

# The Bibliometric Analysis of Interventions in English Literacy Difficulties of Primary School Students with Dyslexia

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## **The Bibliometric Analysis of Interventions in English Literacy Difficulties of Primary School Students with Dyslexia**

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### **Abstract**

This study aims to map the research landscape on English literacy difficulties and interventions among primary school students with dyslexia using a bibliometric approach. Data were retrieved from the Scopus database using targeted keywords, resulting in 63,184 documents. After applying filters for publication year (2020–2025), subject area (social sciences), language (English), and open-access status, a final dataset of 1492 relevant articles were obtained. Following this, the analysis was subsequently performed in RStudio using Biblioshiny and visualized with VOSviewer. The results indicate a substantial decrease in annual growth in publications, despite high levels of author involvement and collaborative endeavours. The United States and the United Kingdom dominate in production and citation impact, and notable journals, scholars, institutions, and nations are among the key contributors. Likewise, four major research areas emerged from the thematic cluster analysis: foundational literacy skills, learning disorders in school settings, speech and communication difficulties, and educational psychology topics such as self-esteem. Findings from this study underscore the need for early,



organized, and comprehensive interventions for children with dyslexia, a condition with several facets. To close the gap in dyslexia-related scholarship worldwide, it also highlights the need for more inclusive, geographically diverse research collaborations.

## **Introduction**

English literacy, encompassing reading and writing, is a key skill for primary students, forming the basis for learning in subjects like science, math, and social studies (Gomes et al., 2016). Early literacy strongly predicts future academic success (Peixoto et al., 2023), and students with solid reading and writing abilities are generally better prepared for higher education and career opportunities (Tsagari & Sperling, 2017).

Early intervention is essential for addressing literacy challenges. Strategies like dialogic reading have been effective in supporting English language learners (ELLs) by enhancing their oral language skills (Kennedy & McLoughlin, 2023). Beyond school, the home environment also plays a critical role; children with rich early literacy experiences tend to perform better in primary school (Bigozzi et al., 2023).

Globally, 7.10% of primary students are estimated to have developmental dyslexia (Yang et al., 2022), which mainly impairs reading and writing. Dyslexic children often read slowly, make frequent decoding errors, and struggle with comprehension and spelling (Ali et al., 2025; Chan et al., 2004; Van Setten et al., 2021). Writing may also be difficult, with issues in handwriting, idea organization, and grammar (Chan et al., 2004; Isa et al., 2019).

From a cognitive-linguistic perspective, phonological awareness deficits are a core characteristic (Chalmpé & Vlachos, 2025; Van Setten et al., 2021). Difficulties with working memory, attention, and processing speed further impact academic performance (Chalmpé & Vlachos, 2025; Xiao et al., 2022). Emotionally, dyslexic students may experience anxiety, frustration, and low self-esteem, which can lead to withdrawal from learning activities and social difficulties (Chan et al., 2004; Novita, 2016; Xiao et al., 2023). Additional signs may include poor motor coordination and, in some cases, grade repetition due to ongoing academic struggles (Chalmpé & Vlachos, 2025; Van Setten et al., 2021).

However, fragmentation in previous research on interventions for English literacy difficulties among elementary school students with dyslexia persists in the current literature. As shown by past studies, research has focused on specific learning approaches, cognitive barriers, or emotional issues encountered by students with dyslexia. These points create a notable gap in the systematic and analytical coverage of this area, as reflected in how research on English literacy and dyslexia in primary schools has evolved, which themes dominate current discourse, and where international collaboration is most active. As a result, educators and policymakers may lack holistic foundational references to support reliable interventions and allocate resources in line with evolving needs.

To fill the knowledge gap, this study applied bibliometrics. Bibliometric analysis, a quantitative research methodology, is a highly effective tool for examining publishing trends, citation influence, and collaboration (Donthu et al., 2021; Mayr et al., 2018; Zupic & Čater, 2015). With this approach, the most prolific authors, emerging trends, and conceptual frameworks within a particular research domain can be identified. Specifically, in the context of elementary education studies focused on interventions, English literacy difficulties, and dyslexia, this approach is highly

relevant. It can be used to track the dynamics of research developments and identify areas requiring further exploration.

Consequently, the purpose of this study is to compile a thorough bibliometric review of studies that have examined interventions in English literacy difficulties among dyslexic primary students. By analyzing the composition and evolution of the current literature, the study identifies key trends, significant contributors, and recurring themes in this field.

Specifically, the objectives are to (1) identify the publication trends and research productivity related to interventions in English literacy difficulties among dyslexic primary students, (2) determine the most influential authors, journals, and institutions, (3) analyze international collaboration and its impact on citation metrics, and (4) explore the dominant thematic clusters within this research area. The findings of this study are expected to provide valuable insights that can inform future research directions, support educators in implementing effective interventions, and assist policymakers in developing inclusive educational strategies for students with dyslexia.

To accomplish these research aims and objectives, the following research questions are hereby formulated:

1. What are the major research trends and publication patterns related to interventions in English literacy difficulties among dyslexic primary students between 2020 and 2025?
2. Which journals, authors, and institutions have contributed most significantly to this field of study during the period under review?
3. Which countries demonstrate the highest research productivity and citation impact in English literacy interventions for dyslexic primary students?
4. What are the dominant thematic clusters in the research on English literacy interventions for dyslexic children in primary schools, and how are they interconnected?

## **Literature Review**

### ***Research on dyslexia and literacy development***

Research has long established that dyslexia is a multifactorial learning disorder characterized primarily by deficits in phonological processing (Faisca et al., 2023; Prabhu et al., 2024; Ring & Black, 2018), decoding (Georgitsi et al., 2021; Handler & Fierson, 2011; Peterson, 2014), and working memory (Barbosa et al., 2019; Medina & Guimarães, 2021). These deficits often result in persistent challenges in reading, spelling, and writing, particularly among primary school children (Lee & Ha, 2025; Tambyraja et al., 2023). More recent studies emphasize that dyslexic learners also struggle with foreign language acquisition, such as English, due to difficulties in pronunciation, spelling, and memory retention (Dimililer & Istek, 2018; Kamal, 2020; Mayorova & Sinitsyna, 2018).

In the context of literacy development, two primary theories, including the phonological deficit theory (Snowling, 2000) and the dual deficit hypothesis (Wolf & Bowers, 1999), have dealt in depth with the concept of literacy barriers. Various literacy difficulties are attributed to delays in phonological processing and slow naming speed, as both theories explain. Dyslexia, as demonstrated by numerous research findings, involves complex cognitive and linguistic aspects. This complexity is often a major source of additional challenges in multilingual learning, particularly for ELLs.

This implies that pedagogical strategies, linguistic frameworks, and cognitive models are key elements to incorporate into a multidimensional approach to conducting an in-depth analysis

of dyslexia and literacy development. Likewise, difficulties with reading and writing in the first language, as well as the complexities of learning a foreign language such as English, are key factors to consider when designing effective literacy interventions for dyslexic students.

To achieve these goals, this study applies bibliometric methods to map the various forms of interventions developed and to explore the direction of research in related fields. Through this approach, the research aims to identify the most effective interventions and uncover any remaining shortcomings in previous studies.

### ***Emotional and psychosocial dimensions of dyslexia***

The emotional and psychosocial impacts of dyslexia are also receiving increasing attention in various studies. Increased anxiety and depression (Ihbour et al., 2021; Wang et al., 2023; Xiao et al., 2022, 2023), as well as low self-esteem (Nasika & Thoma, 2023; Zuppardo et al., 2020), are common in elementary school students with dyslexia, particularly as a result of repeated academic difficulties and experiences of marginalization (Anderson, 2009; Sadeghi et al., 2024; Vizhi & Rathnasabapathy, 2023).

Similarly, some studies report that these problems are worsened or can be addressed through interactions with teachers and peers (Leslie, 2025a, 2025b; Yildiz et al., 2012). Alternatively, other research suggests that regular parental support has a protective function by improving educational outcomes and fostering resilience in ELLs (Leslie, 2025a; Pouillet & Wendland, 2021).

In addition to their academic performance, these studies underscore the significance of addressing the psychosocial well-being of dyslexic learners. It is implied that interventions for these ELLs should adopt a holistic framework that addresses cognitive and linguistic difficulties, as well as emotional and social well-being. This paper argues for systematically mapping current initiatives and research trends through a bibliometric approach. Using this method, it is possible to discover beneficial solutions and identify gaps in areas where psychosocial dimensions are not yet fully understood.

### ***Intervention programs and their effectiveness***

Building on the aforementioned issues, it is crucial to review prior studies on interventions and their effectiveness. Numerous investigations have documented structured and efficacious interventions aimed at enhancing phonological awareness (Layes et al., 2022; Lee & Kim, 2025; Munro, 2017; Wise et al., 2016), as well as auditory and visual memory (Fusco et al., 2015; Lawton, 2016; Peters et al., 2019; Van Herck et al., 2022), and reading comprehension (Harrar-Eskinazi et al., 2022; Mazaheri et al., 2024; Soriano-Ferrer et al., 2025; Zygouris et al., 2018). In the case of literacy outcomes, these interventions have resulted in significant improvement when implemented in the early stages of primary education (Lawton, 2016; Mazaheri et al., 2024).

Concurrently, early-stage therapy programs aimed at fostering emotional resilience have been advocated as a means of reducing stress and psychological burden (Alexander-Passe, 2008; Łodygowska & Czepita, 2012). While these approaches have demonstrated efficacy in local contexts, they often lack scalability and broader applicability, limiting their worldwide relevance (Alqahtani, 2024; Hall et al., 2023; Toffalini et al., 2021). These limitations underscore persistent structural deficiencies in dyslexia research, particularly the lack of an integrative framework that holistically encompasses cognitive, emotional, and contextual dimensions.

Therefore, while profound, existing knowledge of dyslexia interventions remains fragmented and highly context-dependent. There is an urgent need for a more comprehensive synthesis of research trajectories and intervention outcomes to bridge micro-level pedagogical insights with macro-level policy and strategic frameworks. To this end, this study adopts a bibliometric methodology to systematically map the global research landscape on intervention efficacy, assess its impact, and uncover remaining gaps that hinder scalability and long-term educational transformation.

### ***Geographic and methodological gaps in research***

The strength of existing literature lies in its multidisciplinary scope, integrating psychology, education, linguistics, and special education to provide a holistic understanding of dyslexia as both a cognitive and socio-emotional challenge. However, this comprehensive approach has not fully addressed several limitations. Research remains heavily concentrated in Western contexts (Wu et al., 2022; Zhang et al., 2021), with limited representation from Africa (Janaathanan & Nithyanandam, 2020), Central Asia, and parts of the Middle East (Aldakhil, 2024; Sharma & Sagar, 2017; Sun et al., 2013).

Worldwide collaboration is also still limited, restricting the diversity of perspectives and the interplay of intervention approaches (Han, 2025; Whitley et al., 2018). Furthermore, many intervention studies still focus on the short term (Thurmann-Moe et al., 2021) and lack longitudinal evaluation of outcomes and sustainability (Omar et al., 2023).

Thus, bibliometric mapping serves as a critical methodological tool for visualizing these disparities, enabling researchers to identify underrepresented regions, collaboration networks, and structural gaps in global publication patterns (Donthu et al., 2021). This implies that future research on dyslexia interventions should prioritize greater geographic inclusivity and cross-cultural collaboration to ensure that findings are globally representative and contextually adaptable.

Methodologically, there is an urgent need for longitudinal and comparative designs that can assess the durability of intervention effects over time. In this study, the identified gaps justify using a bibliometric approach to examine the global distribution, collaboration networks, and methodological patterns in dyslexia research, thereby identifying underexplored areas and informing more equitable and inclusive research practices.

### ***Rationale for the present study***

The rationale for this study is based on the previous studies that highlight cognitive, emotional, and pedagogical dimensions of dyslexia. Nevertheless, the understanding of this field is still fragmented because of spatial inequalities, the limitation of inclusivity, and short-term interventions (Han, 2025; Whitley et al., 2018). To mitigate these limitations, this study applies bibliometric analysis to offer a reliable framework for outlining worldwide research trends, publication patterns, and thematic priorities from 2020 to 2025.

Through this approach, this paper aims to provide a more comprehensive and inclusive insight into English literacy difficulties among primary school students with dyslexia. Likewise, this study identifies potential areas for future research and promotes broader global collaboration to achieve educational equality.

## Method

### *Study design*

A bibliometric approach was used to identify knowledge gaps and guide future research on interventions to address English literacy barriers among primary students with dyslexia. This analysis offers an overview of research developments over time, revealing trends and patterns through a quantitative examination of bibliographic data, as noted by Donthu et al. (2021) and Mayr et al. (2018). Furthermore, this approach allows for a systematic and numerical evaluation of research progress (Zupic & Čater, 2015).

To strengthen its conceptual foundation, the analysis was grounded in bibliometric theory, drawing on Price's Law of exponential scientific growth (Price, 1963) and Lotka's Law of author productivity (Lotka, 1926). These basic models explain how scholarly output, collaboration, and citation patterns develop across disciplines, offering a theoretical perspective for interpreting research productivity and influence. By applying these bibliometric principles, this study goes beyond descriptive mapping to evaluate the structural maturity and dynamics of knowledge diffusion in the fields of dyslexia and English literacy research.

### *Data source*

The data sources that were used in this study were obtained from the Scopus database. This source is utilized because it is globally acknowledged as a reliable and comprehensive index of peer-reviewed scientific databases, as confirmed by previous studies (Baas et al., 2020; Pranikutė, 2021; Wahyuni et al., 2024). To ensure methodological rigour and relevance, the search was then limited to journal articles published in the social sciences, open access, written in English, and indexed between 2020 and 2025.

The time frame in this study was selected to capture recent advances in literacy intervention strategies, reflecting current pedagogical and technological innovations. The year of publication was limited to the last five years to ensure that the analysis includes studies utilizing the latest methods and technologies, which are likely to be more robust and reliable (Hong & Pluye, 2018).

### *Data collection*

To obtain the data from the Scopus database, the keywords employed were TITLE-ABS-KEY ("intervention" OR "strategy" OR "approach" OR "method") AND ("English" OR "language" OR "linguistic" OR "communication") AND ("learning" OR "acquisition" OR "education" OR "development") AND ("dyslexia" OR "reading disorder" OR "learning disability" OR "specific learning difficulty") AND ("support" OR "assistance" OR "treatment" OR "remediation").

This search yielded 63,184 papers as of March 2025, exceeding the minimum requirement of 200 documents for a valid bibliometric analysis, as suggested by Rogers et al. (2020). After applying filters for language (English), publication type (article), publication period (2020-2025), and open-access status, the dataset was reduced to 3849 papers. A final screening for topic relevance yielded 1492 articles. The selection process adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021), to ensure transparency and replicability.

**Data analysis**

To analyze the data, RStudio’s biblioshiny package was then used to perform descriptive and network-based bibliometric analyses. This software is used because its capability enables quantitative assessment of publication patterns, citation structures, and author collaboration networks, offering information about influential researchers, conceptual frameworks, and emerging research themes, as recommended by Aria and Cuccurullo (2017) and Donthu et al. (2021).

Additionally, to improve visualization and thematic exploration, VOSviewer was employed to generate co-authorship, co-citation, and keyword co-occurrence maps, as suggested by prior studies (Al Husaeni & Nandiyanto, 2021; Soegoto et al., 2021; Suryantoro et al., 2023).

**Results**

The following section presents the findings of the bibliometric analysis in line with the research questions. Initially, it provides a brief overview of research trends and publication patterns from 2020 to 2025 associated with English literacy difficulties among dyslexic primary students. It then analyzes the foremost journals, authors, and institutions that have made significant contributions to this field. Third, it analyzes the countries with the highest levels of research productivity and citation impact. Finally, it identifies the dominant thematic clusters that characterize the research landscape.

Figure 1 provides a clear overview of academic publishing during this period, where a total of 1492 documents were published. However, despite this output, the field saw an annual growth decline of 24.61%. The number of contributors remained high, with 5133 authors involved. On average, each publication had around four co-authors, although only 20.84% of the publications involved international collaboration.

In addition, 118 papers were single-authored, showing that solo research continues but is not dominant. Publications were spread across 433 sources, with 93,453 references cited, and 3690 unique author keywords recorded. The documents had an average age of 2.7 years, and each received about 7.4 citations, indicating that the field is both recent and moderately impactful.

Timespan 2020:2025	Sources 433	Documents 1492	Annual Growth Rate -24.61%
Authors 5133	Authors of single-authored docs 118	International Co-Authorship 0.84%	Co-Authors per Doc 3.98
Author's Keywords (DE) 3690	References 93453	Document Average Age 2.7	Average citations per doc 7.399

Figure 1: Overview of bibliometric descriptors for articles on English literacy and dyslexic primary students.

Regarding publishing outlets, Figure 2 highlights the top 10 journals. The Journal of Applied Research in Intellectual Disabilities ranked first with 69 papers, followed by Frontiers in Education (63) and Sustainability (Switzerland) (53), suggesting an interdisciplinary focus on education, societal development, and sustainability. Other contributors included the Journal of

Speech, Language, and Hearing Research (50) and Education Sciences (44). Mid-level journals included the International Journal of Language and Communication Disorders (37), Dyslexia (34), and the American Journal of Speech-Language Pathology (33), with the list completed by Language, Speech, and Hearing Services in Schools (32) and the European Journal of Special Needs Education (31). This distribution reflects both diversity and specialization across education, communication disorders, and special needs research.

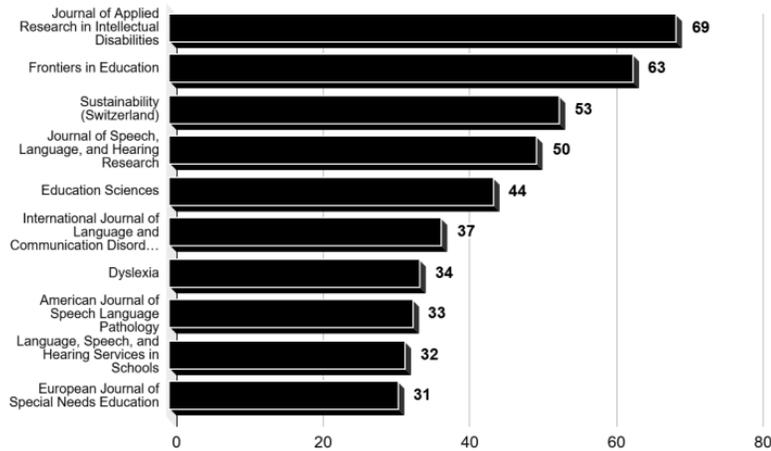


Figure 2: The distribution of pertinent publication outlets.

Regarding authorship, Figure 3 identifies Sharon Vaughn as the most prolific researcher, with 10 published documents. She is followed by Philip Capin with 9, and Johny Daniel, Gail Gillon, Richard Hastings, Mohamad Ahmad Saleem Khasawneh, and Suze Leitão, each with 8 publications. Robert Didden, Peter Langdon, and Greg Roberts contributed 7 each. This distribution indicates a relatively balanced authorship pattern, with no single scholar dominating.

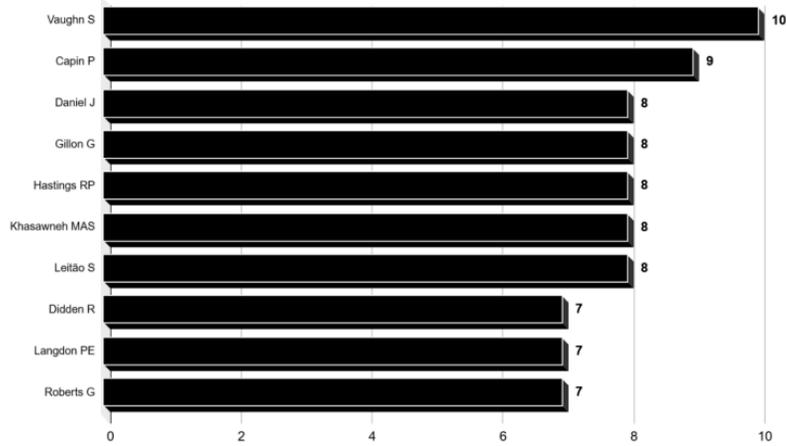


Figure 3: The ten foremost authors.

Figure 4 presents the most active institutions. The University of California leads with 77 publications, followed by the University of Cambridge (54) and the University of Amsterdam (51). Florida State University and University College London also contributed significantly with 50 and 45 publications, respectively. Other key contributors included Radboud University (42), the University of Canterbury (40), the University of Texas at Austin (35), Arizona State University (34), and the University of Calabar (32). These institutions highlight the concentration of research in Western hubs, alongside emerging contributions from Africa.

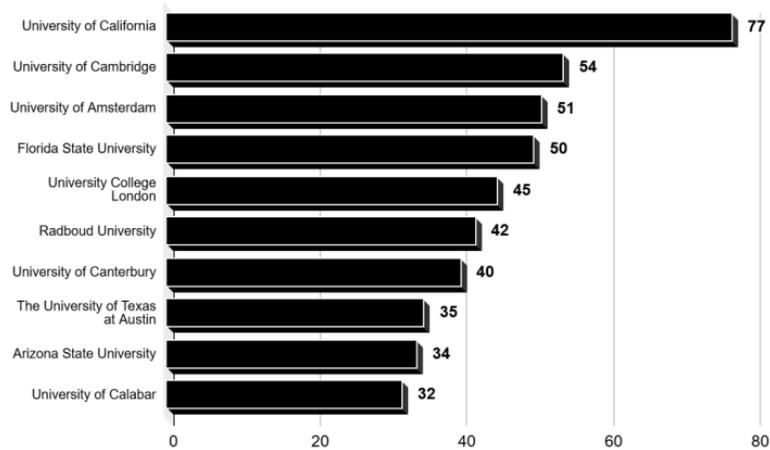


Figure 4: The ten foremost affiliations.

At the national level, Figure 5 illustrates global patterns. The United States dominates the field, followed by the United Kingdom, with additional contributions from Australia, Canada, the Netherlands, and Germany. Moderate participation was recorded from India, China, Brazil, Nigeria, and South Africa. At the same time, regions such as Central Africa, Central Asia, and parts of the Middle East had little to no indexed output.



Figure 5: The geographical distribution of publication outputs by country.

The analysis of citations, illustrated in Figure 6, highlights the USA as the most influential country with 2060 citations, followed by the UK (1888) and the Netherlands (495). This strengthens the observation that the field is dominated by Western countries in both output and impact.

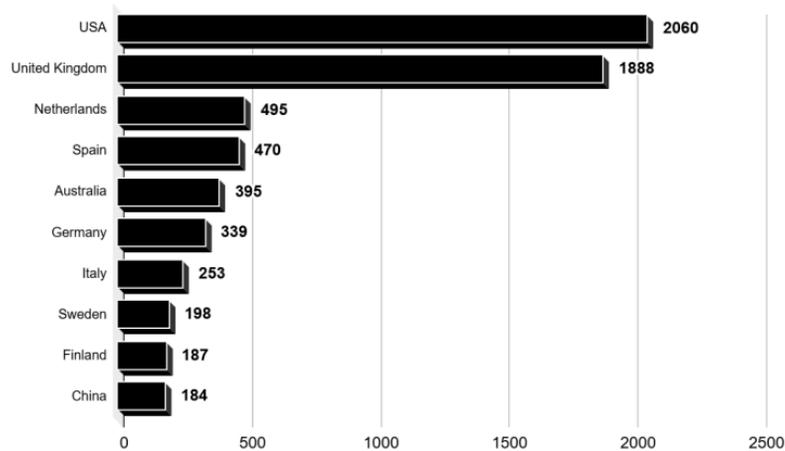


Figure 6: Most influential countries and their respective total number of citations.

Finally, Figure 7 shows four major thematic clusters. The red cluster emphasizes foundational literacy skills, including reading, vocabulary, phonological awareness, and spelling. The blue cluster highlights school-related terms, including learning, dyslexia, reading comprehension, and self-esteem. The green cluster relates to speech disorders, communication, and social interaction, while the yellow cluster emphasizes writing, decoding, and self-efficacy. In addition to literacy challenges, these clusters indicate that research encompasses affective, communicative, and developmental dimensions.



Research in Intellectual Disabilities, *Frontiers in Education, Sustainability*) (Kaldas et al., 2020; Rawat, 2014). Similarly, authorship patterns reveal a stable group of contributors, such as Sharon Vaughn and Philip Capin, who sustain the literature through collaborative networks and research leadership (Abbasi & Kenneth Chung, 2013; Bindu et al., 2019; McGowan et al., 2020; Mogaji, 2024; Mullen et al., 2013; Stenberg & Beare, 2024). This pattern underscores the importance of research collaboration and consistent scholarly productivity for advancing educational science, as supported by previous studies (Abramo et al., 2016; de Frutos-Belizón et al., 2024; Heiser, 2023).

At the institutional level, dominance by Western universities such as California, Cambridge, and Amsterdam reflects broader patterns of academic productivity and impact (Garner et al., 2018; Ma & Ladisch, 2016). The contribution of institutions like the University of Calabar signals emerging representation from Africa, though overall disparities persist. Geographically, Western dominance is reinforced, with the USA and UK leading in both productivity and citations, echoing earlier observations of limited representation from non-Western regions (Aldakhil, 2024; Han, 2025; Wu et al., 2022).

Regional gaps in Central Africa, Central Asia, and the Middle East are likely linked to funding and infrastructural barriers (Hottenrott & Lawson, 2017; I Narayan et al., 2021; Janodia et al., 2021; Narayan et al., 2023; Shehatta & Al-Rubaish, 2019). Citation analysis further confirms Western influence, with the USA, UK, and Netherlands producing the greatest impact (Abramo et al., 2016; Maral, 2024; Shehatta & Al-Rubaish, 2019).

Thematic clusters demonstrate that research goes beyond phonological and literacy skills, traditionally emphasized as the core deficits of dyslexia (Faisca et al., 2023; Georgitsi et al., 2021; Peterson, 2014; Prabhu et al., 2024), to include emotional, communicative, and developmental dimensions. This aligns with evidence showing that dyslexia is a multifactorial condition involving both phonological and non-phonological deficits (Dimililer & Istek, 2018; Menghini et al., 2010; Sadeghi et al., 2024; Vender, 2017; Zygouris et al., 2018). Interventions focusing on phonological awareness, memory, and comprehension have proven effective (Harrar-Eskinazi et al., 2022; Layes et al., 2022; Zygouris et al., 2018), confirming earlier evidence of the success of structured literacy programs in improving reading outcomes among dyslexic learners.

Regardless, emotional issues, including anxiety, depression, and low self-esteem, are still present as barriers, specifically stipulated in existing research on the psychosocial impact of dyslexia (Alexander-Passe, 2009; Alexander-Passe, 2008; Ibour et al., 2021; Sadeghi et al., 2024; Yildiz et al., 2012). To address emotional issues effectively, holistic intervention frameworks should encompass cognitive, language demands, emotional well-being, and social inclusion, as these aspects are interconnected and crucial (Leslie, 2025a, 2025b; Pouillet & Wendland, 2021).

In contrast, parental involvement consistently strengthens resilience and academic adjustment (Leslie, 2025a; Pouillet & Wendland, 2021), while social interaction with teachers and peers can either exacerbate or mitigate these difficulties in self-esteem (Yildiz et al., 2012). For long-term effectiveness, early identification of issues and the provision of personalized interventions are essential (Harrar-Eskinazi et al., 2022; Jincy & Hency Jose, 2021; Menghini et al., 2010; van der Leij et al., 2013; Vender, 2017).

Overall, even though the field is academically active and rich in thematic content, it continues to struggle with issues such as declining growth, regional disparities, and limited inclusivity. It is imperative to address these gaps by promoting effective interventions and ensuring equitable support for dyslexic primary students, particularly in multilingual contexts where additional language acquisition presents compounded challenges, through enhanced international collaboration, broader representation, and integrated approaches that combine cognitive,

emotional, and developmental perspectives (Dimililer & Istek, 2018; Mayorova & Sinitsyna, 2018).

By incorporating these bibliometric insights alongside pedagogical and policy perspectives, a more transparent link can be established between research findings and classroom practice. The need for capacity-building initiatives and funding strategies that encourage equitable participation from underrepresented regions is underscored by the observed concentration of scholarship in the Western context and limited international collaboration. By aligning bibliometric trends with inclusive education frameworks, this study highlights practical pathways for developing early identification systems, teacher training modules, and evidence-based literacy interventions that are both contextually adaptable and globally informed.

### **Conclusion and Implications**

This study used bibliometric analysis to map and assess the research landscape surrounding English literacy challenges and intervention strategies for primary school students with dyslexia. Drawing from the Scopus database and employing tools such as Biblioshiny and VOSviewer, the analysis captured key trends in publication output, identified leading contributors, including top authors, journals, institutions, and countries, and uncovered major thematic clusters from 2020 to 2025.

Although publication volume has declined over time, the field remains vibrant, with notable collaboration among researchers and strong institutional involvement. Thematic analysis revealed that current research goes beyond just cognitive and academic concerns, such as reading, phonological awareness, and spelling, and increasingly addresses the emotional, communicative, and developmental needs of primary students with dyslexia. The dominance of Western countries in both research output and citations underscores the need for more inclusive global collaboration, especially involving underrepresented regions.

Overall, the findings reinforce the complex and multifaceted nature of dyslexia and the critical importance of early, tailored interventions. Looking ahead, future research should adopt innovative, inclusive, and interdisciplinary approaches, not only to better support students with dyslexia but also to bridge geographic gaps in research participation and knowledge production.

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