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Instructional communication in inclusive deaf education: a global and Asian bibliometric review

Siti Farisah Yahya, Syar Meeze Mohd Rashid, Khairul Farhah Khairuddin
Faculty of Education, Universiti Kebangsaan Malaysia, Bangi, Malaysia

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ABSTRACT

Instructional communication supports equitable access, participation, and learning in inclusive deaf education. However, evidence on how this field has evolved globally, particularly in Asian contexts, remains fragmented. This bibliometric review analyses 423 Scopus-indexed publications (2015–2025) using performance indicators and science-mapping techniques to examine publication trends, collaboration networks, thematic structures, and intellectual development. The findings indicate sustained growth after 2018, driven by global inclusion agendas and the expansion of digital learning environments. While research increasingly emphasizes multimodal pedagogy, inclusive practices, and technology-enhanced communication, collaboration networks remain dominated by Western institutions. Asian contributions, although growing, are more visible in emerging technology-oriented domains than in foundational theoretical cores. The study identifies a shift from clinically oriented approaches toward integrated, multimodal, and digitally mediated instructional communication frameworks. It further reconceptualizes instructional communication as an evaluative indicator of inclusive teaching quality, reflecting access, interaction, and pedagogical responsiveness. These findings highlight the need for stronger regional research capacity, context-sensitive theoretical development, and more inclusive global knowledge structures. The study has implications for policy development, teacher training, and curriculum design in multilingual and technologically diverse educational systems, particularly across Asia.

Corresponding Author:

Syar Meeze Mohd Rashid
Faculty of Education, Universiti Kebangsaan Malaysia
43600 UKM Bangi, Selangor, Malaysia
Email: cikgumeeze@ukm.edu.my

1. INTRODUCTION

Instructional communication for deaf and hard-of-hearing (DHH) learners has changed significantly over the past decade. This transformation has been driven by global education reforms, advances in technology, and shifting pedagogical perspectives within inclusive education. The period from 2015 to 2025 represents a vital phase in international education policy, marked by the Incheon Declaration and the Education 2030 Framework for Action, which reaffirm the right of learners with disabilities to equitable and high-quality education [1]. Together with the United Nations Convention on the Rights of Persons with Disabilities (CRPD), these frameworks have encouraged education systems to move beyond physical placement toward meaningful participation, interaction, and communicative access. For DHH learners, this shift foregrounds instructional communication practices that support engagement and learning rather than mere integration in mainstream settings [2], [3].

Aligned with sustainable development goal 4 (SDG-4), inclusive education requires responsive environments that address diverse linguistic and cognitive needs. For DHH learners, this involves multimodal communication using sign language, visual support, written scaffolds, and assistive technologies to enhance understanding [4]–[6]. Recent research emphasizes the importance of aligning communication modalities with linguistic, cultural, and educational diversity, particularly in multilingual and multicultural contexts [7]–[9]. Technological innovation has further expanded instructional communication possibilities through real-time captioning, remote interpreting, artificial intelligence (AI)–based accessibility tools, and digital learning platforms, while simultaneously introducing pedagogical and equity-related challenges [10]–[14]. These challenges became more visible during the COVID-19 pandemic, which exposed persistent communication barriers in digital and hybrid learning environments [15]–[18].

Theoretical perspectives on DHH pedagogy have evolved in parallel with these shifts. Recognition of sign languages as full natural languages has strengthened bilingual–bicultural approaches that position signed and spoken or written languages as complementary communicative resources [19]–[21]. Scholars increasingly acknowledge the heterogeneity of DHH learners, including signing students, oral communicators, cochlear implant users, and multimodal learners with varied communication preferences [22]. Methodological diversification, including mixed methods and interdisciplinary approaches, has further enriched understanding of instructional communication within complex educational ecologies [8], [23], [24].

In this study, instructional communication is conceptualized as the purposeful and dynamic exchange of meaning between teachers and learners through verbal, visual, written, and technology-mediated modalities. Drawing on educational communication theory, it extends beyond content transmission to encompass interactional processes that shape learner engagement, access, and participation [19], [25]. Within inclusive education, instructional communication functions not only as a pedagogical process but also as an evaluative indicator of inclusive teaching quality, as it directly shapes access, participation, and learning outcomes [26].

Despite the expansion of research in this area, there remains a lack of comprehensive bibliometric synthesis of global publication trends, collaboration networks, and conceptual developments in DHH instructional communication research, particularly in Asian contexts. Existing studies tend to focus on specific interventions, technologies, or pedagogical approaches without systematically mapping how the field has evolved structurally and intellectually. This gap limits understanding of how knowledge production is distributed globally and how dominant theoretical frameworks are shaped across regions. This study addresses this gap by offering a novel bibliometric analysis that reconceptualizes instructional communication as an indicator of inclusive teaching quality and examines the structural position of Asian research within the global knowledge landscape. Bibliometric analysis offers a rigorous method for addressing this gap by examining publication performance, citation dynamics, and thematic clustering [27], [28].

This study advances educational communication theory by reconceptualizing instructional communication as an evaluative construct of inclusive teaching quality rather than solely a pedagogical process. While prior research has primarily examined instructional communication as a set of strategies or interactional practices, this study positions it as a multidimensional indicator encompassing communicative access, learner participation, and pedagogical responsiveness. By integrating perspectives from deaf education, multimodal communication, and inclusive pedagogy, the study extends existing frameworks to account for the dynamic and context-dependent nature of communication in diverse educational settings.

Furthermore, the findings challenge the implicit universality of dominant theoretical models by revealing structural imbalances in global knowledge production. Western scholarship continues to shape foundational intellectual cores, whereas Asian research is more visible in emerging technological domains, reflecting a center–periphery dynamic in theory development. Accordingly, this study contributes to theory by: i) reframing instructional communication as a measurable dimension of inclusive teaching quality and ii) highlighting the need for context-sensitive theoretical frameworks that reflect multilingual, multicultural, and technologically diverse educational ecologies, particularly in Asian contexts. This study analyses Scopus-indexed publications from 2015 to 2025 to address the following research questions:

- What are the global publication and citation trends in instructional communication research for DHH learners?
- Who are the most influential authors, institutions, and countries, and how are collaboration networks structured?
- What thematic clusters and intellectual foundations shape the field's development?
- How is instructional communication conceptualized in relation to inclusive teaching quality?
- What is the position and contribution of Asian research within the global knowledge structure?

2. METHOD

This study adopted a bibliometric research design to systematically examine the structural and thematic development of research on instructional communication for DHH learners between 2015 and 2025. Bibliometric analysis enables large-scale synthesis of scholarly production by examining publication patterns, citation structures, collaboration networks, and keyword co-occurrence [27], [28]. In contrast to traditional narrative reviews, bibliometric approaches provide quantitative and visual evidence of how knowledge domains evolve, consolidate, or diversify over time [27], [28]. In this study, bibliometric techniques were employed not merely to describe trends but to evaluate how instructional communication has been positioned within inclusive education research.

2.1. Data source and search strategy

Scopus was selected as the sole data source due to its extensive international journal coverage and robust citation-indexing system, which supports performance analysis and science mapping [29]. Comparative studies indicate that Scopus provides broad disciplinary representation across education, linguistics, disability studies, psychology, and applied social sciences [30]. Given the interdisciplinary nature of DHH instructional communication, the use of Scopus was considered appropriate. However, reliance on a single database may introduce coverage bias, as Scopus primarily indexes English-language and Western-based publications. This may underrepresent regional scholarship, particularly from Asian contexts where research is often published in local or non-indexed databases. Future studies should incorporate regional databases such as the ASEAN citation index to improve representativeness and reduce geographical bias.

An advanced Boolean search strategy was constructed to capture literature at the intersection of DHH populations, instructional communication, and educational contexts. The search was conducted in the TITLE-ABS-KEY fields. The query used was: TITLE-ABS-KEY (deaf OR “hard of hearing” OR “hearing loss” OR DHH OR “deaf education”) AND TITLE-ABS-KEY (“instructional communication” OR “teacher communication” OR “pedagogical communication” OR “classroom communication” OR “instructional strategies” OR “communication strategies” OR “teaching communication”) AND TITLE-ABS-KEY (education OR learning OR classroom OR “inclusive education” OR “special education”). The search was conducted in December 2025.

2.2. Inclusion and screening procedures

The initial search yielded 711 records. Applying the publication year filter (2015–2025) reduced the dataset to 448 records. Restricting document types to articles, reviews, books, book chapters, and conference papers resulted in 441 records. Limiting to English-language publications produced a final dataset of 423 documents. The screening process followed the PRISMA framework adapted for bibliometric research [27], [31]. Inclusion criteria required explicit focus on instructional, pedagogical, or classroom communication involving DHH learners across educational settings. Studies centered exclusively on medical, audiological, or clinical interventions without clear educational communication relevance were excluded. Figure 1 illustrates the identification, screening, and inclusion process.

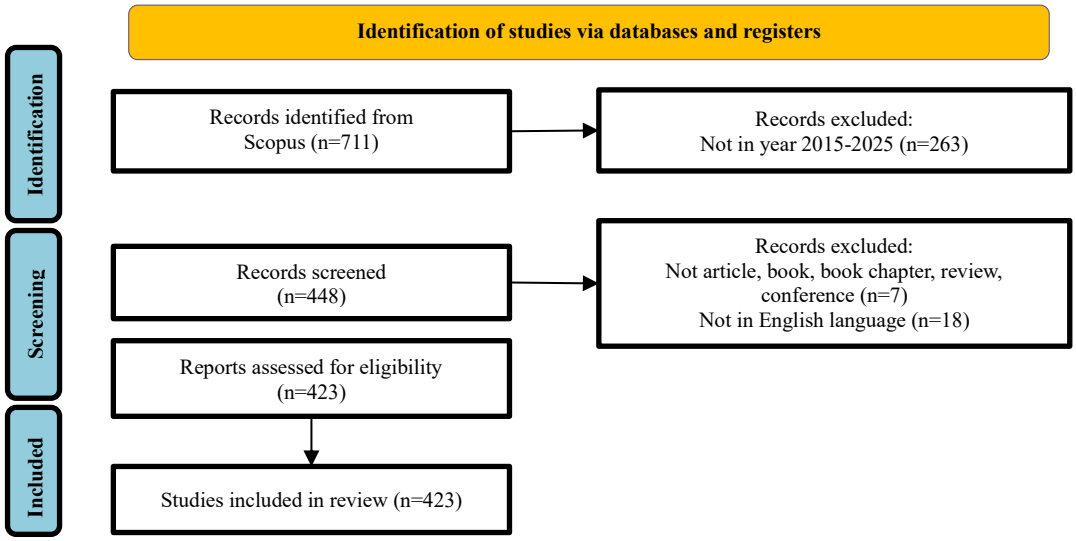

Figure 1. PRISMA flow diagram

2.3. Data extraction and analysis procedure

Bibliographic data were exported in CSV format and analyzed using VOSviewer (version 1.6.20) and supplementary analytical tools. Extracted metadata included authorship, affiliations, keywords, citations, and references. Data cleaning followed established standards to prevent network fragmentation, including standardization of author names, affiliations, country labels, and semantically similar keywords [27], [32]. Performance analysis and science-mapping techniques were then applied to examine publication trends, collaboration patterns, thematic clusters, and intellectual structures within the field [28], [32], [33].

For network construction in VOSviewer, specific threshold parameters were applied to ensure analytical clarity and reduce visual noise. A minimum of five documents per author, five documents per institution, and five documents per country were required for inclusion in the respective co-authorship networks. The threshold of five documents was selected to balance analytical clarity and inclusiveness, ensuring that only sufficiently active contributors formed stable network structures while minimizing fragmentation caused by sparse data. For keyword co-occurrence analysis, a minimum occurrence threshold of 10 was set to identify dominant thematic patterns. In co-citation analysis, only sources with at least 20 citations were included to ensure that the resulting intellectual structure reflected influential and established contributions within the field.

Full counting was applied in co-authorship and citation analyses to ensure equal weight to each contributing author and document. The choice of full counting was intended to preserve visibility of emerging and regionally bounded research, particularly from Asian contexts. Network visualizations were generated using association strength normalization. Cluster interpretation followed iterative examination of keyword relationships, citation patterns, and thematic proximity to ensure conceptual coherence. By combining performance indicators with structural mapping techniques, this methodological approach enables systematic evaluation of how instructional communication research for DHH learners has evolved globally, how knowledge production is distributed, and how conceptual emphases relate to inclusive teaching quality.

3. RESULTS

3.1. Publication growth and citation dynamics (2015–2025)

The field of instructional communication for DHH learners shows sustained growth over the last decade, indicating expanding scholarly attention to communicative access, inclusive pedagogy, and technology-supported learning. This trend aligns with broader empirical work stressing the centrality of interaction quality, communicative access, and engagement in inclusive classrooms [20], [34]–[36]. As shown in Table 1, annual publication volume rose markedly after 2018, peaking in 2024 and remaining high in 2025. This acceleration after 2018 may be attributed to the convergence of global inclusion policies, increased implementation of SDG-4, and the rapid expansion of digital and hybrid learning environments, further intensified during the COVID-19 pandemic.

Table 1. Annual publication and citation metrics (2015–2025)

Year	Documents	Total citations	Average citations	h-index
2025	61	90	1.48	6
2024	66	162	2.45	8
2023	45	214	4.75	10
2022	43	394	9.16	11
2021	31	460	14.84	12
2020	43	752	17.49	13
2019	36	591	16.42	11
2018	28	380	13.57	10
2017	27	409	15.15	15
2016	19	372	19.58	11
2015	24	729	30.38	14

Recent studies similarly document how captioning systems, digital platforms, and AI-supported accessibility tools have reshaped instructional communication possibilities for DHH learners [37]–[39]. The temporal evolution of research output is further illustrated in Figure 2, which shows a sustained increase in annual publications on DHH instructional communication from 2015 to 2025. Citation indicators show a time-lag pattern, with earlier cohorts accumulating higher average citations and stronger h-index values compared to more recent publications. Across 2015–2025, Asian output accounts for 12.8% of global publications. China, South Korea, and Japan lead Asian productivity, while Southeast Asian participation (e.g., Malaysia, Indonesia, and Thailand) remains comparatively modest.

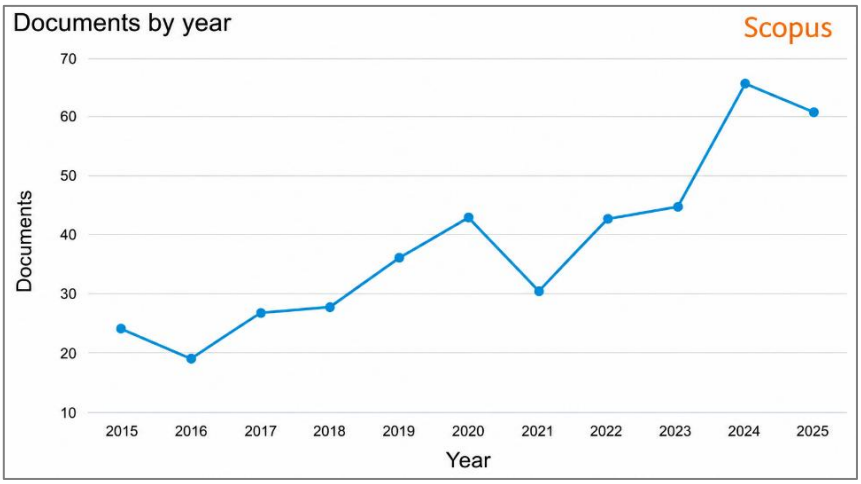

Figure 2. Annual publication trends (2015–2025)

3.2. Research collaboration and patterns of knowledge production

Co-authorship analysis across authors, institutions, and countries indicates that instructional communication research for DHH learners remains strongly Western-centered. Although Asian research activity is increasing, particularly in technology-oriented domains, representation within high-influence collaboration clusters remains limited. At the institutional level, collaboration hubs are dominated by Western universities and specialized deaf education centers, with no Asian institution meeting the VOSviewer inclusion threshold. Country-level collaboration shows the United States functioning as a central hub connecting multiple regions, while Asian countries occupy more peripheral positions. Cross-border collaboration involving Asian researchers is most visible in technology-oriented areas such as AI-mediated communication, remote interpreting, and digital accessibility tools [38], [40], [41].

3.3. Thematic evolution and emerging emphases (keyword co-occurrence)

Figure 3 identifies four major thematic clusters shaping instructional communication research for DHH learners between 2015 and 2025. The central cluster focuses on deafness, communication, and sign language. A second prominent cluster centers on hearing loss, hearing aids, and cochlear implants. A temporal shift is evident, with earlier studies emphasizing clinical-linguistic constructs and later research increasingly foregrounding inclusive education, accessibility, assessment, and technology-enhanced learning.

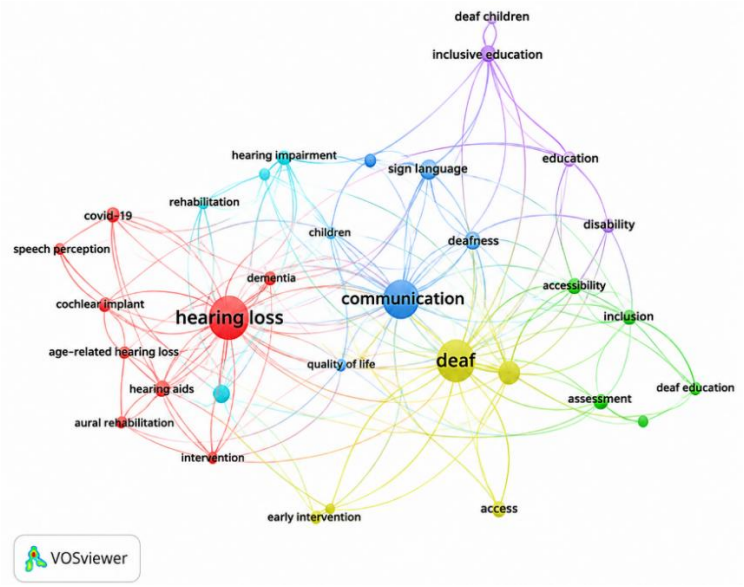

Figure 3. Keyword co-occurrence network

Asian-origin terminology remains limited within the global keyword map. Where visible, Asian research prioritizes inclusive education, communication barriers, bilingual education, teacher readiness, and assistive technology [38], [42]. East Asian studies more frequently foreground AI captioning, sign-language recognition, and remote interpreting [40], [41].

3.4. Intellectual structure: foundations and shifting centers of gravity

Co-citation and bibliographic coupling analyses indicate that the intellectual foundations of DHH instructional communication research are rooted in deaf education, language development, inclusive pedagogy, and communication sciences. Between 2020 and 2025, emerging research fronts increasingly focus on digital accessibility and AI-mediated communication, including automated captioning, sign language recognition, and hybrid instructional systems [43], [44]. Another stream addresses classroom inclusion for cochlear implant users, emphasizing multimodal strategies and instructional adaptation. A further emerging front highlights inclusive pedagogy in multilingual and multicultural contexts, particularly salient in Asian educational systems.

4. DISCUSSION

4.1. Interpreting publication growth and citation patterns

The sustained growth observed in publication output reflects intensifying global inclusion agendas and the rapid digitalization of instructional environments. This trend aligns with broader empirical work emphasizing interaction quality, communicative access, and engagement in inclusive classrooms [20], [34]–[36]. While Western research remains theoretically dominant, Asian contributions are more application-oriented, particularly in technology-enhanced communication, accessibility tools, and emerging digital learning environments.

However, increasing publication volume should not be interpreted as immediate intellectual consolidation. Citation patterns demonstrate a predictable time-lag effect, whereby earlier cohorts accumulate higher average citations and stronger h-index values due to longer circulation periods. Similar patterns have been observed in emerging technology-mediated interventions, where conceptual stabilization occurs gradually over time [40], [43]. These dynamics suggest that the field is expanding but remains in a process of theoretical consolidation. From an evaluative perspective, this expansion indicates growing recognition of instructional communication as central to inclusive teaching quality, yet consensus around core constructs and measurement approaches is still evolving.

4.2. Structural imbalances in regional participation and collaboration

Regional participation patterns reveal structural asymmetries in global knowledge production. The comparatively limited Asian output (12.8%) suggests uneven research capacity and fragmented regional integration. Given that multilingual and multimodal classroom ecologies are prevalent across Asian educational systems, this imbalance raises questions about the generalizability of dominant instructional communication frameworks.

Collaboration patterns indicate that research agendas and methodological norms are still shaped by a small set of dominant centers. Stronger Asia–West and intra-Asia collaboration is needed so inclusive education frameworks reflect local governance realities and culturally embedded understandings of disability in Southeast Asia [45], [46]. Country-level collaboration patterns indicate that the United States functions as a central hub, while Asian countries remain more peripheral. Although cross-border collaboration involving Asian researchers is visible in technology-oriented areas such as AI-mediated communication and digital accessibility [38], [40], [41], these networks remain relatively fragmented. Strengthening comparative and multi-site research designs may therefore be essential to test whether instructional communication practices generalize across diverse linguistic and technological contexts**.**

4.3. Thematic shifts and conceptual reorientation

Thematic analysis indicates a gradual shift from clinically oriented and modality-specific approaches toward integrated, multimodal, and technology-enhanced perspectives. Earlier research often foregrounded clinical-linguistic constructs, whereas more recent studies emphasize inclusive education, accessibility, assessment, and digital learning environments [15], [17]. This transition reflects pandemic-driven disruptions that intensified attention to communicative resilience and adaptability. It also signals a conceptual broadening of instructional communication beyond device-supported access toward holistic pedagogical responsiveness [47]–[49].

Nevertheless, Asian-origin terminology remains comparatively limited within global keyword structures. Where present, Asian research tends to prioritize inclusive education, communication barriers, bilingual education, teacher readiness, and assistive technology [38], [42], while East Asian research more

frequently foregrounds AI captioning, sign-language recognition, and remote interpreting [40], [41]. Although these contributions enrich applied and technological domains, they remain less visible within dominant conceptual clusters.

4.4. Intellectual centers and emerging fronts

Co-citation patterns indicate that foundational intellectual cores remain anchored in deaf education, language development, inclusive pedagogy, and communication sciences. At the same time, bibliographic coupling reveals more dynamic movement in emerging fronts, particularly in digital accessibility and AI-mediated communication [43], [44]. Notably, Asian contributions are more visible in these emerging domains than in established co-citation cores. This suggests that regional scholars are shaping future-oriented research directions rather than reinforcing foundational theoretical frameworks. While such positioning highlights innovation, it may also contribute to center–periphery dynamics in citation visibility and theoretical recognition.

Conceptually, Asian contexts represent distinctive communicative ecologies characterized by multilingualism, varied sign-language recognition regimes, and uneven digital infrastructures [3], [50]. These contextual features challenge assumptions embedded in dominant instructional communication models. If such contexts remain peripheral in theory-building processes, the global validity of prevailing frameworks for evaluating inclusive teaching quality may be constrained.

4.5. Implications for policy and practice

The findings suggest that strengthening inclusive teaching quality requires integrating multimodal instructional communication competencies into teacher education and continuous professional development. Given the increasing role of digital and hybrid learning environments, educators must be equipped to effectively combine sign language, visual supports, written scaffolds, and technology-mediated communication to ensure equitable access for DHH learners, consistent with global inclusive education priorities [1]. From a policy perspective, education systems should prioritize the development of accessible digital infrastructure, standardized captioning quality, and inclusive communication guidelines that align with diverse linguistic and cultural contexts. In Asian settings, where multilingualism and uneven technological access are prevalent, policies must be context-sensitive and responsive to local educational ecologies. Furthermore, strengthening regional research capacity and cross-border collaboration is essential to reduce existing imbalances in global knowledge production. Greater inclusion of Asian perspectives in theoretical and empirical research will enhance the relevance and applicability of instructional communication frameworks for evaluating inclusive teaching quality across diverse educational systems.

5. CONCLUSION

This bibliometric review examined global publication trends, collaboration networks, thematic developments, and intellectual structures in instructional communication research for DHH learners between 2015 and 2025. The findings show sustained growth and increasing diversification in the field. There is also a clear shift from clinically oriented approaches toward multimodal, technology-enhanced, and inclusion-focused perspectives. Despite this progress, structural asymmetries remain. Western institutions continue to dominate high-impact collaboration networks and foundational theoretical cores. In contrast, Asian research remains comparatively peripheral, although it is increasingly active in emerging technology-oriented domains. These patterns suggest that current conceptualizations of instructional communication, and consequently inclusive teaching quality, are shaped by limited institutional and linguistic contexts.

This study advances the field by establishing instructional communication as a measurable indicator of inclusive teaching quality. This includes communicative access, learner participation, and pedagogical responsiveness. By mapping how this construct has been conceptualized and operationalized across the literature, the study provides a more systematic understanding of how inclusive teaching quality can be evaluated in diverse educational settings. However, the analysis is limited by the use of a single database (Scopus), the inclusion of English-language publications only, and the defined time frame. In addition, bibliometric methods do not assess the methodological quality of individual studies. Future research should expand database coverage, include multilingual sources, and strengthen cross-regional collaboration. These steps are necessary to improve the global validity and contextual relevance of instructional communication frameworks in inclusive education.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Siti Farisah Yahya	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	
Syar Meeze Mohd Rashid	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓
Khairul Farhah Khairuddin	✓			✓	✓					✓	✓	✓		

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest associated with this publication.

INFORMED CONSENT

This study analyzed bibliographic records from published literature and did not involve human participants or personal data.

DATA AVAILABILITY

The dataset was derived from Scopus using the search strategy reported in the Methods section. Access to Scopus data is subject to database licensing restrictions; processed data and analysis files can be provided upon reasonable request.

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BIOGRAPHIES OF AUTHORS

Siti Farisah Yahya is a Ph.D. Candidate at the Centre for Community Education and Well-Being, Faculty of Education, Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, Malaysia. She holds a master's degree in special education from Universiti Pendidikan Sultan Idris (UPSI), Malaysia. Her research focuses on deaf and hard-of-hearing education, pedagogical communication, and teacher professional development. She can be contacted at email: farisahyahya2015@gmail.com.

Syar Meeze Mohd Rashid is a senior lecturer at the Centre for Community Education and Well-Being, Faculty of Education, Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, Malaysia. He holds a Ph.D. in Special Education (Hearing Impairment) from UKM and a Master of Education from University of Malaya (UM). His research interests include Malaysian sign language, hand-code communication for hearing impairment, inclusive education, and spiritual education for persons with disabilities. He can be contacted at email: cikgumeeze@ukm.edu.my.

Khairul Farhah Khairuddin is a senior lecturer at the Centre for Community Education and Well-Being, Faculty of Education, Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, Malaysia. She holds a B.Ed. (Special Education) from UKM, an M.A. in Special Education from the University of Newcastle (Australia), and a Ph.D. in Inclusion and Deaf Education from the University of Manchester, UK. Her research interests are inclusive education, special education for children who are deaf or hard-of-hearing, and teacher preparation in diverse educational contexts. She can be contacted at email: kfk@ukm.edu.my.