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Mapping interpreter training worldwide: A bibliometric study (1992–2021)

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Abstract: Drawing on data from the Web of Science Core Collection and employing bibliometric analysis, this paper visualizes and examines 1,210 international academic publications on interpreter training from 1992 to 2021. It traces the field's development through key indicators such as publication volume, national distribution of authorship, research hotspots, and emerging trends. The findings reveal that: (1) scholarly output in this area has increased significantly; (2) the distribution of research is geographically uneven, with the majority of publications originating from the United States, Spain, and the United Kingdom. International collaboration remains limited, as evidenced by the relatively low number of co-authored papers across countries; (3) current research primarily concentrates on community interpreting, training models, and computer-assisted interpreter training; and (4) emerging trends highlight innovations in research paradigms, greater integration of theoretical perspectives, and the adoption of mixed research methods. The study offers insights for interpreter training in China, emphasizing the need to prioritize community interpreter education from an interdisciplinary perspective, adopt a combination of quantitative and qualitative methods in traditional research, and engage with cutting-edge developments in interpreter training within the context of human-machine interaction.

Keywords: interpreter training; publication history; authors' country distribution; hotspots and trends in Interpreting; data visualization.

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1. Introduction

In November 2022, OpenAI released ChatGPT, an intelligent chatbot that quickly attracted global attention. Translation was soon identified as one of the professions most susceptible to replacement by artificial intelligence. However, interpreting remains fundamentally different. As communicators operating within specific social and institutional contexts, interpreters must not only demonstrate advanced bilingual proficiency but also incorporate cultural knowledge, ideological awareness, and sociopolitical understanding to ensure accurate and effective communication. These complex requirements currently remain beyond the technical capabilities of ChatGPT. Against this backdrop, the question of how to cultivate high-quality interpreters has emerged as a shared research priority among scholars in China and abroad.

Research on interpreter training in China began in the 1990s and has increasingly focused on three core areas: interpreting pedagogy, interpreting processes, and professional interpreting practice. Studies on interpreting pedagogy have examined various instructional methods, including flipped classrooms, immersive situational learning, and blended online and offline teaching (Chen, 2015; Deng & Lu, 2018; Wang, 2020). Research on interpreting processes has concentrated on the acquisition and application of interpreting strategies, skills, and cognitive processes (Zhong, 2006; Zhou & Ding, 2006; Wen, 2020; Zhao & Feng, 2020). Practice-oriented studies have tended to reflect the practical needs of interpreter education and training (Xu, 2012; Zhang & Zhang, 2019; Feng & Fang, 2022). Overall, interpreter training research in China has evolved from a thematic to a skills-based orientation (Zhong, 2006), with most research drawing on data from classroom-based instruction and being situated primarily within the higher education sector.

Although interpreting as an activity and informal training practices existed before the 1940s, formal interpreter training programs in the West began to take shape during that decade, particularly at the Universities of Geneva and Vienna. These early programs were primarily based on an apprenticeship model. In the 1960s, interpreter training was increasingly influenced by the development of Interpretive Theory (Seleskovitch, 1978). From the 1980s onward, the field began to align itself more closely with scientific research paradigms (Zhao, 2017). By 2009, more than 300 university-based interpreter training programs had been established worldwide, and the number surpassed 500 by 2020 (Hao & Pym, 2022). Despite this growth, it remains the case that over two-thirds of interpreter trainers at the international level come from linguistic or literary backgrounds and lack formal interpreting experience. This disconnect has contributed to a persistent gap between the competencies of graduates and the expectations of the professional market (Hao & Pym, 2022). Consequently, there has been growing academic interest in how interpreter education can be better aligned with real-world professional requirements (Chouc, 2024).

2. Defining core concepts

2.1 Interpreter competence

Interpretation competence is central to the broader concept of interpreter competence. According to Gile's Effort Models, interpreting requires the concurrent execution of several

cognitive processes, including listening and analysis, memory retention, speech production, and overall coordination. These processes must be carried out in real time and under considerable cognitive pressure (Gile, 1995). Building on this theoretical framework, interpretation competence encompasses not only the effective use of interpreting knowledge, methods, and techniques, but also the ability to manage complex cognitive functions, navigate intercultural communication, and adjust to various contextual demands. These skills are fundamental to ensuring the accurate and coherent transfer of meaning between languages and across cultural settings (Zhao & Feng, 2020).

Beyond interpretation competence, interpreters are also expected to cultivate a range of broader capabilities. These include the ability to identify problems, adapt to different interpreting environments, demonstrate proficiency in writing, and apply creative thinking (Kiraly, 2003). Moreover, professional interpreters should be equipped with market awareness, managerial skills, and the capacity to create value. They are also expected to engage in the professional development of the field and to exercise autonomy in pursuing individual career objectives. Collectively, these three dimensions form the foundation of interpreter professional competence (Feng & Fang, 2022).

To address specific challenges in diverse interpreting contexts, scholars have also explored domain-specific interpretations of interpreter competence. In the legal domain, the highly formal and precise nature of legal texts demands that interpreters not only possess general interpreting ability but also demonstrate a sound understanding of legal systems, terminology, and conventions (Sarcevic, 2000; Alcaraz & Hughes, 2002). In the context of medical interpreting, the work is characterized by a high degree of specialization, technical complexity, and standardization. Medical interpreters must therefore possess domain-specific competence and adhere to ethical standards tailored to the healthcare setting in order to support patient care effectively (Su & Guo, 2021). In business interpreting, strategic competence is particularly important. Performance in this setting is influenced by the interpreter's knowledge base and language proficiency, while the demands of business negotiation also call for strong psychological resilience and physical stamina (Wen, 2020).

2.2 Interpreter training

Interpreter training encompasses a broad array of structured activities designed to develop and refine interpreter competence. These activities are typically implemented by higher education institutions, vocational training centers, and professional associations. Although the terms "teaching" and "training" are sometimes used interchangeably, they emphasize different aspects of interpreter development. Teaching often refers to the acquisition of theoretical knowledge, including language proficiency and interpreting theories, while training emphasizes practical skill development through exercises, simulations, and applied practice (Gile, 1995; Pöchhacker, 2004). Research on interpreter training typically focuses on three key areas: university-based interpreter education, which offers structured curricula and academic foundation; in-service training programs provided by institutions or agencies aimed at enhancing practitioners' professional skills; and technology-assisted training, such as the use of computer-aided interpreting tools and digital platforms (Setton & Dawrant, 2016). This multidimensional framework reflects the evolving demands of the interpreting profession and highlights the need to integrate theoretical instruction with practical training.

Hurtado Albir (2015) proposes that universities should adopt a competence-based model of interpreter education that incorporates teaching, learning, and assessment. While this model has been widely implemented in institutions with well-established programs, recent research has focused on evaluating its effectiveness and adapting it to varied institutional contexts (e.g., González-Davies & Enríquez-Raído, 2016; Wang & Mu, 2021). Zhao and Feng (2020) argue that project-based approaches and the participation of industry professionals in interpreter education are more effective than traditional classroom instruction in cultivating applied talents. The term "applied talents" refers to individuals who not only possess theoretical knowledge but also demonstrate the ability to apply interpreting skills effectively in real-world contexts. Additionally, the development of professionalism, service awareness, and technical literacy in interpretation should be emphasized alongside competence-building efforts (Zhou & Ding, 2006). With the increasing influence of information technology, interpreter training has expanded from conventional classroom instruction to hybrid modes that combine online and offline learning (Eser et al., 2020). In response to the interdisciplinary nature of interpreting tasks, universities have also implemented joint training models that include courses in psychology, intercultural communication, and related fields to foster interpreters with cross-cultural competence (Su & Shang, 2020).

In the domain of institutional training, the International Association of Conference Interpreters (AIIC) is the only global professional organization for conference interpreters and plays a pivotal role in promoting professionalization (Zwischenberger, 2009). AIIC serves professional interpreters, graduates of Master of Translation and Interpreting (MTI) programs, and individuals without formal interpreting education. It has developed evaluation standards for university-level interpreting programs based on five criteria: admissions, course design, curriculum content, faculty qualifications, and assessment mechanisms (Zhang & Zhang, 2019). Despite AIIC's authoritative role, the quality of training offered by other professional bodies and commercial institutions varies considerably. In this context, stronger state-level regulation is needed to standardize training practices and promote intermediary organizations that link MTI graduates with employment opportunities. These measures are essential for aligning educational outcomes with the actual demands of the interpreting profession (Xu, 2012).

In terms of technology integration, the European Master's in Translation (EMT) framework emphasized as early as 2009 that interpreters must develop information literacy skills. These include the ability to use digital tools and search engines—such as terminology databases, electronic corpora, and online dictionaries—to support their interpreting tasks (EMT Expert Group, n.d.). In recent years, information technology has been increasingly incorporated into interpreter training programs (Carsten et al., 2021). This technological transformation has facilitated the emergence of new forms of interpreting, including virtual reality interpreting projects (such as IVY), digital interpreting corpora, and self-training software for interpreters (Sandrelli & de Manuel Jerez, 2007; Deng & Lu, 2018; Eser et al., 2020). Some researchers have also proposed the potential use of metaverse technologies in remote interpreter training, suggesting that such innovations could transcend temporal and spatial constraints and promote interactive learning environments (Wang & Zhu, 2021).

Review-based studies are essential for mapping the development of the interpreter training field. To date, only two major review studies on interpreter training have been conducted in China.

Deng et al. (2022) analyzed the European Master's in Conference Interpreting (EMCI) teacher training workshop in terms of teaching organization, autonomous learning, and the use of technology, and considered its implications for interpreter education in China. However, the study focused exclusively on the EMCI framework. Guo and Li (2020) employed CiteSpace to compare domestic and international research on interpreting pedagogy, considering factors such as publication volume, research themes, and frontiers. This study primarily reflected the domestic teaching perspective, emphasizing elements such as curriculum design, teaching methodology, interpreting quality, and learning outcomes. It did not account for the diversity and learner-centered approaches emphasized in international research. Additionally, the time span (2012–2021) and sample size (207 Chinese papers and 330 international papers) were relatively limited and did not capture the full trajectory of interpreter training research. To address these limitations, the present study examines global interpreter training research published between 1992 and 2021, with the aim of identifying spatial and temporal patterns, research priorities, and trends. The findings are intended to inform interpreter education practices in China in response to emerging needs in the current era.

3. Methodology

This study presents a bibliometric analysis of interpreter training research, based on data retrieved from the Web of Science Core Collection. The search was conducted using Boolean logic with the query "TS=(the interpreter training OR the translator training)". The earliest relevant publication identified was Barčenkov's article "Training Translators and Interpreters in the USSR", published in 1992. The search was performed on September 27, 2022, covering the period from 1992 to 2021. Following a manual review to eliminate irrelevant and duplicate records from the initial set of 1,977 articles, a final sample of 1,210 articles was retained. Since the search strategy included both "interpreter training" and "translator training", articles that exclusively addressed translator training without reference to interpreting were excluded. Additional exclusion criteria applied to studies focused solely on literary translation, general translation technologies, or language acquisition without direct relevance to interpreting pedagogy or practice.

This study seeks to address three core research questions: (1) What are the stages of development in interpreter training research? (2) What are the key research hotspots and thematic trends in this field? (3) What frontier areas have recently emerged in interpreter training research?

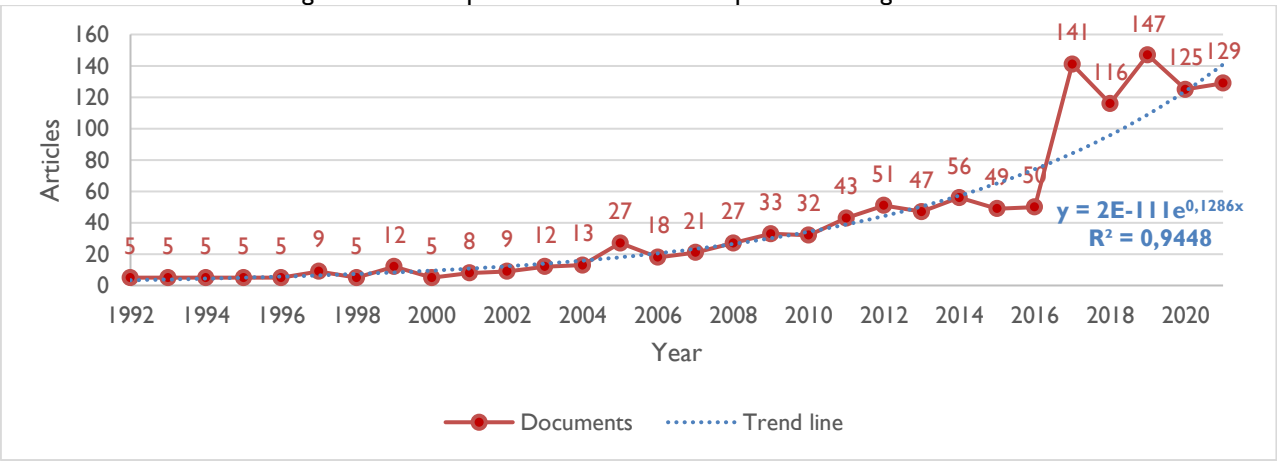
To conduct the analysis, the study employed the Bibliometrix package within the RStudio environment. RStudio is an integrated development platform for the R programming language that offers a stable and efficient interface for data processing, statistical analysis, and visualization. Bibliometrix is a dedicated tool for bibliometric and scientometric analysis, allowing for the importation of bibliographic data from multiple databases and supporting a wide range of functions, including descriptive statistics, index calculation, co-occurrence network analysis, and the visualization of knowledge structures. Its web-based interface, Biblioshiny, provides an accessible, graphical user environment that facilitates interaction without requiring advanced programming skills.

The research process began with the import and preprocessing of the curated dataset via Biblioshiny. Analytical procedures included the examination of the temporal and spatial distribution of publications, the construction of keyword co-occurrence networks, and the detection of emerging keywords to identify shifts in research focus. By integrating the computational capabilities of RStudio with the analytical strengths of Bibliometrix, the study ensured a rigorous examination of global research patterns in interpreter training.

Three main dimensions of analysis were undertaken. First, temporal distribution and citation trends were assessed by analyzing annual publication volumes. Spatial distribution was evaluated by country-level publication counts, thereby identifying regional research contributions and developmental trajectories. Second, research hotspots were identified through keyword co-occurrence mapping, which revealed the most frequently associated thematic clusters. Third, emerging research frontiers were examined using keyword burst analysis, which illustrated the evolution of scholarly interest across different time periods.

4. Spatial and temporal distribution of interpreter training research

Figure 1. Annual publication chart of interpreter training research



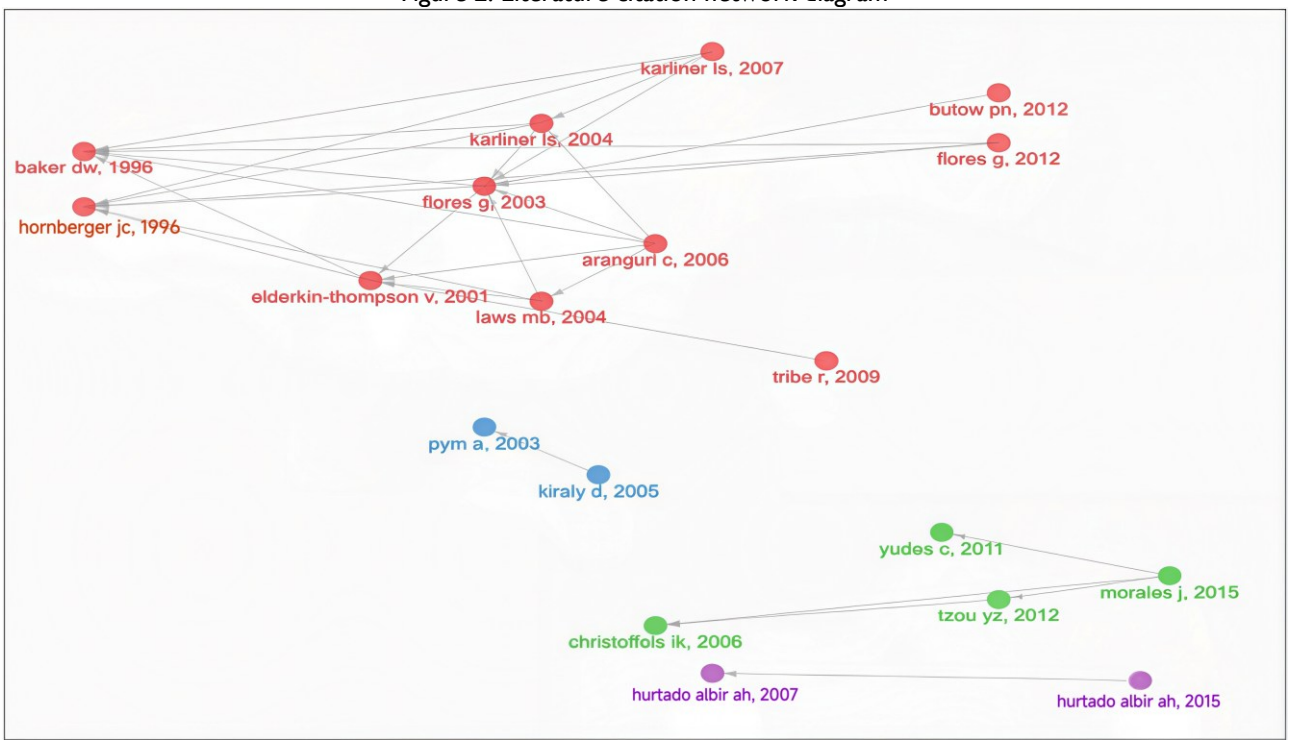
Source: Authors

Figure 1 illustrates the overall trajectory of interpreter training research, revealing three distinct stages of development. The first stage, referred to as the germination period (1992–2005), marks the initial phase during which interpreter training received limited academic attention. During this time, many countries and regions had not yet recognized the significance of research in this field, and the number of related publications remained relatively low. The second stage, known as the development period (2006–2015), is characterized by a steady increase in research output, with an annual growth rate of 11.77%. During this period, interpreter training began to attract broader interest from the international academic community, with scholars focusing increasingly on interpreter agency and the diversification of training methodologies. The third stage, identified as the period of rapid growth (2016–2021), witnessed a marked surge in publication output, with a growth rate of 20.87% and a peak in 2019. This increase may be attributed to the widening gap between the intensification of international exchange and cooperation, the growing demand for high-quality interpreters, and the inconsistent training outcomes under the existing educational

frameworks (Xu, 2012). These dynamics have contributed to a renewed surge of scholarly interest in interpreter training.

Overall, the annual publication volume has exhibited an upward trend, with an average growth rate of 11.86%, suggesting that interpreter training is an increasingly prominent topic within translation and interpreting studies. The rising number of publications reflects growing scholarly engagement with issues related to interpreter education and competence development. While Figure 1 presents a macro-level overview of long-term trends, further analysis is required to examine the specific research emphases within each developmental stage, including the distribution of highly cited works and the thematic content characterizing different phases.

Figure 2. Literature citation network diagram



Source: Authors

Figure 2 presents a visualization of changes in highly cited literature over time, offering a micro-level perspective on the intellectual development of interpreter training research. The diagram reveals four distinct citation sub-networks comprising a total of 14 nodes, each representing key publications interconnected through citation relationships. A close examination of these 14 influential works provides insight into the shifting research emphases and scholarly trajectories in the field.

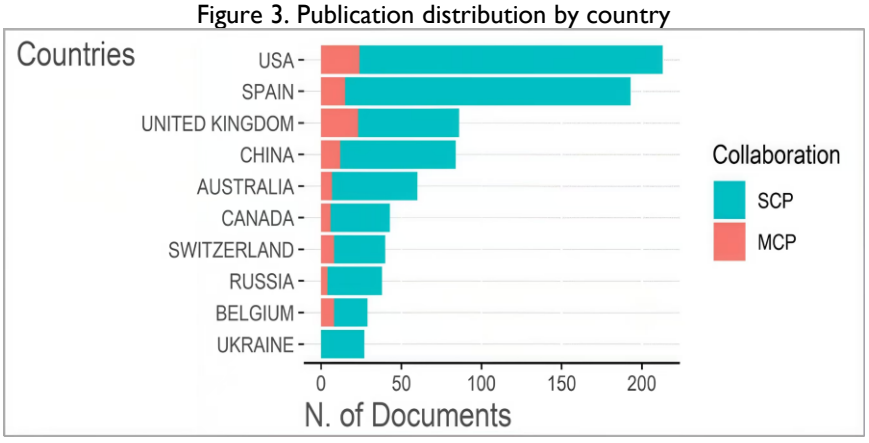
Sub-network one (red) is the largest cluster, consisting of eight interconnected publications centered on medical interpreter training. This sub-network originates from two foundational studies published in 1996 by Hornberger et al. and Baker et al., indicating both the longevity and foundational influence of medical interpreting research. Hornberger et al. (1996) compared "remote simultaneous interpretation" and traditional "consecutive interpretation" methods, concluding that patients showed a preference for remote simultaneous modes to address communication challenges. Similarly, Baker et al. (1996), through a survey of 530 Latin American patients, revealed that while

interpreter-mediated communication was preferred, inadequate medical interpreting skills often led to significant gaps in patient understanding of diagnosis and treatment. Other red-node publications build upon these two seminal works. For instance, Karliner et al. (2007), drawing on earlier studies, affirmed the critical role interpreters play in healthcare communication and offered targeted recommendations to improve training and quality assessment. Additional studies explored challenges faced by interpreters in medical contexts, such as increasing training demands, role shifts among nurse interpreters, and the evolving dynamics between healthcare providers and patients (Elderkin-Thompson et al., 2001; Flores et al., 2003, 2012).

Sub-network two (blue) covers a relatively short time frame (2003–2005), representing a concentrated period of scholarly activity focused on interpreting competence. This cluster includes discussions on the origins of interpreting ability, with key contributions from Kiraly (2005) and Pym (2003), who introduced the notion of "minimalist interpretation ability". Sub-network three (green) spans a longer period (2006–2015) corresponding to the broader developmental phase of interpreter training research. It focuses on experimental studies investigating the cognitive mechanisms underlying simultaneous interpretation, particularly the relationship between bilingualism, working memory, and performance outcomes (Christoffels et al., 2006). Sub-network four (purple), which also spans from 2007 to 2015, concentrates on university-level interpreter education. It includes studies proposing dynamic models of interpreting competence in response to higher education reform, with particular attention to curriculum design and evaluation frameworks (Hurtado Albir, 2007).

In summary, highly cited literature from the early years primarily concentrated on medical interpreter training, which established a research foundation for subsequent studies. Later scholarship expanded to include themes such as the cultivation of interpreting abilities, the development of educational models, and the evaluation of interpreting mechanisms. Figures 1 and 2 collectively illustrate the temporal evolution of interpreter training research, demonstrating how scholarly focus has shifted over time. In parallel, Figure 3 provides a spatial analysis of global research output, identifying geographic patterns and concentrations of scholarly activity. Together, these visualizations offer a comprehensive overview of both the chronological development and regional distribution of interpreter training research, thereby contributing to a more nuanced understanding of the field and highlighting potential directions for future inquiry.

Figure 3. Publication distribution by country



Source: Authors

As illustrated in Figure 3, MCP (Multiple Country Publications) refers to papers co-authored by researchers from different countries, while SCP (Single Country Publications) denotes papers authored by researchers of the same nationality. The data indicate that interpreter training research remains largely a domestically driven effort in most countries. The number of SCPs significantly exceeds that of MCPs, suggesting that cross-border collaboration in this field is still relatively limited. Among all countries, the United States demonstrates the highest level of international collaboration, having produced 24 co-authored papers with foreign researchers. China ranks fourth in terms of MCPs; however, approximately 85.7% of its publications are single-country papers, reflecting a comparatively low degree of international academic connectivity and collaboration.

In addition, the average citation frequency of Chinese publications stands at 9.29, considerably lower than that of other leading countries. For comparison, the average citation frequency in the United States is 25.45, followed by Switzerland at 23.32, and the Netherlands at 16.58. These figures suggest that the international influence of Chinese research on interpreter training remains limited. This may be partly attributed to the relatively late emergence of interpreter training as a research field in China, which implies considerable potential for future academic collaboration and international engagement. It is also important to consider the possible influence of publication language, as a substantial number of Chinese studies may appear in Chinese-language journals. This linguistic factor could affect both the international visibility of Chinese scholarship and the extent of cross-national research cooperation in interpreter training.

5. Interpreter training research hotspots

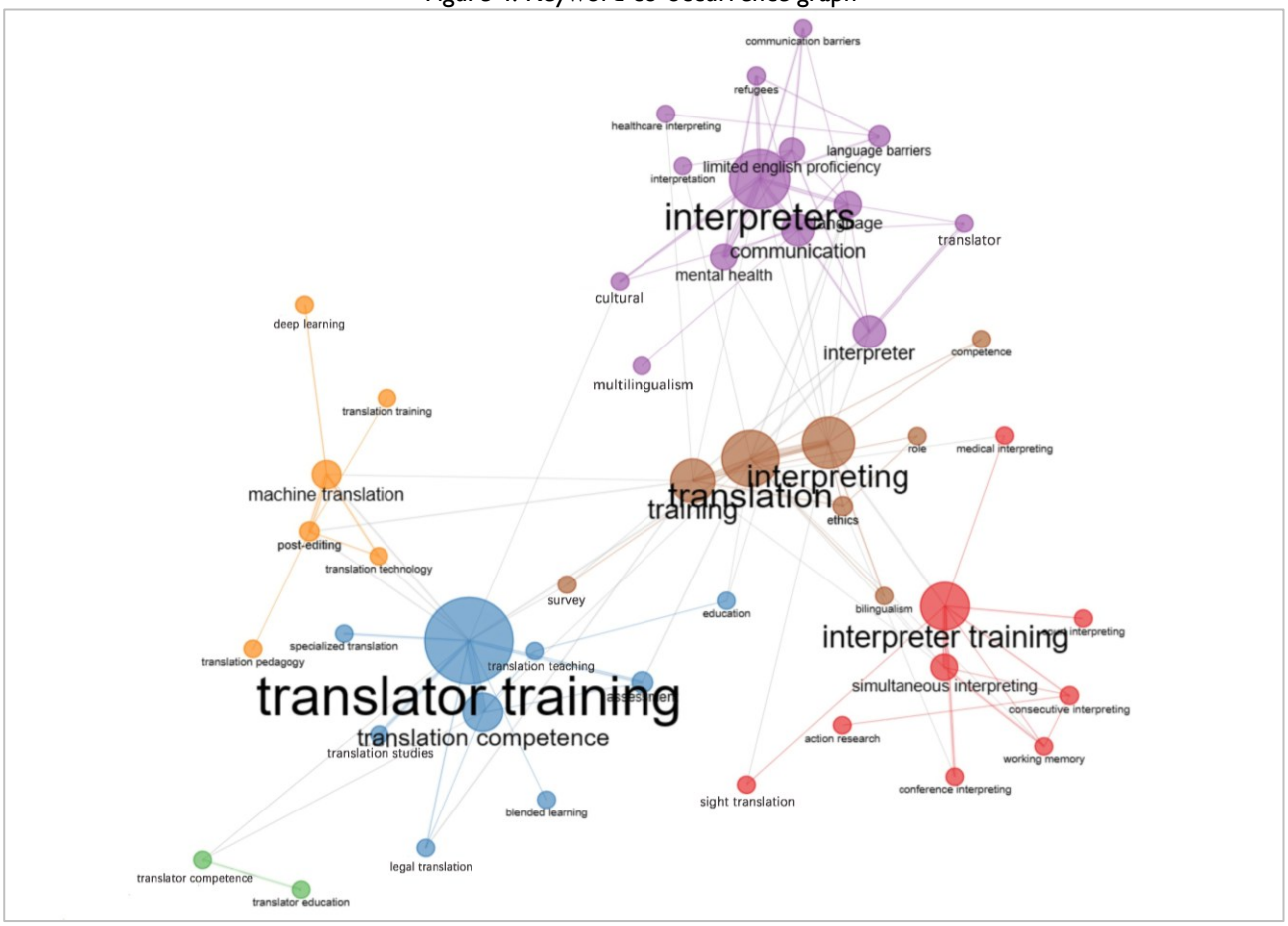
According to Duan and Cai (2016), keywords serve as concise representations of an article's central ideas and intellectual focus. Keyword co-occurrence analysis further enables the identification of relationships between terms, offering insights into prevailing research themes and areas of concentrated scholarly attention. Figure 4 presents a co-occurrence network of keywords related to interpreter training research. The diagram reveals five major thematic clusters, distinguished by color: purple, brown, red, blue, and yellow. Each cluster represents a grouping of frequently co-occurring keywords, thereby reflecting core research areas within the field.

Baker (2004) argues that keywords function primarily as linguistic markers for researchers, and thus require careful interpretation in order to address substantive research questions. Based on this premise and following a comprehensive analysis of the interpreter training literature, three primary thematic clusters have been identified. The first cluster, visualized in purple, is centered on the keyword "interpreter" and includes terms such as "medical interpreting", "refugees", "mental health", "communication", "language barriers", and "cross-cultural competence". This cluster reflects scholarly interest in interpreter competence within the context of community interpreting, particularly in healthcare and refugee-related settings.

The second cluster, represented in brown, is anchored by the term "interpreting training" and features keywords such as "interpreter role", "interpreter ethical norms", and "bilinguals". This group highlights research concerned with interpreter identity formation, the development of ethical standards, and bilingualism training. Together, the purple and brown clusters can be conceptually

grouped under the broader category of "interpreter training based on community interpreting", as both emphasize capacity building and professional development in community-oriented settings.

Figure 4. Keyword co-occurrence graph



Source: Authors

The red cluster is characterized by keywords such as "simultaneous interpretation", "consecutive interpretation", "sight translation", and "working memory", which are organized around the central term "interpreting training". This cluster reflects research focused on various forms of interpreting and the cognitive processes they entail. The blue cluster, surrounding the term "interpreter training", contains keywords such as "translation teaching", "translation ability", and "translation evaluation", indicating an emphasis on pedagogical strategies and competence assessment in interpreting education. These two clusters share common themes related to instructional methods and cognitive performance, and thus are jointly categorized as "interpreting talent training mode research".

Finally, the yellow cluster is relatively small and revolves around the term "machine translation", including keywords such as "translation technology", "translation training", and "deep learning". This grouping indicates a research focus on computer-assisted interpreting training (CAIT), particularly the application of emerging digital technologies in interpreter education.

In summary, the keyword co-occurrence network supports the classification of interpreter training research into three major areas: (1) interpreter training based on community interpreting,

(2) interpreting talent training mode research, and (3) computer-assisted interpreting training research. These categories provide a structured framework for understanding the thematic composition and evolution of research in the field.

6. Interpreter training based on community interpreting

The largest sub-network identified in the citation network diagram (Figure 2) is centered on medical interpreter training, which falls under the broader category of community interpreting. The concept of community interpreting was first introduced by the Linguistics Society in London and typically refers to interpreting services provided within domestic public service sectors. These include medical interpreting (Baker et al., 1996; Hornberger et al., 1996; Flores et al., 2003; Karliner et al., 2007), court interpreting (Moeketsi et al., 2005; Lee, 2017; Lee & Huh, 2021), sign language interpreting (Stone, 2017), military interpreting (Lipkin, 2008; Takeda, 2009), and refugee interpreting (Rousseau et al., 2011; Sabar & Tenenboim, 2018).

In addition, a growing body of literature addresses the provision of community interpreting services for minors, highlighting the specific linguistic, cognitive, and emotional needs of child clients. For instance, Bonacruz Kazzi and Cooper (2003) examine the challenges faced by interpreters working in pediatric healthcare settings, particularly in maintaining communication accuracy while preserving the child's comfort and sense of trust. Similarly, Salaets and Balogh (2019) explore the complexities of interpreting for minors in legal and asylum contexts, stressing the importance of specialized training that accounts for vulnerability, autonomy, and developmentally appropriate communication.

Given the distinctive characteristics of community interpreting, practitioners frequently encounter challenges such as unclear role definitions and insufficient knowledge of the relevant professional domains. These issues may negatively affect interpreting quality and impede effective communication among stakeholders. In response to these challenges, several strategic approaches have been proposed.

First, interdisciplinary training is strongly recommended to prepare interpreters for the multifaceted demands of community settings. In addition to language and interpreting techniques, training programs should include content from fields such as psychology, cultural studies, and intercultural communication. Such an approach fosters interpreters with both cross-linguistic and cross-cultural competence (Su & Shang, 2020). Empirical studies have shown that initiatives like the Medical Simultaneous Interpreting Training Program (MSITP) and Interprofessional Education (IPE) offer effective frameworks for cultivating qualified community interpreters, particularly in healthcare contexts (Hlavac & Harrison, 2021; Carlson et al., 2022).

Second, it is essential to clearly define and internalize the professional roles of community interpreters. These professionals often mediate complex interactions between diverse stakeholders—such as doctors and patients, or legal professionals and defendants—and must act not only as linguistic facilitators but also as cultural intermediaries. For example, court interpreters are expected to adhere to strict standards of neutrality and confidentiality, and must avoid disclosing any case-related information (Lee, 2017; Lee & Huh, 2021).

Finally, the integration of advanced technologies, such as virtual reality (VR), into interpreter training programs is gaining momentum. In Australia, for example, VR-based simulations are used to recreate real-world scenarios involving domestic violence victims, social workers, and law enforcement officers. These immersive environments enhance student readiness by overcoming the constraints of traditional classroom settings and accelerating the development of key professional competencies (Gerber et al., 2021).

7. Research on the training mode of interpreting talents

In Figure 2, the blue, green, and purple nodes in the literature citation network correspond to studies focusing on the development of training models for interpreting talents. These include research on concepts and models of translation competence, interpreting instruction, and the design of translation courses. Interpreting differs significantly from translation in that it is a real-time, high-pressure activity conducted without the opportunity for deliberation or external consultation (Wu, 1995). Given this distinction, interpreter training programs must prioritize the psychological demands placed on interpreters, particularly in relation to stress, anxiety, memory, decision-making, and feedback mechanisms. Furthermore, the standardization and advancement of interpreter training are closely tied to the development of appropriate teaching materials. As a critical component of curriculum design, textbooks play a foundational role in shaping the training pathways for novice interpreters (Yuan, 2022).

First, the literature associated with the blue node highlights the distinction between interpretation training and language learning. Pym (2003) introduced a minimalist concept of interpretation competence, arguing that language education is typically grammar-oriented and normative, whereas interpretation training is socially situated and practice-driven. As such, training programs should account not only for linguistic instruction but also for the pressures interpreters face in formal settings. In response to issues related to interpreter anxiety, recent studies have introduced innovative training approaches, such as TED speech-based practice and drama-based training, which are designed to support students in managing performance-related stress, improving speech delivery, and mastering body language (Liu & Hale, 2018; Bendazzoli & Pérez-Luzardo, 2021).

Second, interpreting is fundamentally a memory-intensive activity. The green node literature includes experimental studies that examine the role of working memory in simultaneous interpretation. Christoffels et al. (2006) found that professional interpreters demonstrated superior working memory performance compared to teachers and students, reinforcing the idea that working memory is a key skill in simultaneous interpreting. Due to the complexity of studying memory and attention—both of which involve neurocognitive processes—current research continues to explore the impact of interpreter training on these cognitive functions through exploratory experiments (Antonova Ünlü & Sağın Şimşek, 2018; Santilli et al., 2019).

Third, interpreting strategies are central to handling challenges during performance. Bartłomiejczyk (2006) defined interpreting strategies as methods used to prevent or resolve potential problems or to enhance interpreting outcomes. Research in this area includes studies on the use of strategies in simultaneous interpreting (Bartłomiejczyk, 2006), comparisons between

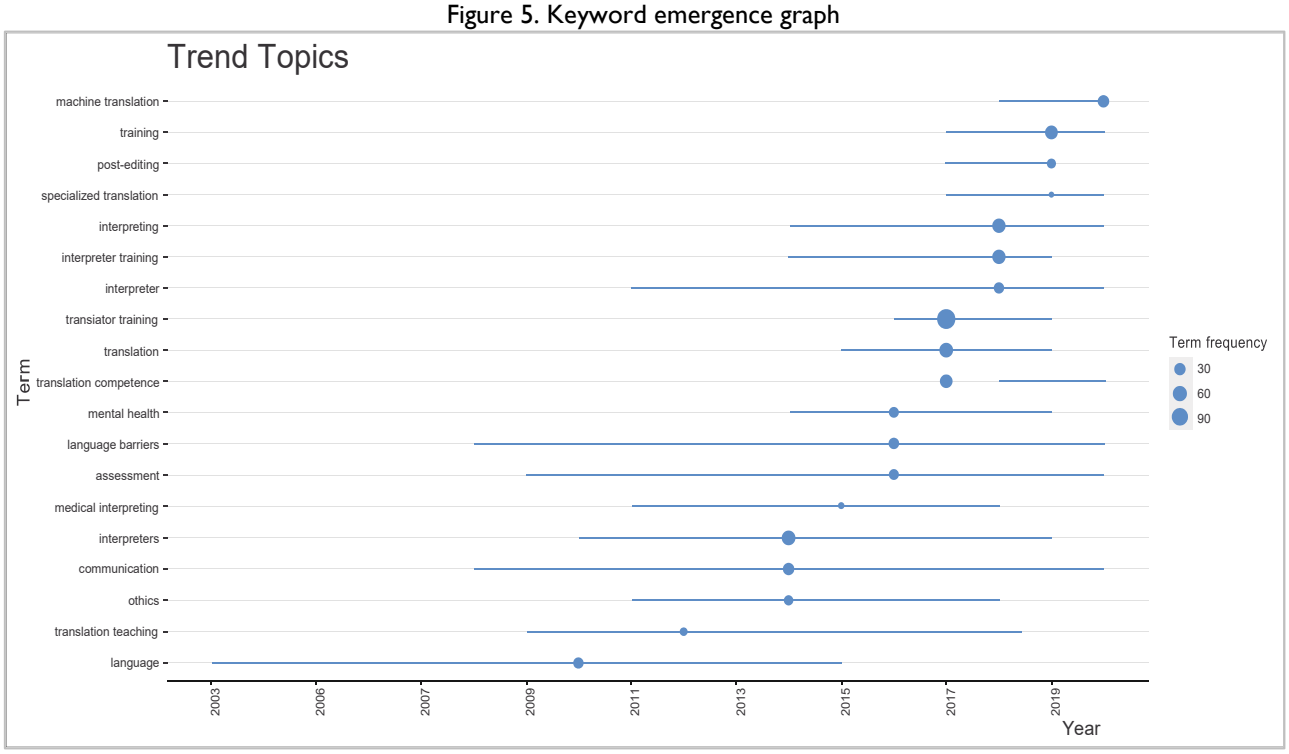
professional interpreters and students (Díaz-Galaz et al., 2015), and differences in strategic behavior across students at different proficiency levels (Arumí Ribas, 2012).

Fourth, effective evaluation and feedback are crucial to skills-based interpreter training. The purple node literature emphasizes this point, with Hurtado Albir (2007) advocating for the integration of summative, formative, and diagnostic assessments into interpreter training programs. Evaluation and feedback not only foster learner autonomy but also promote trust and communication between teachers and students (Yang & Carless, 2013). Moreover, Lee (2018) found that students tend to place greater value on instructor feedback than on peer feedback in interpreting tasks.

Finally, the development of instructional materials should adhere to a progression from simpler to more complex interpreting tasks (Yuan, 2022). However, current interpreting textbooks often begin with theoretical overviews or isolated examples, without providing concrete guidance for lesson planning or pedagogical implementation (Tao, 2005). Encouragingly, recent pedagogical innovations—including flipped classrooms, cooperative learning, and interpreting workshops—have begun to reshape interpreter training programs (Kim, 2015). These learner-centered approaches align with Vygotsky's constructivist learning theory and contribute to more effective interpreter education (Wang, 2020), although they also place increased demands on instructors in terms of class preparation and management.

8. Research on computer-assisted interpreting training

Figure 5. Keyword emergence graph



Source: Authors

Computer-Assisted Interpreting Training (CAIT) represents the smallest cluster identified in Figure 4 and is the most recently emerging node in the keyword burst detection graph shown in

Figure 5. This positioning highlights CAIT as a relatively new yet rapidly expanding area of scholarly interest. Originating in the mid-1990s, CAIT was initially developed to enhance interpreting pedagogy through the incorporation of information and communication technology (ICT) (Sandrelli & de Manuel Jerez, 2007). Early research primarily explored ICT's role in task preparation and electronic resource management (Jin, 2013). In more recent years, however, studies have expanded to examine the pedagogical potential of digital tools, including the use of terminology databases and the promotion of reflective, metaliteracy-based approaches designed to improve interpreter preparedness (Álvarez-Pérez & Pérez-Luzardo Díaz, 2022; Sales Salvador, 2022).

Beyond its impact on instructional practices, ICT is also reshaping the interpreting profession itself. Developments such as video conferencing and remote interpreting are becoming increasingly common in professional settings, requiring interpreters to adapt to new working conditions and technological interfaces (Mezcua, 2019). The evolution of CAIT has moved from relatively basic functions—such as providing databases for student self-study, supporting instructors in the creation of question banks, and curating multilingual news websites—towards the establishment of integrated online teaching platforms, the compilation of large-scale digital corpora, and the use of virtual reality (VR) to design immersive learning environments for both learners and educators.

This ongoing transformation has facilitated several important shifts in interpreter training. Instructional delivery has evolved from traditional in-person teaching to hybrid online-offline formats. Classroom dynamics have transitioned from teacher-centered approaches to student-centered learning models, drawing on socioconstructivist principles such as those proposed by Vygotsky. Additionally, the learner's role has changed from passive recipient of knowledge to active participant in the construction of learning outcomes.

Despite these advancements, CAIT also presents certain challenges. These include the risk of diminished classroom engagement among students, overdependence on third-party software tools, and interruptions caused by unreliable internet connections (Şahin, 2013; Sandrelli & de Manuel Jerez, 2007; Eser et al., 2020).

8. Research trends in interpreter training

Emerging keywords are often used to identify research topics that exhibit novelty, academic significance, and growth potential within a particular time frame. The progression and transformation of these keywords over time reflect dominant themes and changing directions within the scholarly landscape (Xiao & Zhang, 2016). In the keyword emergence graph, the size of each node corresponds to the frequency of the keyword's appearance during the analyzed period. Larger nodes represent higher frequency and, consequently, greater academic attention, whereas smaller nodes suggest lower frequency and limited relevance for identifying research trends.

As illustrated in Figure 5, commonly occurring keywords such as "interpreters" and "training", alongside less frequent terms such as "ethical norms" and "professional translation", provide limited specificity for interpreting evolving research directions. After excluding such broad or general expressions, a clearer picture of keyword development emerges. In the early stages of interpreter training research, keywords such as "language" and "communication" were prominent. Over time, these have been replaced by more specialized terms, including "interpreter training",

"medical interpretation", and "interpretation ability". In recent years, terms like "machine translation" have also begun to attract increasing attention. This section synthesizes insights from both the keyword co-occurrence network (Figure 4) and the keyword emergence graph (Figure 5) to outline the principal trajectories and thematic focuses of research in interpreter training.

8.1 Innovative breakthroughs in research paradigms

The keyword emergence graph illustrates that interpreter training has evolved through three main stages: training focused on language ability and interpreting skills, market-oriented training for community interpreting, and computer-assisted interpreting training (CAIT) characterized by human–machine interaction. Scholars have increasingly examined the roles and power dynamics of interpreters during interpreting tasks, and interpreter training methods have gradually shifted from traditional classroom-based instruction to technologically supported approaches. These include the incorporation of artificial intelligence, neural networks, and big data. The yellow cluster in the keyword co-occurrence network (Figure 4) also highlights CAIT as one of the current focal points and emerging trends in the field.

Interpreter training is undergoing a period of technological transformation, marked by the growing use of virtual learning environments (VLEs) and open educational resources (OERs) tailored for interpreters (Sandrelli & de Manuel Jerez, 2007; Carsten et al., 2021). Virtual reality (VR) technology enables synchronization between wearable and handheld devices, facilitates data sharing across applications and platforms, and adjusts in real time to the user's activities, thereby simulating realistic task-based scenarios (Borthwick et al., 2015). In particular, simulated classrooms offer immersive experiences that reflect the practical and situational demands of interpreting education.

It is evident that the language services industry is undergoing substantial change in the context of artificial intelligence. A central question for future research and practice is how emerging technologies may be systematically incorporated into interpreting pedagogy, how they may support innovation in teaching methodologies and training models, and how they may foster interactive engagement between interpreters and technological systems.

8.2 Intersections of research perspectives

In the keyword co-occurrence graph (Figure 4), the cluster representing interpreter training research grounded in community interpreting highlights cross-disciplinary joint training as a proposed solution to challenges such as ambiguous role perception and insufficient domain-specific knowledge among interpreters (Su & Shang, 2020). This has contributed to the evolution of interpreter training research from a primarily linguistic orientation to a multidisciplinary framework that integrates fields such as medicine, law, and political science (Hlavac & Harrison, 2021; Carlson et al., 2022). Interpreting instruction has also incorporated pedagogical methods from other disciplines—for example, the use of drama-based techniques to enhance students' capacity to manage stress (Bendazzoli & Pérez-Luzardo, 2021), and experiential learning through conference observation, where students identify and propose solutions to interpreting challenges (Hoyte-West, 2022).

From a neurolinguistic perspective, simultaneous interpreting engages multiple stages of cognitive processing—including information encoding, decoding, and output—simultaneously across various brain regions. This task places particularly high demands on cognitive capacity (Gile, 1995). As an interdisciplinary field, neurolinguistics draws from linguistics, neuroscience, psychology, and cognitive science. Recent studies have employed techniques such as eye-tracking to investigate attention allocation during interpreting tasks (Stachowiak-Szymczak & Korpal, 2019). These findings are important for clarifying the neural mechanisms involved in interpreting and provide practical implications for interpreter training. Future research is expected to further explore how various cognitive and contextual factors influence interpreting performance through the lens of neurolinguistics.

8.3 Diversification of research methods

As illustrated in the citation network diagram (Figure 2), influential scholars such as Baker et al. (1996), Hornberger et al. (1996), and Christoffels et al. (2006) predominantly employed experimental designs to conduct quantitative research. By contrast, in the keyword co-occurrence diagram (Figure 4), studies by Van de Walle et al. (2022), Eser et al. (2020), and others applied qualitative methodologies such as interviews and classroom observation. This suggests that interpreter training research commonly utilizes dual-track methodological approaches, combining bibliometric or literature-based analysis with either experimental procedures or qualitative inquiry.

In qualitative studies, research participants are frequently composed of student interpreters and community service users, including individuals who are deaf, patients, and refugees (Salaets & Balogh, 2019; Eser et al., 2020). Semi-structured interviews, focus groups, and similar formats are often adopted to gain in-depth insights, with transcription and coding frequently conducted using qualitative data analysis software such as NVivo (Salaets & Balogh, 2019; Van de Walle et al., 2022). Experimental studies remain prevalent in interpreter training research, typically examining how various interpreting variables influence the quality of interpretation (Christoffels et al., 2006; Liu & Hale, 2018).

In recent years, emerging methods such as multimodal corpus analysis and eye-tracking have been increasingly applied in quantitative research to introduce new analytical dimensions to the field (Chouc & Conde, 2016; Stachowiak-Szymczak & Korpal, 2019). However, purely quantitative research can sometimes lead to superficial conclusions and may encounter challenges in ensuring the reliability and validity of findings. It is therefore necessary to optimize research design, adhere to rigorous quantitative protocols, and enhance methodological training. Combining quantitative and qualitative approaches can improve both the accuracy and generalizability of research outcomes, while also preserving the depth and context-specific nature of interpreter training studies (Yang et al., 2013).

9. Conclusion

This study utilized the Bibliometrix package and its web-based interface, Biblioshiny, within the RStudio environment to conduct a bibliometric analysis of the spatial and temporal distribution,

research hotspots, and emerging trends in interpreter training over the past three decades. The quantitative analysis yielded several key findings. First, the annual publication trajectory demonstrates a consistent upward trend, indicating that interpreter training has attracted growing scholarly attention. The country-level publication map reveals that most countries tend to engage in independent research, with limited international collaboration. Nonetheless, the increasing number of publications suggests substantial potential for enhanced global cooperation in this field.

Second, the keyword co-occurrence analysis generated five major clusters, each reflecting distinct thematic directions in interpreter training research. By reviewing and categorizing the literature associated with these clusters, three central research areas were identified: interpreter training within the context of community interpreting, research on training models for interpreting professionals, and the development of computer-assisted interpreting training (CAIT).

Third, the keyword emergence analysis reveals thematic evolution over time. Different stages in the development of interpreter training research are associated with distinct emerging terms, reflecting shifts in scholarly focus. Earlier stages emphasized foundational terms such as "language" and "communication", followed by more specialized concepts such as "interpreter training", "medical interpretation", and "interpretation ability". In recent years, attention has shifted toward topics such as "machine translation". In parallel with thematic developments, methodological approaches have also evolved. The field has moved beyond discipline-specific boundaries, adopting a range of quantitative and qualitative techniques—including experiments, interviews, corpus-based research, and eye-tracking analysis—thus contributing to a more comprehensive research landscape.

Currently, global research on interpreter training, as reflected in the Web of Science database, is undergoing a period of dynamic and diversified growth. Traditional topics such as interpreting strategies, cognitive mechanisms, and pedagogical practices remain central. At the same time, increasing emphasis is placed on community interpreter training and the changing role of interpreters in response to social needs. Innovative training models are emerging, characterized by interdisciplinary collaboration and the application of advanced technologies through CAIT.

In comparison, interpreter training research in China has gained momentum only in recent years and still presents notable gaps when measured against international benchmarks. Several strategic directions are proposed for future development. First, stronger international collaboration should be promoted. Chinese scholars and institutions are encouraged to engage in sustained academic exchange and establish research partnerships with international counterparts to enhance the impact and global visibility of their work. Second, it is important to move beyond traditional paradigms by encouraging interdisciplinary initiatives. Interpreter training programs in Chinese universities could benefit from long-term cooperation with hospitals, courts, and business organizations, and from joint training initiatives that integrate expertise from fields such as medicine, law, and economics.

Third, interpreter training in China should develop research frameworks that align with the country's unique educational context and policy orientations. Particular attention should be given to incorporating the principles of curriculum-based ideological and political education（课程思政), which aims to embed civic and ethical values within the teaching process. This approach advocates the simultaneous cultivation of professional interpreting competence and a strong sense of social responsibility. Finally, future efforts should prioritize the integration of CAIT and human–computer

interaction, ensuring that interpreter training in China remains responsive to technological innovations and emerging pedagogical approaches.

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Conflict of interests

No potential conflict of interest was reported by the author(s).

Research dataset

This study is a bibliometric analysis and does not rely on the collection of new primary data. The analyzed data consists of 1,210 curated international academic publications on interpreter training. The initial data were retrieved from the Web of Science Core Collection on September 27, 2022, covering the 1992–2021 period.

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The data from this research, which are not included in this work, may be made available by the author(s) upon request.

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