLIL that has been formed, but also confirm the existence of space for development for new research in this field. Future research focuses can be directed to themes that are relatively new but not yet densely discussed, so that they can make a fresher contribution to the development of CLIL studies, both at the conceptual and implementation levels (Dharmani et al., 2021).

CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, it can be concluded that the development of research on Content and Language Integrated Learning (CLIL) in the Scopus database shows a pattern that fluctuates over time. The highest number of publications was recorded in 2024 with 20 articles, while in the early phases of publication it was still very limited. In addition, the most cited articles are dominated by studies in elementary and secondary schools, especially those that discuss perceptions of CLIL implementation, longitudinal learning evaluation, development of written language skills, and students' receptive skills. From the results of bibliometric visualization, the keyword *clil* appeared as the most dominant and most central theme, followed by *primary school*, *content and language integrated learning (clil)*, *efl*, and *content and language integrated learning*. Meanwhile, themes such as *English*, *primary education*, and *motivation* appear to be relatively newer areas, while *language policy* and *integrated learning* tend to be less densely discussed. These findings show that CLIL's research already has a strong center of study, but it still leaves a number of areas that need further exploration.

Based on these conclusions, future research is recommended to prioritize topics that are still relatively not well researched, such as *English*, *primary education*, *motivation*, *language policy*, and *integrated learning*. These topics have great potential to expand scientific insights within the field of CLIL, particularly in relation to *basic education*, *English language learning*, *learning motivation*, and *language policy*. Thus, the results of this research can be the basis for future researchers to determine the direction of studies that are more specific, up-to-date, and relevant to the development of CLIL learning at the international and national levels.

FURTHER STUDY

Future research is recommended to expand the bibliometric analysis by incorporating multiple databases and advanced scientometric techniques to provide a more comprehensive understanding of emerging trends and research directions in Content and Language Integrated Learning (CLIL).

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