

Inclusive Technical and Vocational Education and Training for Learners with Disabilities and Marginalized Groups: A Bibliometric Analysis

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Abstract

This study mapped the development of research on inclusive Technical and Vocational Education and Training (TVET) for learners with disabilities and marginalized groups. Using a bibliometric design, 1,393 documents published from 1979 to 2026 and indexed in the Web of Science Core Collection were analyzed through Bibliometrix, VOSviewer, and Microsoft Excel. The analysis examined publication trends, productive and influential countries, journals, and authors, as well as the field's intellectual, conceptual, and social structures. Results showed a marked increase in publications after 2016, indicating growing scholarly attention to inclusive TVET. Research productivity and citation influence were

concentrated in high-income countries, particularly the United States, while international collaboration remained uneven. The literature was distributed across disability, rehabilitation, behavioral, medical, psychiatric, and vocational journals, confirming the field's multidisciplinary character. Co-citation analysis revealed strong intellectual foundations in behavioral intervention, rehabilitation, psychosocial support, transition, and employment-oriented research. Keyword and thematic analyses identified education, employment, disability, vocational training, rehabilitation, inclusion, skills, and supported employment as central concepts, although the field remained conceptually fragmented and more

developed around disability than broader forms of marginalization. The study concludes that inclusive TVET is an expanding but unevenly structured field. Stronger theoretical integration, wider participation from underrepresented regions, and closer alignment among teacher education, inclusive pedagogy, accessible curriculum, transition support, and labor-market participation are recommended.

Key words: *Inclusive, Technical and Vocational Education and Training, Learners with Disabilities, Marginalized Groups, Bibliometric Analysis*

Introduction

Technical and Vocational Education and Training (TVET) has become a strategic pathway for developing work-related skills, improving employability, and supporting inclusive participation in economic and social life. In contemporary education systems, TVET is not only concerned with preparing learners for specific occupations but also with expanding equitable access to skills development for diverse populations, including learners with disabilities and those from marginalized communities (UNESCO, 2016; Lange, Hofmann & Di Cara, 2020). Inclusive education, in this regard,

requires institutions to remove barriers to participation, provide responsive learning environments, and ensure that all learners are given meaningful opportunities to succeed (UNESCO, 2020; Florian & Black-Hawkins, 2011). Inclusive education further emphasizes that inclusion is a systemic responsibility involving teachers, administrators, families, peers, and policy actors rather than an isolated classroom practice (Ummah, Tahar, Yasin, Hashim & Ediyanto, 2024).

Despite the global commitment to inclusive education, learners with disabilities and marginalized groups continue to experience barriers in accessing and completing TVET programs. These barriers include inadequate facilities, limited assistive technologies, insufficient teacher preparation, inflexible assessment practices, and weak institutional support systems (WHO & World Bank, 2011; UNESCO, 2020). In vocational schools, the assessment of learners with special needs may also become problematic when teachers rely solely on minimum completion standards rather than on differentiated, disability-responsive assessment tools (Hutapea, 2024). Such findings suggest that inclusive TVET requires more than access to enrollment; it also demands curriculum adaptation,

accessible training environments, appropriate assessment, and strong transition support toward employment and lifelong learning (Garcia-Mandico, Prinz, Thewissen & Levy, 2022).

Scholarly attention to inclusive education has increased over the past decades. Bibliometric evidence shows that inclusive education has developed into a broad and multidisciplinary research field, with studies examining policy, pedagogy, teacher preparation, disability rights, equity, and educational governance (Hernández-Torrano, Somerton & Helmer, 2020; Cretu & Morandau, 2020). However, the specific intersection of inclusive education and TVET remains less consolidated, especially when viewed through the combined lens of disability inclusion and marginalization. Recent bibliometric work on TVET has shown increasing global interest in vocational education research, but it also indicates the need to examine more specialized themes, contributors, and collaboration patterns within the field (Jumamil-Valenzuela & Cuban, 2026; Donthu, Kumar, Mukherjee, Pandey & Lim, 2021).

Bibliometric analysis is useful for examining the development, structure, and direction of a research field through publication trends, citation patterns,

authorship productivity, keyword networks, and collaboration structures (Zupic & Čater, 2015). Relatively, science-mapping techniques also enable the identification of the intellectual, conceptual, and social structures of a body of literature by analyzing co-citation, keyword co-occurrence, and co-authorship relationships (Cobo, López-Herrera, Herrera-Viedma & Herrera, 2011). In the context of inclusive TVET, such an approach can reveal which countries, journals, and authors are shaping the field, what themes are emerging, and how researchers collaborate across institutions and national contexts. This approach is particularly important because inclusive TVET research spans multiple domains, including special education, vocational pedagogy, disability studies, labor-market participation, educational policy, and social equity (Hernández-Torrano et al., 2020; Arshad, Mudey & Dwiputrianti, 2026).

Considering these gaps, the present study conducts a bibliometric analysis of research on inclusive Technical and Vocational Education and Training for learners with disabilities and marginalized groups. Specifically, it aims to determine annual publication trends, identify the most productive and influential contributors by country, journal, and

author, and examine the field's intellectual, conceptual, and social structures. By mapping the development of this research area, the study is expected to provide a clearer understanding of how inclusive TVET scholarship has evolved and where future research may be directed. The findings may also guide researchers, teacher educators, TVET institutions, and policymakers in strengthening evidence-based approaches to inclusive skills development, particularly for learners who continue to face educational and labor-market disadvantages (Lange et al., 2020; Hutapea, 2024).

Method

Research Design

This study employed a bibliometric research design to examine the development of scholarly literature on inclusive Technical and Vocational Education and Training (TVET) for learners with disabilities and marginalized groups. Bibliometric research is appropriate when the aim is to quantitatively map publication growth, influential contributors, citation patterns, and knowledge structures within a specific field of inquiry (Donthu et al., 2021). This design is also suitable for identifying the intellectual, conceptual, and social structures of a research domain

through techniques such as citation analysis, co-citation analysis, keyword co-occurrence analysis, and co-authorship mapping (Zupic & Čater, 2015). Similar bibliometric approaches have been applied in education-related studies to systematically and visually examine research trends, productive authors, journals, countries, and emerging themes (Kılınç, 2024).

Data Collection

Shown in Figure 1 is the study's research process including the data collection and the tools used for the analysis. As displayed in the figure, the data for the study were retrieved from the Web of Science (WoS) Core Collection, specifically from the Science Citation Index-Expanded (SCI-Expanded); the Social Sciences Citation Index (SSCI); the Conference Proceedings Citation Indexes (CPCI-S & CPCI-SSH), Book Citation Indexes (BKCI-S & BKCI-SSH) and the Emerging Sources Citation Index (ESCI). The WoS was selected because it provides curated citation records, journal literature, conference proceedings, books, cited references, author information, affiliation data, and subject classifications, all of which are useful for bibliometric analysis. Additionally, the use of WoS is also

common in bibliometric studies because it allows researchers to retrieve structured bibliographic metadata needed for citation-based and network-based analyses (Kılınç, 2024).

The search strategy to the title, abstract, and author keywords fields was designed to capture literature on TVET, vocational education, technical education, inclusive education, disability, and marginalized learners. With this, the search string used included terms such as *"TVET," "technical and vocational education and training," "vocational education and training," "skills training," "inclusive education," "special education," "learners with disabilities," "marginalized learners," "disadvantaged youth," "out-of-school youth," "refugee students," and "rural learners."* In relation, the use of multiple synonymous and related terms strengthens retrieval because bibliometric datasets depend heavily on the completeness and precision of the search terms used to represent the research

domain (Donthu et al., 2021). Meanwhile, the search was not limited by a starting year, allowing the study to capture the field's historical development. However, the endpoint was set to June 2026 to define the dataset's final coverage.

The inclusion criteria presented in Figure 1 covered types of documents such as articles, proceedings papers, review articles, book chapters, and early access publications. These document types were included because bibliometric analysis can examine different forms of scholarly communication, particularly in fields such as education, training, policy, and practice-oriented research (Zupic & Čater, 2015). In addition, no language restrictions were applied to broaden the literature's coverage and avoid excluding potentially relevant studies on inclusive TVET from non-English-speaking contexts. After the search and refinement process, 1,393 documents were included in the final dataset for bibliometric analysis.

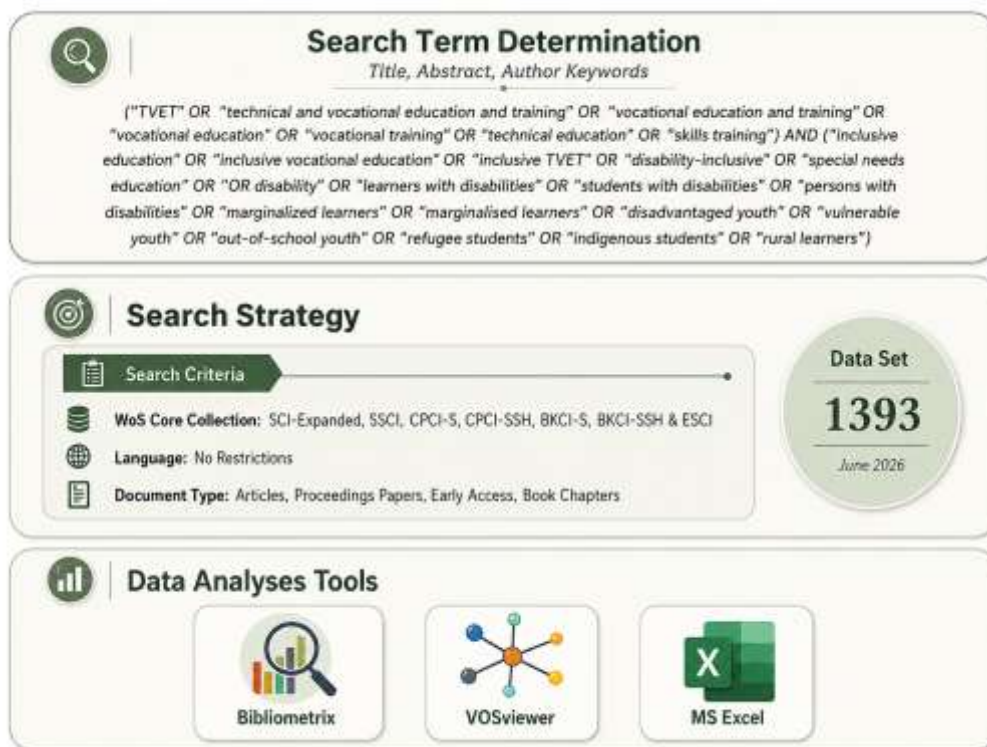


Figure 1. The Research Process
Source: Web of Science (WoS) Database

Data Analysis

The exported Web of Science records were analyzed using bibliometric techniques such as RStudio (Bibliometrix), VOSviewer, and MS Excel as presented in Figure 1. Their combined use provides a systematic procedure for describing publication trends, identifying influential contributors, and mapping the knowledge structures of inclusive TVET research.

Bibliometrix was used to process the bibliographic dataset and generate descriptive indicators, including annual publication trends, productive countries, influential journals, and contributing authors. Bibliometrix is an R-based tool designed for comprehensive science mapping and bibliometric analysis, making it appropriate for examining productivity, citation indicators, collaboration patterns, and thematic development (Aria & Cuccurullo, 2017). Its use is also consistent with recent bibliometric studies that used Biblioshiny or Bibliometrix, together with visualization tools, to analyze research

trends and scholarly contributions (Nurhayati, Rahmawati & Surwanti, 2024).

Consequently, the VOSviewer was used to visualize and analyze the field's intellectual, conceptual, and social structures. Specifically, it supported the mapping of relationships among keywords, authors, countries, journals, and cited sources. VOSviewer is widely used in bibliometric studies because it can construct and visualize bibliometric networks, enabling researchers to interpret clusters, link strengths, and relationships among bibliographic units (van Eck & Waltman, 2010). Its use is also appropriate for studies aimed at identifying research themes, collaboration networks, and emerging directions in education and vocational research (Zain, Rahman, Fadzil, Mohammad & Zulkifly, 2025).

Relatively, the MS Excel was used as a supplementary tool to organize, clean, tabulate, and summarize metadata before and after bibliometric processing. This step helped ensure that the data were properly arranged for frequency counts, table

preparation, and presentation of descriptive results. Data cleaning and organization are important in bibliometric analysis because errors in author names, keywords, source titles, or document information may affect the accuracy of productivity and network results (Donthu et al., 2021).

Findings

Publication Trends on Inclusive TVET for Learners with Disabilities and Marginalized Groups

Table 1 presents the descriptive general data for the studies included in the analysis of inclusive TVET for learners with disabilities and marginalized groups from 1979 to 2026. The dataset sourced from the WoS database comprises 1,393 documents published across 740 sources, including journals and books. These documents maintain an average age of 9.61 years and are supported by a vast scholarly foundation of 50,743 references. The academic impact of the collection is evidenced by an average of 19.77 citations per document.

Table 1. Descriptive General Data of the Included Studies

<i>General Information about Data</i>	<i>Results</i>
Time Span	1979:2026
Sources (Journals, Book, etc)	740
Documents	1393
Annual Growth Rate %	10.17
Average Document Age	9.61
Average Number of Citation per Document	19.77
References	50743
Keyword Plus	2176
Author's Keywords	3243
Authors	4967
Single Author Document	165
Coauthors per Document	3.99
International Coauthorships %	15.87

Source: Web of Science (WoS) Database

The authorship metrics from Table 1 indicate a highly collaborative research environment involving 4,967 total authors. The data shows that single-author documents are relatively rare with 165, while the average number of coauthors per document is 3.99. Furthermore, international coauthorships account for 15.87% of the total output. The intellectual breadth of the field is further reflected in the identification of 2,176 Keyword Plus

terms and 3,243 Author's Keywords across the sampled literature.

Relatively, Figure 2 presents the annual number of publications and the average number of citations by year for inclusive TVET for learners with disabilities and marginalized groups. According to the figure, publication output remained low from 1979 to the early 2000s, with several years recording only 1 or 2 publications. A gradual increase in publications was observed after 2010, while a more

pronounced rise occurred from 2016 onward. The highest number of publications was recorded in 2025, with 148, followed by a lower count in 2026. In terms of citation indicators, the mean total citations per article reached its highest

value in 2004 with 108.53, followed by 1990 with 95.80. Other visible citation values were recorded in selected years. The mean total citations per year remained lower than the mean total citations per article throughout the covered period.

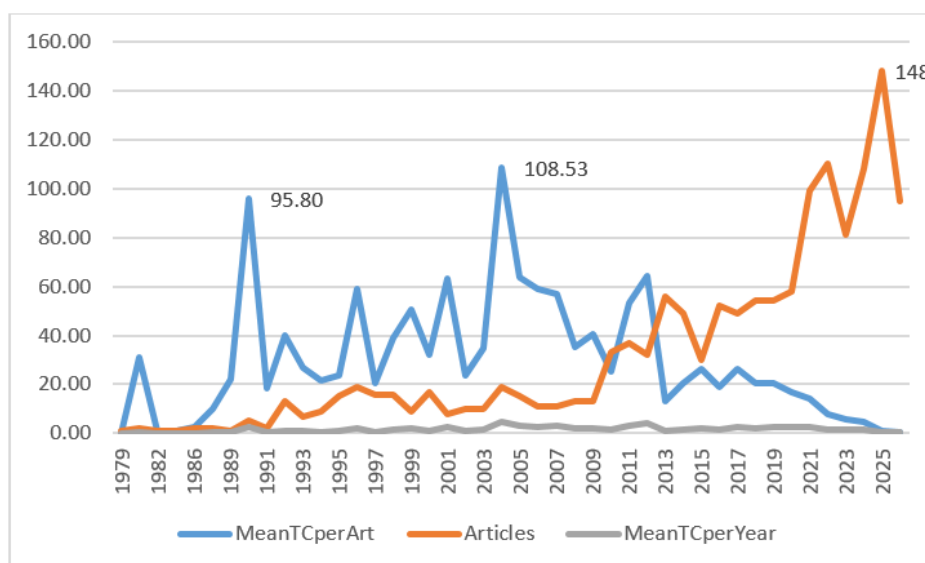


Figure 2. Number of Publications and Average Citation by Year

Source: Web of Science (WoS) Database

Most Productive and Influential Research Contributors to Inclusive TVET Research

The scholarly landscape of inclusive Technical and Vocational Education and Training (TVET) research reveals distinct patterns of geographic, institutional, and individual leadership. Regarding geographic contributions, as shown in Table 2, the United States recorded the highest number of articles, with 484 publications, comprising 455 single-country publications (SCP) and 29 multiple-country publications (MCP). Germany

followed with 81 articles, including 71 SCP and 10 MCP, while the United Kingdom ranked third with 71 articles, consisting of 56 SCP and 15 MCP. Australia produced 67 articles, with 55 SCP and 12 MCP, followed by China with 64 articles, including 42 SCP and 22 MCP. Canada also ranked among the leading contributors, with 58 articles, including 41 SCP and 17 MCP. The remaining countries in Table 2 also contributed to the publication output, although with lower article counts. Spain recorded 48 articles, while the Netherlands

recorded 33. India produced 25 articles, followed by Russia with 24 articles. Japan and Switzerland each published 19 articles, while France, Italy, and South Africa each published 17.

When looking at the weight of academic influence through citations, the United States again leads the world with 14,706 citations. The United Kingdom

followed with 2,018, Canada with 1,773, Australia with 1,604, and the Netherlands with 1,010. Other cited countries included Germany (696 citations), China (670), Finland (343), Denmark (283), Korea (264), New Zealand (256), Switzerland (253), Spain (252), Greece (239), and France (229).

Table 2. Productive and Influential Research Countries

<i>MOST RELEVANT COUNTRIES</i>				<i>MOST CITED COUNTRIES</i>	
<i>Country</i>	<i>Articles</i>	<i>SCP</i>	<i>MCP</i>	<i>Country</i>	<i>Total Citation</i>
USA	484	455	29	USA	14706
GERMANY	81	71	10	UNITED KINGDOM	2018
UNITED KINGDOM	71	56	15	CANADA	1773
AUSTRALIA	67	55	12	AUSTRALIA	1604
CHINA	64	42	22	NETHERLANDS	1010
CANADA	58	41	17	GERMANY	696
SPAIN	48	45	3	CHINA	670
NETHERLANDS	33	20	13	FINLAND	343
INDIA	25	22	3	DENMARK	283
RUSSIA	24	23	1	KOREA	264
JAPAN	19	16	3	NEW ZEALAND	256
SWITZERLAND	19	15	4	SWITZERLAND	253
FRANCE	17	13	4	SPAIN	252
ITALY	17	16	1	GREECE	239
SOUTH AFRICA	17	12	5	FRANCE	229

Source: Web of Science (WoS) Database

For the distribution of research across various academic journals as shown in Table 3, *Zugänge zu Inklusion: Erwachsenenbildung, Behindertenpädagogik und Soziologie im*

Dialog is the most frequent publisher, with 26 articles. This finding is followed closely by the *Journal of Applied Behavior Analysis*, with 22 articles, and *Disability and Rehabilitation*, with 20. Other prominent

platforms for this work include *Behavioral Interventions* and several specialized journals focusing on intellectual disabilities, Autism, and vocational rehabilitation, illustrating the field's multidisciplinary reach.

In terms of citation indicators, *Exceptional Children* ranked first among the most cited journals with 1,154 total citations and an h-index of 10. *Schizophrenia Bulletin* followed with 921 total citations and an h-index of 5. *Pediatrics* and *The Lancet* each recorded 774 total citations, with h-index values of 2 and 1, respectively. The *Journal of Applied*

Behavior Analysis obtained 650 total citations and had the highest h-index among the listed cited journals at 13. Other cited journals included *Pain* with 601 citations, *Autism* with 496, *Archives of Disease in Childhood* with 491, *Journal of Intellectual Disability Research* with 467, *Behavior Therapy* with 427, *American Journal of Psychiatry* with 407, *Arthritis Care & Research* with 397, *Journal of Autism and Developmental Disorders* with 376, *Research in Autism Spectrum Disorders* with 338, and *Archives of Physical Medicine and Rehabilitation* with 318.

Table 3. Productive and Influential Research Journals

MOST PUBLISHED JOURNALS		MOST CITED JOURNALS		
Sources	Articles	Source	Total Citations	h-index
Zugänge zu Inklusion: Erwachsenenbildung, Behindertenpädagogik und Soziologie im Dialog	26	Exceptional Children	1154	10
Journal of Applied Behavior Analysis	22	Schizophrenia Bulletin	921	5
Disability and Rehabilitation	20	Pediatrics	774	2
Behavioral Interventions	17	The Lancet	774	1
Journal of Applied Research in Intellectual Disabilities	14	Journal of Applied Behavior Analysis	650	13
Journal of Behavioral Education	14	Pain	601	6
Journal of Intellectual Disability Research	14	Autism	496	6
Exceptional Children	13	Archives of Disease in Childhood	491	2
Journal of Autism and Developmental Disorders	13	Journal of Intellectual Disability Research	467	13
Frontiers in Psychiatry	12	Behavior Therapy	427	3

Rehabilitation Counseling Bulletin	12	American Journal of Psychiatry	407	2
Research in Autism Spectrum Disorders	12	Arthritis Care & Research	397	3
Behavior Analysis in Practice	11	Journal of Autism and Developmental Disorders	376	9
Career Development and Transition for Exceptional Individuals	11	Research in Autism Spectrum Disorders	338	9
Journal of Vocational Rehabilitation	11	Archives of Physical Medicine And Rehabilitation	318	5

Source: Web of Science (WoS) Database

At the individual level, as reflected in Table 4, Francis J. Keefe is identified as a leading figure, having authored 10 relevant articles. Lerman, Dorothea C.; Liberman, RP; Lu, Weili; Miltenberger, Raymond G.; Oursler, Janice; Servili, Chiara; and Somers,

Tamara J. each produced 8 articles. Beninato, John; Chan, Fong; Keefe, FJ; and Salomone, Erica each recorded 7 articles. Caldwell, DS; Gao, Ni; and Gottfried, Michael A. each had 6 articles

Table 4. Productive and Influential Authors

<i>MOST RELEVANT AUTHORS</i>		<i>MOST CITED AUTHORS</i>			
<i>Author</i>	<i>Articles</i>	<i>Author</i>	<i>h-index</i>	<i>TC</i>	<i>Articles</i>
KEEFE, FRANCIS J.	10	KEEFE FJ	7	1094	7
LERMAN, DOROTHEA C.	8	CALDWELL DS	6	1042	6
LIBERMAN, RP	8	HELMS M	4	781	4
LU, WEILI	8	MCGURK SR	1	774	1
MILTENBERGER, RAYMOND G.	8	MUESER KT	1	774	1
OURSLE, JANICE	8	COOPER BENJAMIN	1	749	1
SERVILI, CHIARA	8	NARENDORF SARAH CARTER	1	749	1
SOMERS, TAMARA J.	8	SHATTUCK PAUL T.	1	749	1
BENINATO, JOHN	7	STERZING PAUL R.	1	749	1
CHAN, FONG	7	TAYLOR JULIE LOUNDS	1	749	1
KEEFE, FJ	7	WAGNER MARY	1	749	1
SALOMONE, ERICA	7	KEEFE FRANCIS J.	10	612	10
CALDWELL, DS	6	BAUCOM D	3	603	3
GAO, NI	6	BEAUPRE P	3	603	3
GOTTFRIED, MICHAEL A.	6	HARVEY PHILIP D.	2	530	2

Source: Web of Science (WoS) Database

For the most cited authors, Keefe FJ ranked first with an h-index of 7, total

citations of 1,094, and 7 articles. Caldwell DS had an h-index of 6, 1,042 total

citations, and 6 articles. Helms M recorded an h-index of 4, 781 total citations, and 4 articles. McGurk SR and Mueser KT each had 774 total citations, an h-index of 1, and 1 article. Cooper Benjamin, Narendorf Sarah Carter, Shattuck Paul T., Sterzing Paul R., Taylor Julie Lounds, and Wagner Mary each recorded 749 total citations, an h-index of 1, and 1 article. Keefe Francis J. also appeared with 612 total citations, an h-index of 10, and 10 articles, while Baucom D and Beaupre P each recorded 603 total citations and an h-index of 3. Harvey Philip D. had 530 total citations, an h-index of 2, and 2 articles.

Intellectual, Conceptual, and Social Structures of the Field

The intellectual structure of inclusive TVET research was examined

through author, source, and document co-citation networks, which present the principal co-cited contributors, publication outlets, and references within the field. Figure 3 presents the author co-citation network generated using a minimum threshold of 25 citations per author. A total of 92 authors met the threshold, while the visualized network contained 91 items distributed across five clusters, with 1,348 links and a total link strength of 14,392. The network shows multiple co-citation connections among the authors, with Gresham, F. M.; Keefe, F. J.; the World Health Organization; Miltenberger, R. G.; Wehman, P.; Bond, G. R.; Liberman, R. P.; and Mueser, K. T. appearing among the prominent nodes across the five clusters.

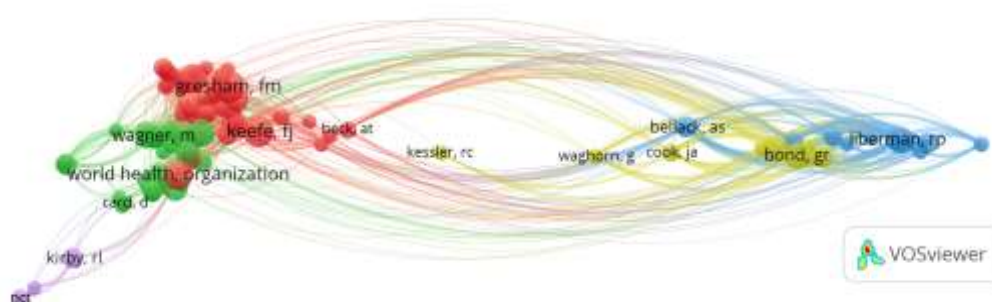


Figure 3. Author Cocitation Network
Source: Web of Science (WoS) Database

Relatively, the results in Table 5 which is the leading co-cited authors, sources, and documents in inclusive TVET correspond with the authors displayed in

the network. Gresham, F. M. had the highest citation count with 132 citations and a total link strength of 594, followed by Keefe, F. J. (108; 139), the World Health

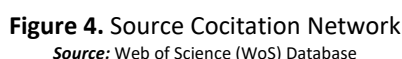
Organization (106; 326), Miltenberger, R. (1,606) and Liberman, R. P. (1,318), while G. (102; 328), and Wehman, P. (96; 406). Matson, J. L. and Braun, V. registered 75 and 74 citations, respectively Bond, G. R. recorded the highest total link strength at 1,768, followed by Mueser, K. T.

Table 5. Leading Co-Cited Authors, Sources, and Documents in Inclusive TVET

<i>Cocitation Type</i>	<i>Cluster</i>	<i>Item</i>	<i>Citations</i>	<i>Total Link Strength</i>
Author	1	Gresham, FM	132	594
Author	1	Keefe, FJ	108	139
Author	1	World Health Organization	106	326
Author	1	Miltenberger, RG	102	328
Author	2	Wehman, P	96	406
Author	4	Bond, GR	85	1768
Author	3	Liberman, RP	85	1318
Author	4	Mueser, KT	84	1606
Author	1	Matson, JL	75	273
Author	2	Braun, V	74	134
Source	4	Journal of Applied Behavior Analysis	1124	23532
Source	4	Journal of Autism and Developmental Disorders	1095	28918
Source	1	Research in Developmental Disabilities	501	15211
Source	3	Schizophrenia Bulletin	402	21314
Source	4	Autism	381	11195
Source	1	Exceptional Children	365	8354
Source	3	American Journal of Psychiatry	345	17939
Source	1	Journal of Intellectual Disability Research	326	7750
Source	2	Archives of Physical Medicine and Rehabilitation	316	6939
Source	2	Disability and Rehabilitation	314	5529
Document	1	Sarokoff RA, 2004, Journal of Applied Behavior Analysis	34	135
Document	4	Cohen J., 1988, Statistical Power Analysis for the Behavioral Sciences	32	38
Document	3	Braun V., 2006, Qualitative Research in Psychology	31	17
Document	1	Stokes TF, 1977, Journal of Applied Behavior Analysis	25	82
Document	2	Test DW, 2009, Career Development and Transition for Exceptional Individuals	25	94
Document	2	Carter EW, 2012, Journal of Disability Policy Studies	24	66
Document	2	[Anonymous], 2000, Diagnostic and Statistical Manual of Mental Disorders	23	64
Document	1	Wolf MM, 1978, Journal of Applied Behavior Analysis	21	53
Document	1	Parsons MB, 2012, Behavior Analysis in Practice	19	74
Document	3	Salomone E, 2019, Frontiers in Psychiatry	19	78

Source: Web of Science (WoS) Database

Behavior Analysis, Journal of Autism and Developmental Disorders, Research in Developmental Disabilities, Schizophrenia Bulletin, Autism, Exceptional Children, American Journal of Psychiatry, Journal of Intellectual Disability Research, Archives of Physical Medicine and Rehabilitation, and Disability and Rehabilitation



15,211), *Schizophrenia Bulletin* (402;21,314), *Autism* (381; 11,195), *Exceptional Children* (365; 8,354), and the *American Journal of Psychiatry* (345; 17,939), followed by three sources with 314–326 citations.

1093

six clusters, forming 1,151 co-citation links with a total link strength of 2,465. The network displays several prominent references, including works by Sarokoff, Cohen, Braun, Stokes, Test, Carter, Wolf, Parsons, Salomone, and the Diagnostic and Statistical Manual of Mental Disorders. The larger nodes represent more frequently co-cited documents, while the connecting lines indicate the co-citation relationships among the references included in the network.

Table 5 further details the leading cited references represented in the document co-citation network shown in Figure 5. The Sarokoff's 2004 article had the highest citation count (34) and a total link strength of 135, followed by Cohen's 1988 book (32; 38) and Braun's 2006 article (31; 17). Other leading references included Stokes (25; 82), Test (25; 94), Carter (24; 66), the 2000 Diagnostic and Statistical Manual of Mental Disorders (23; 64), Wolf (21; 53), Parsons (19; 74), and Salomone (19; 78).

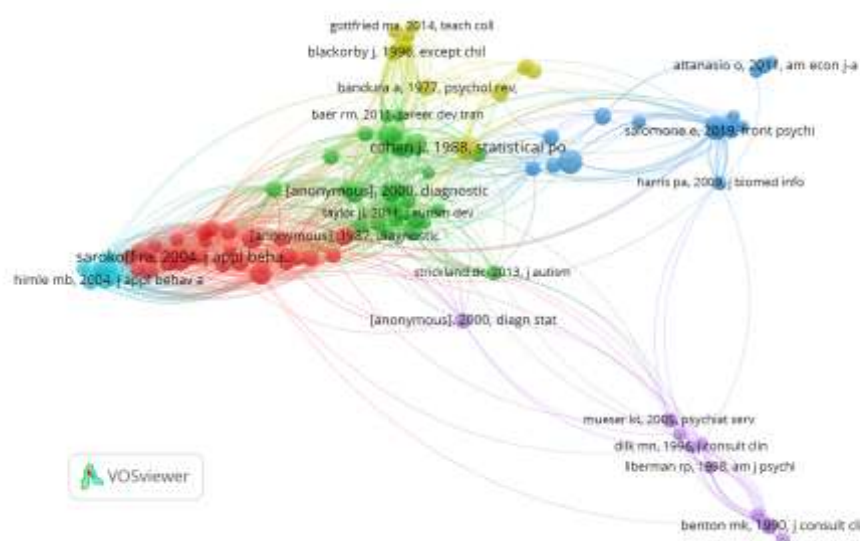


Figure 5. Document Cocitation Network
Source: Web of Science (WoS) Database

Following the examination of the field's intellectual structure through author, source, and document co-citation analyses, the succeeding analysis focuses on keyword co-occurrence to identify the

major concepts, thematic relationships, and research clusters within inclusive TVET literature. Shown in Figure 6 is the keyword co-occurrence network generated using a minimum threshold of 20 occurrences per

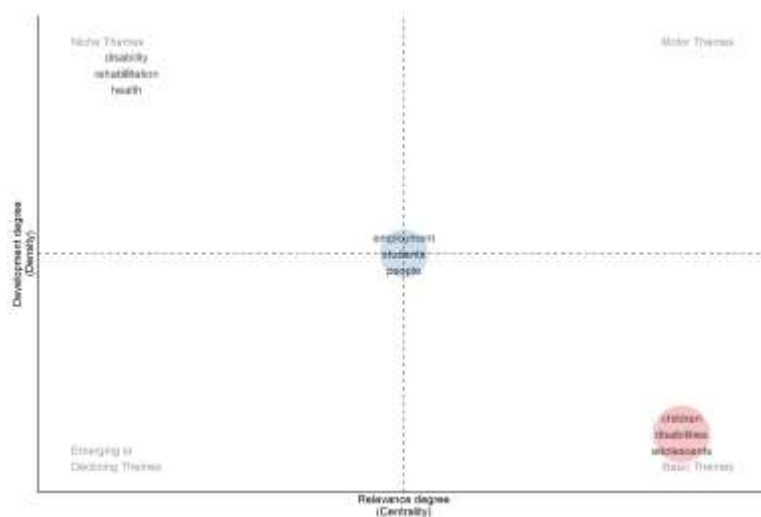


Figure 7. Thematic Map of Keywords
Source: Web of Science (WoS) Database

The social structure of inclusive TVET research was examined through co-authorship networks among authors and countries, revealing patterns of scholarly collaboration within the field (see Figures 8 and 9). For the author collaboration network shown in Figure 8, a minimum threshold of two publications per author was applied to include researchers with

repeated contributions to collaborative scholarship to produce clear and analytical meaningful representation of recurring co-authorship relationships within the field. For the country collaboration network in Figure 9, at least one internationally coauthored publication was required to capture countries' participation in cross-national research



Figure 8. Co-Operation Between Authors
Source: Web of Science (WoS) Database

Figure 8 presents the co-authorship network generated using a minimum

threshold of two documents per author. Of the 383 eligible authors, 26 were

connected in the final network and were grouped into five clusters, forming 55 links with a total link strength of 65. The network shows several connected author groups, including clusters centered on Jay Plasman, Michael A. Gottfried, Jennifer A. Freeman, Shaun M. Dougherty, Michael W. Harvey, Dawn A. Rowe, Katherine Ledbetter-Cho, Robert G. Didden, and Nataly Lim. The node sizes represent author prominence within the network, while the connecting lines indicate co-authorship relationships among the identified researchers.

Lastly, Figure 9 presents the country collaboration network comprising 84 items

distributed across 15 clusters, with 308 links and a total link strength of 580. The United States formed the largest node and maintained collaboration links with countries including Canada, China, England, Germany, India, Malaysia, South Africa, South Korea, and Qatar. Other visible collaborative nodes included Germany, the Netherlands, Spain, Italy, Sweden, Japan, France, Australia, Taiwan, and England. The connecting lines represent international co-authorship relationships, while the varying node sizes indicate differences in publication output among the participating countries.

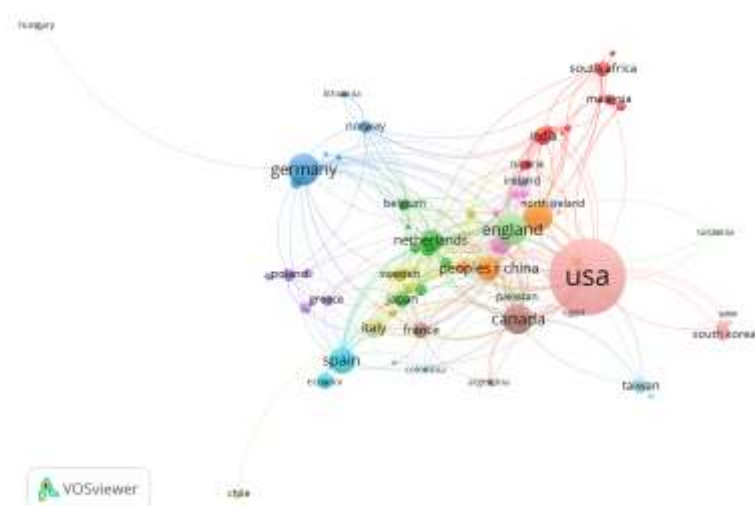


Figure 9. Co-Operation Between Countries
Source: Web of Science (WoS) Database

Discussion

This study interprets the bibliometric patterns, influential contributors, and intellectual, conceptual,

and social structures of research on inclusive Technical and Vocational Education and Training (TVET) for learners with disabilities and marginalized groups.

The findings indicate that inclusive TVET is an expanding field, although its growth has been uneven. The annual growth rate of 10.17% and the marked increase in publications after 2016 reflect greater scholarly recognition of TVET's role in promoting educational participation, employment, and social inclusion. This pattern is consistent with the growth of inclusive education research as inclusion has gained prominence in educational policy, teacher preparation, curriculum, and institutional practice (Crețu & Morandău, 2020; Methlagl, 2022; Kılınç, 2024). The lower publication output in 2026 likely reflects incomplete indexing rather than an established decline. Meanwhile, the higher citation averages of earlier studies may be attributed to their longer time to accumulate citations, showing that citation performance is influenced by both scholarly importance and publication age (Bornmann & Daniel, 2008).

The authorship results further demonstrate that inclusive TVET research is primarily collaborative. The small proportion of single-author documents and the average of nearly four authors per publication indicate that research in this area commonly involves multiple forms of expertise. This is understandable because

inclusive TVET requires contributions from vocational educators, special education specialists, rehabilitation professionals, psychologists, policymakers, employers, and disability organizations. Bibliometric analysis treats co-authorship as an indicator of the social organization of knowledge production, particularly in research areas that cross disciplinary and professional boundaries (Donthu et al., 2021). However, the international co-authorship rate of 15.87% indicates that collaboration remains predominantly national or institutional. Thus, the field may be collaborative at the research-team level without being equally international in its knowledge exchange.

The geographical pattern further reflects the uneven international structure of inclusive TVET research. The United States, followed by Germany, the United Kingdom, Australia, China, and Canada, dominated publication and citation output, indicating that the field is concentrated in countries with established systems in special education, rehabilitation, employment support, and vocational research. This pattern is consistent with broader inclusive education research, which shows that high-income countries occupy leading positions in publication and collaboration networks (Methlagl, 2022;

Kılınç, 2024). However, this concentration raises concerns about the limited representation of developing-country contexts. Approaches developed in the Global North may not fully account for differences in culture, labor markets, institutional capacity, and educational access across regions (Meekosha, 2011). The lower visibility of African, South Asian, Latin American, and other developing regions is especially significant because marginalized learners in these settings often face overlapping barriers related to poverty, gender, location, stigma, and limited resources. Thus, TVET should be viewed not only as preparation for employment but also as a means of advancing human development, social justice, and sustainable livelihoods within specific contexts (McGrath & Powell, 2016).

The distribution of publications across disability, rehabilitation, behavioral, psychiatric, medical, and vocational journals confirms the field's multidisciplinary nature. The prominence of sources such as the *Journal of Applied Behavior Analysis*, *Disability and Rehabilitation*, *Exceptional Children*, and the *Journal of Autism and Developmental Disorders* shows that inclusive TVET has been strongly influenced by behavioral

intervention, disability support, rehabilitation, and special education. This diversity is valuable because participation in vocational education is shaped by educational, psychological, health, social, and employment factors. However, the strong presence of clinical and rehabilitation journals also suggests that inclusive TVET is often framed around individual impairment and support rather than broader issues of vocational pedagogy, institutional accessibility, and labor-market reform. Evidence from East African TVET programs shows that exclusion also results from rigid curricula, insufficient teacher preparation, unclear policies, inaccessible institutions, and negative attitudes (Ebuenyi, Rottenburg, Bunders-Aelen & Regeer, 2020). Likewise, employment opportunities for persons with disabilities depend on workplace learning, organizational support, employer practices, and access to meaningful work, rather than on vocational preparation alone (Bartram & Cavanagh, 2019).

The author productivity and citation results further reflect the influence of rehabilitation, behavioral science, pain management, mental health, autism, and transition research. The prominence of Keefe, Lerman, Liberman, Miltenberger, Mueser, and other authors indicates that

the field draws substantially from research addressing behavioral interventions, psychosocial functioning, supported employment, and disability-related outcomes. The difference between the most productive and most cited authors is also meaningful from a bibliometric perspective. Publication count represents the volume of contribution, whereas total citations and the h-index capture different dimensions of recognition and accumulated influence; consequently, a highly productive author is not automatically the most influential within the citation network (Donthu et al., 2021). Citation rankings should therefore be interpreted as indicators of visibility within the retrieved literature rather than direct measures of research quality, particularly because citation accumulation is affected by publication date, disciplinary size, database coverage, and the prominence of the journals in which studies appear (Bornmann & Daniel, 2008).

Meanwhile, the co-citation findings show that the intellectual foundation of inclusive TVET draws from several interconnected traditions. The prominence of Gresham, Miltenberger, Matson, and the *Journal of Applied Behavior Analysis* reflects a strong behavioral and skills-intervention base. At the same time,

Keefe, Bond, Liberman, and Mueser represent rehabilitation, psychosocial support, and employment-oriented research. The visibility of Wehman and transition-focused studies further emphasizes the importance of preparing learners with disabilities for employment and independent adulthood. Test, Mazzotti, Mustian, Fowler, Kortering & Kohler (2009) identified vocational education, paid work experience, self-determination, interagency collaboration, and transition planning as factors associated with better post-school outcomes. Similarly, Shattuck, Narendorf, Cooper, Sterzing, Wagner & Taylor (2012) reported that young people with autism often faced difficulty entering postsecondary education and employment after leaving school. These findings help explain the central position of employment, transition, supported employment, and vocational skills in the field's intellectual structure.

Consequently, the strong co-citation presence of autism, intellectual disability, psychiatry, and rehabilitation sources further indicates that inclusive TVET research has concentrated on groups facing substantial barriers to education and employment. This focus is supported by evidence that vocational interventions

such as Individual Placement and Support and specialized transition programs can improve employment participation for some people with psychosocial disabilities and autism. However, the available intervention evidence remains uneven, with substantially fewer rigorous studies involving people with intellectual disabilities (Weld-Blundell, Shields, Devine, Dickinson, Kavanagh & Marck, 2021). The co-citation network, therefore, reflects both an established concern with employment intervention and an unresolved need to broaden the evidence base across disability groups, cultural settings, and forms of vocational participation.

The keyword network confirms that employment is a central concern in inclusive TVET research. The prominence of education, employment, disability, vocational training, skills, rehabilitation, inclusion, and supported employment shows that the field strongly connects education with workforce participation. The visibility of children, adolescents, students, and autism spectrum disorder further suggests that much of the literature focuses on preparation for adulthood and the transition from school to vocational learning or employment. This aligns with transition research showing that positive

post-school outcomes depend on the experiences and support provided before learners leave formal education (Test et al., 2009). However, the dominant keywords also indicate that the literature is more developed around disability than the broader category of marginalized groups. Gender, refugees, Indigenous communities, rural disadvantage, ethnicity, and other forms of social exclusion were less visible, despite calls for inclusive TVET to address gender inequality, discrimination, precarious employment, and intersecting barriers to decent work (Wignall, Piquard & Joel, 2023).

Moreover, the thematic map shows that inclusive TVET is expanding but remains conceptually fragmented. Disability, rehabilitation, and health appeared as well-developed yet relatively isolated niche themes, indicating specialized knowledge that is not fully connected to the broader field. Children, disabilities, and adolescents emerged as central themes, demonstrating their relevance but limited internal development. Employment, students, and people occupied an intermediate position, linking education, disability, rehabilitation, and labor-market participation. In science mapping, centrality reflects a theme's importance to the field, while density

indicates its level of development (Cobo et al., 2011; Aria & Cuccurullo, 2017). The absence of motor themes suggests that inclusive TVET has not yet developed a robust central framework. Instead, the field comprises several specialized traditions that have yet to converge on inclusive pedagogy, vocational curriculum, transition support, employment, institutional accessibility, and social inclusion.

Lastly, the social structure presents a similar combination of connectivity and fragmentation. Although numerous authors met the publication threshold, only a small proportion were connected in the final co-authorship network, resulting in several localized clusters rather than a single integrated scholarly community. By contrast, the country network was broader, with the United States serving as the principal hub connecting countries across North America, Europe, Asia, Africa, and the Middle East. This suggests that international activity exists, but recurring collaboration may depend heavily on a limited number of countries and research groups. Stronger participation from underrepresented regions would enable the field to capture informal training systems, resource-constrained institutions, community-based vocational learning, and

locally defined forms of marginalization that may be overlooked in dominant models. Such participation is particularly important because inclusive TVET requires context-sensitive knowledge rather than the uncritical transfer of approaches developed in high-income settings (Meekosha, 2011).

Conclusion

The study on inclusive Technical and Vocational Education and Training for learners with disabilities and marginalized groups has emerged as a growing but unevenly developed field of research. The increasing scholarly attention given to inclusive TVET reflects its expanding role in promoting educational participation, workforce preparation, employment, and social inclusion. However, the literature remains more strongly developed around disability than around the broader experiences of marginalized groups, indicating the need to widen future research toward gender, ethnicity, refugee status, rural disadvantage, Indigenous communities, and other intersecting forms of exclusion.

The analysis of productive and influential contributors shows that the field is multidisciplinary and geographically concentrated. Research has been shaped mainly by countries with established

systems in special education, rehabilitation, behavioral intervention, employment support, and vocational research, while developing regions remain less visible. The prominence of disability, rehabilitation, behavioral, medical, psychiatric, and vocational journals confirms that inclusive TVET draws from several professional and disciplinary traditions. Nevertheless, productivity and citation influence were not always aligned, showing that research output, scholarly visibility, and intellectual influence represent different dimensions of contribution. The limited representation of developing-country settings suggests that dominant approaches may not fully reflect local cultures, labor markets, institutional capacities, and barriers to participation.

The intellectual, conceptual, and social structures reveal a field connected by themes of education, employment, disability, vocational training, rehabilitation, transition, skills development, and supported employment. Its intellectual foundation is strongly influenced by behavioral intervention, rehabilitation, psychosocial support, special education, and employment-oriented research. However, the thematic structure remains fragmented, with specialized areas not yet fully integrated

into a coherent framework for inclusive TVET. Author collaboration is also organized around localized research groups, while international cooperation is concentrated among a limited number of countries. Future studies should therefore strengthen theoretical integration, international and interdisciplinary collaboration, and the inclusion of underrepresented regions and marginalized populations.

For teacher education and TVET, this study suggests that inclusive practice should be more deliberately embedded in curriculum, pedagogy, assessment, and workplace preparation. Teacher education programs should equip future and practicing educators with competence in differentiated instruction, accessible learning design, assistive technology, disability awareness, transition planning, inclusive assessment, and collaboration with families, employers, rehabilitation professionals, and community organizations. TVET institutions should likewise move beyond preparing learners for technical employment alone by ensuring accessible facilities, flexible curricula, supportive policies, inclusive workplace partnerships, and pathways to meaningful and sustainable work. These measures position inclusive TVET as a

means of advancing employability, independence, social justice, and lifelong participation.

Limitation and Recommendation

The study is limited by its reliance on Web of Science records and the selected search terms, which may have excluded relevant publications indexed in Scopus, ERIC, regional databases, or local TVET outlets. The incomplete coverage of 2026 may also have affected publication trends, while variations in author names may have influenced productivity and collaboration outcomes. Moreover, bibliometric indicators identify patterns of output, influence, and thematic relationships but do not directly assess the methodological quality of studies, the effectiveness of inclusive TVET interventions, or learners' actual experiences with disabilities and marginalized groups.

Given these limitations, future studies should combine Web of Science with other databases, standardize author and institutional names before analysis, and update the dataset once the 2026 indexing cycle is complete. A systematic or scoping review should also examine the quality, design, and outcomes of inclusive TVET interventions, particularly those involving teacher preparation, accessible

curriculum, workplace transition, and assistive technologies. Research should further prioritize underrepresented regions and marginalized groups, including rural learners, refugees, Indigenous communities, women, and economically disadvantaged populations, to produce more context-sensitive evidence for teacher education programs and TVET policy and practice.

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