Humanities, Arts and Social Sciences Studies

Research Article

*Humanities, Arts and Social Sciences Studies*
*https://so02.tci-thaijo.org/index.php/hasss*
*ISSN (Online): 2630-0079*

# BIBLIOMETRIC ANALYSIS OF PUBLICATIONS ON PROFESSIONAL DEVELOPMENT IN THE SCOPUS DATABASE

*Melbert O. Hungo[1], Vicente S. Betarmos, Jr.[2*], and Leomarich F. Casinillo[3]*

[1] Elementary Education Department, Southern Leyte State University-Tomas Oppus, Philippines
[2] Social Science Education Department, Southern Leyte State University-Tomas Oppus, Philippines
[3] Department of Mathematics, Visayas State University, Philippines

[*]***Corresponding author:***
*Vicente S. Betarmos, Jr.*
*vbetarmos@southernleytestateu.edu.ph*

***Received:*** *30 July 2025*
***Revised:*** *3 December 2025*
***Accepted:*** *9 December 2025*
***Published:*** *26 December 2025*

***Citation:***
*Hungo, M. O., Betarmos, V. S., Jr., & Casinillo, L. F. (2025). Bibliometric analysis of publications on professional development in the Scopus database. Humanities, Arts and Social Sciences Studies, 25(3), 806–818. https://doi.org/10.69598/hasss.25.3.279389*

## ABSTRACT

The study aimed to explore the trends and patterns of published documents online on professional development analyzed via bibliometric analysis using the Scopus database. Specifically, this study explored the documents published by year, author, affiliation, country, document type, and visualized them using VOSviewer. The methodology employed Boolean search queries to obtain peer-reviewed articles, conference proceedings, books, and peer-reviewed papers while excluding non-English and non-scholarly sources. The extraction of metadata provides information about authorship, institutional affiliation, country of origin, and document type before analyzing the publication trends alongside the co-authorship networks and citation impact using h-index calculations, most-cited papers, keyword co-occurrence, thematic mapping, and bibliographic-coupling methods. Findings revealed that the publications on professional development increased considerably between 2022 and 2023 leading Aas, M. and Valachovic, R. W. to become the most influential authors while both the University of Johannesburg and the University of Minnesota Twin Cities produced the highest number of publications. The United States possesses the most dominant position in terms of document publication while social sciences represent 50.3% of the overall contributions alongside journal articles totalling 78.4% of all documents. Publication on professional development emerges as the central theme in the field as strong co-authorship relationships connect various researchers. The study concludes that publication on professional development research shifts toward interdisciplinary collaboration, policy influence, and evidence-based practices, emphasizing inclusive academic networks and evolving priorities. It is recommended that academic leaders promote combined disciplines, broader educational alliances, digital innovation, and fair resource distribution to utilize adaptive learning for educational progress, leadership development, and employee development programs.

**Keywords:** Bibliometric analysis; network visualization; patterns; professional development; trends

## 1. INTRODUCTION

Professional development is a continuous learning process that strengthens abilities along with knowledge and professional competencies throughout education alongside healthcare and business fields and leadership domains (Magwenya et al., 2023). The learning activities included in professional development stem from experiential learning and constructivist and andragogical principles and include workshops supported by mentorship and technology integration (Ahmadian & Ashouri, 2024). It yields effective results when it maintains continuous delivery and involves teamwork and data analysis and occurs within the work environment yet faces barriers from time limitations and staff reluctance to change and standardized strategies (Sims & Fletcher-Wood, 2021). The future of professional development emphasizes individualized educational experiences alongside micro-competency credentials and global team projects and holistic wellness environments (Sharma et al., 2024). Organizations will maintain their professionals' competence and flexibility and innovation through nurturing ongoing learning practices for evolving work environments (Molnár et al., 2024).

Adopting professional competencies for bibliometric analysis requires the complete mastery of automated quantitative research measurement for scholarly work and citations and impact analysis (Gao et al., 2022). This skill set is essential for researchers and academic leaders and government officials seeking to determine research output and influence patterns. Bibliometric analysis competence demands mastery of citation analysis including the h-index and impact factor while students should comprehend Lotka's Law alongside Bradford's Law and Zipf's Law and they need experience with citation databases including Scopus, Web of Science, and Google Scholar (Alsharif et al., 2020). Proficiency with bibliometric tools VOSviewer, Bibliometrix, and CiteSpace allow users to conduct advanced analyses of co-citation patterns and co-authorship collaborations and keyword-mapping and research trend assessments (Sydorenko et al., 2022). Bibliometrics experts continue to advance with emerging fields including scientific mapping including academic ranking systems. Bibliometric professionals can advance their skills through ISSI membership, online courses, and workshops to achieve career development according to Andersen (2021). Educational managers benefit from bibliometric analysis since it allows them to evaluate faculty research and plan strategically and measure collaborative efforts and implement data-based improvements to academic programs as part of institutional development (Ensslin et al., 2022).

Organizational success depends on evidence-based professional development as the primary force for advancing individuals through their careers while improving their organizations. Expert opinions state that professional development needs to be ongoing, with specific examples from the workplace and must follow principles of adult learning to bring about meaningful skill development and career progress (Asterhan & Lefstein, 2024). Research shows that job-embedded training and mentorship along with professional learning communities help educators retain knowledge through the long term as well as apply it effectively (Liu & Phelps, 2020). Several barriers including insufficient support after training and workers' reluctance to change along with insufficient time for development limit the effectiveness of professional training programs (Eroglu & Donmus Kaya, 2021). Data reveals that combining technology with micro-credentials and customized learning paths changes professional development to be more convenient and adaptable for individual needs (Vasilev, 2024).

Despite the importance of professional development (PD), several challenges and knowledge gaps limit its success and lasting impact. The outcome of meaningful PD is hindered by time limitations and insufficient resources and standardized approaches as well as insufficient follow-up support including resistance to change and the inability to measure PD results (Mao et al., 2022). The need for comprehensive research exploration becomes clear because of existing gaps regarding personalized and adaptive learning models and interdisciplinary and cross-cultural insights and well-being impacts and long-term effect evaluations on PD (Paudel & Sherm, 2024). Emerging sustainable PD systems based on technology developments and personalization approaches need implementation for supporting continuous learning and career progression in evolving professions. Bibliometric analysis serves as an exclusive evaluation method for PD without any dedicated research in this field.

Studying PD research gains significant value through bibliometric analysis because this systematic data-driven method shows researchers the field's research trends with their effects along with discernible knowledge gaps. The analysis of publication data and citation networks combined with thematic changes helps bibliometrics reveal leading works and highly productive researchers and major institutions that shape PD research. The approach identifies interdisciplinary relationships since it traces theoretical and model development between different academic fields. Through bibliometric research institutions can evaluate their research productivity as well as explore collaboration relationships and worldwide research imbalances to determine major sector contributions. An analysis of bibliography identifies new educational trends through

keyword and citation pattern analysis research. The analysis helps develop evidence-based choices for educational leaders including policymakers and institutions through its investigation of information gaps so they can advance their PD methods permanently. Hence, this study aimed to examine the trends and patterns of online publications on PD using bibliometric analysis of the Scopus database. Specifically, it analyzed the documents in terms of publication year, authorship, institutional affiliation, country of origin, document type, and visualization through VOSviewer.

## 2. METHOD

The study utilizes a bibliometric analysis to explore academic papers on PD sourced from the Scopus database using systematic methods of data collection, processing, and analysis. It covers the years 2014–2024, ensuring that the analysis reflects the most recent decade of scholarly activity. The research depends on pre-established search queries that use "professional development," "school" and "programs" keywords including Boolean logic (e.g., "professional development" AND "school" AND "programs") to limit and refine results. The Scopus export was conducted on March 20, 2025 and yielded 2,118 documents retrieved online. This study selects peer-reviewed articles from periodical publications including conference papers, books, and review articles that were published recently before they excluded contents written in non-English languages and non-academic documents and repeated entries. The data extraction phase obtains document metadata that reveals author information, institution samples and geographic regions, publication types and citation metrics. Subsequently the data must be cleaned to reduce discrepancies. The research analyzes patterns of publication including networking between authors and citation metrics (h-index and highly cited papers) and keyword-occurrence analysis and thematic visualization in VOSviewer with setting of minimum occurrences set at 5 and full-counting method applied to identify narrative structure and conceptual developments. Intellectual connections including major theoretical foundations can be studied through bibliographic coupling and co-citation analysis methods. The bibliometric indicators synthesis reveals gaps in research, thematic trends, and the international landscape of PD research, providing scholarly influence, interdisciplinary relationships, and avenues for future research. The methodology provides a systematic and reproducible method of assessing the scholarly literature on PD using bibliometric analysis.

## 3. RESULTS AND DISCUSSION

### 3.1 Results

Figure 1 shows the changes in annual PD program document publications from 2014 to 2024 using a line graph that links years as the x-axis and document counts on the y-axis between 30 and 100. The data shows a decline in the number of documents from 2014 to 2015 yet followed by a substantial increase in 2016 before dropping in 2017 followed by continuous growth from 2018 to 2020 peaking in 2020. Research activity rose significantly during 2022–2023 as the analysis indicates publication numbers increased to approximately 90 documents a level that continues into 2024. Research interest keeps increasing within this field as reflected by the highest number of published documents in recent times.

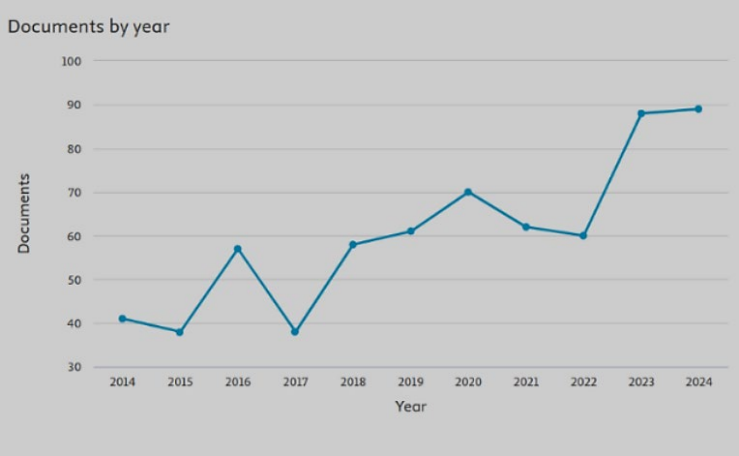


**Figure 1:** Professional development program documents by year

Figure 2 shows professional development document counts by author which evaluates the document frequency of authors up to ten. The number of documents published appears on the x-axis and the y-axis which displays author names. The bars in this illustration represent individual authors' published works, thus displaying different levels of research output. The analysis reveals that Aas, M. and Valachovic, R. W. have the highest document counts in this dataset. Among the authors Avidov-Ungar, O., Criswell, B., Ditmyer, M. M., Haden, N. K., Huber, S. G., Kim, M., Kodama, C., Lotter C. published similar numbers of documents that lag behind the leading two authors. Research contribution distribution among the authors remains balanced according to the data analysis, while publications between authors exhibit minor output variations.

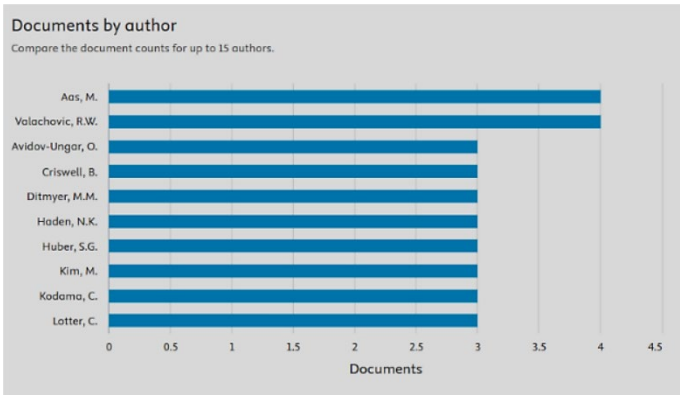


**Figure 2:** Professional development documents by author

Figure 3 shows the professional development documents from different academic institutions according to affiliation which demonstrates document counts reaching up to 10 institutions. The University of Johannesburg including the University of Minnesota Twin Cities hold the lead position for published documents with a total of 10 documents. The other academic institutions represented by The Ohio State University, University of Pennsylvania, University of South Carolina, and University of Michigan Ann Arbor have document counts that position themselves near the lower range behind the lead institutions. Research documents from Columbia University plus Emory University School of Medicine including Harvard Medical School and the University of Pittsburgh total 7 to 8 published documents each. Professional development research receives significant contributions from U.S.-based and South African universities and shows widespread distribution across participating institutions.

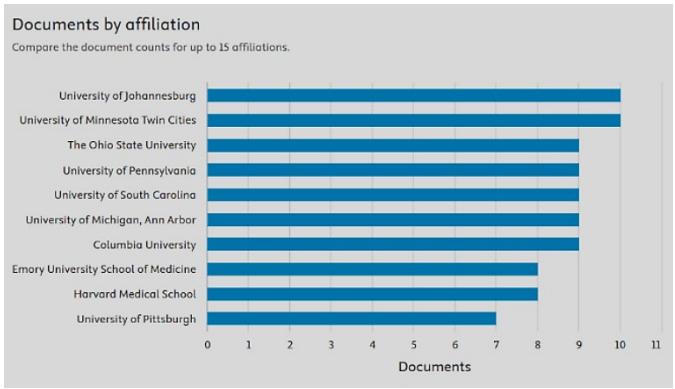


**Figure 3**: Professional development documents by affiliation

Figure 4 shows how country or territory affects the number of published professional development documents in 10 nations. One bar represents the publication numbers from a distinct nation. The research output predominantly originates from the United States with a total of 350 publications. A much lower number of documents is published by Australia and the United Kingdom when compared to the United States. Research publications from the United States lead all others and no other nation exceeds its 350-document output while Canada and South Africa including Malaysia, Chile, New Zealand, Spain, and China follow in descending order of document counts. The United States dominates research output concerning professional development by extensive

margins as other nations mainly located outside North America and Europe contribute significantly less to the scholarship.

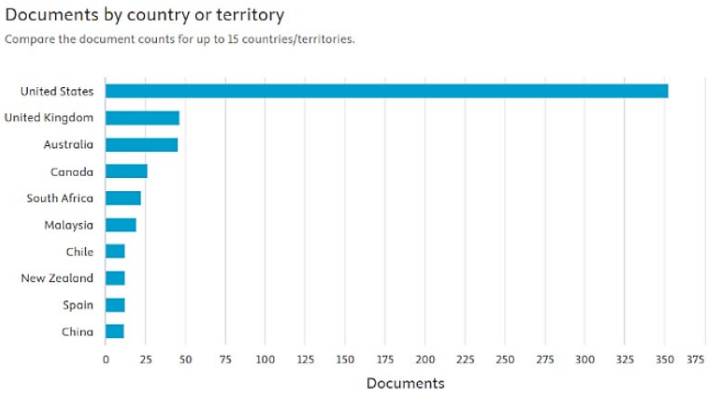


**Figure 4:** Professional development documents by country or territory

Figure 5 shows the distribution of professional development documents by document type. The graph divides its sections by document type while displaying their percentages relative to the total number of documents. Nearly eight out of ten research documents exist as journal articles with a total share of 78.4%. Book chapters along with reviews and conference papers account for 7.4%, 4.7%, and 3.8% of all publications submitted to the database. The research output has minimal contributions from document types including notes at 2.3%; books at 2.0%; editorials at 0.6%; letters, together with short surveys, at 0.5% and 0.3%, respectively; and data papers at 0.2%. Professional development research primarily finds its academic home through journal articles based on strong researcher preference but supplementary research appears in books, reviews and conference papers.

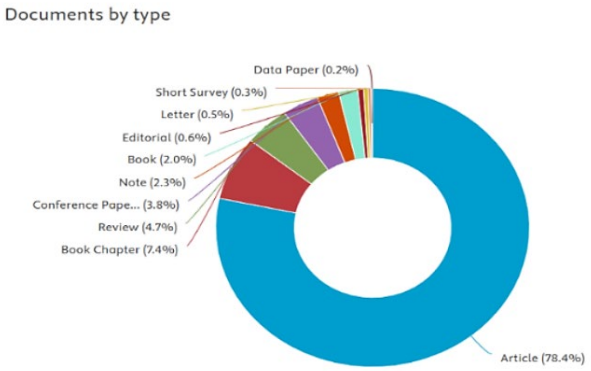


**Figure 5:** Professional development documents by type

Figure 6 shows how professional development documents spread across different academic subjects by presenting their distribution percentages. The different subject areas appear in individual segments along with their percentage distribution of the entire dataset. Professional development research predominates in Social Sciences as this field contains approximately 50.3% of all examined documents according to research output. The healthcare sector primarily focused on medicine represents the second largest subject area with 13.4% of the total publications. Professional development research shows a strong interdisciplinary interest as business and management (7.0%) along with Psychology (6.3%) represent a combined 13.3% of the analyzed documents. The research literature features arts and humanities at 5.8% while health professions account for 3.3% and computer science and engineering each account for 2.4%. Pharmacology and nursing comprise 1.9% and 1.6% respectively and other fields account for 5.5%. The research field of professional development focuses extensively on social science disciplines yet healthcare and business sectors and psychology provide strong academic input toward the multidisciplinary composition.

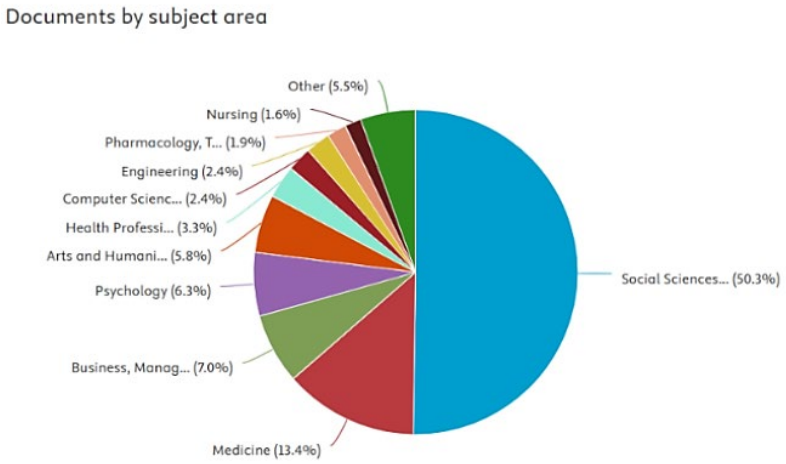


**Figure 6:** Professional documents by subject area

Figure 7 shows a professional development network visualized by VOSviewer depicting author collaboration relationships within a research field. All authors in this diagram receive representation through nodes which co-authorship relations appear as lines between author nodes. The size dimension for these nodes stands for publishing output or co-authorship connections which authors have established while edge width demonstrates co-authorship frequency between linked authors. The diagram identifies Christie Kodama, Jeffrey Disca, Alexandra Mosey, and Leah Jacobs as central contributors as they connect with several other authors in collaborative networks. The scholarly network includes Rebecca Folmar and Kelsey Jarrell including Diane L. Barlow and Sheri A. Massey who form an elaborate web of academic relationships. The research community demonstrates strong interconnectedness because multiple authors frequently collaborate with one another indicating a highly collaborative and efficient academic environment in their field.

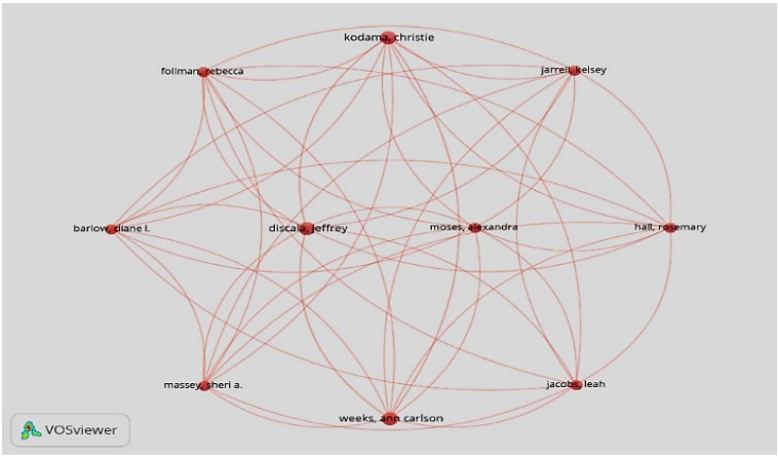


**Figure 7:** The professional development network visualization generated using VOSviewer

Figure 8 illustrates the co-occurrence network produced by VOSviewer to demonstrate crucial research topics and their interconnectedness through keyword occurrences and linkages. The visualization consists of nodes where keyword frequency determines their size and edges illustrate co-occurrence relationships that appear within research papers. Multicolored nodes display different research themes according to thematic groupings. The research shows “professional development” as its main topic because this term appears most frequently and connects with many other terms in the data set. Medical education stands out as the largest cluster with the terms “medical school,” “physicians,” and “faculty development”; education and school leadership make up another substantial cluster with “teaching,” “training,” “students,” and “curriculum”; while human development, psychology, and child development form smaller clusters (green) including smaller clusters on healthcare economics and qualitative research (yellow). Research on professional development demonstrates an interdisciplinary scope because medical training is directly related to leadership development and the formation of healthcare policy.

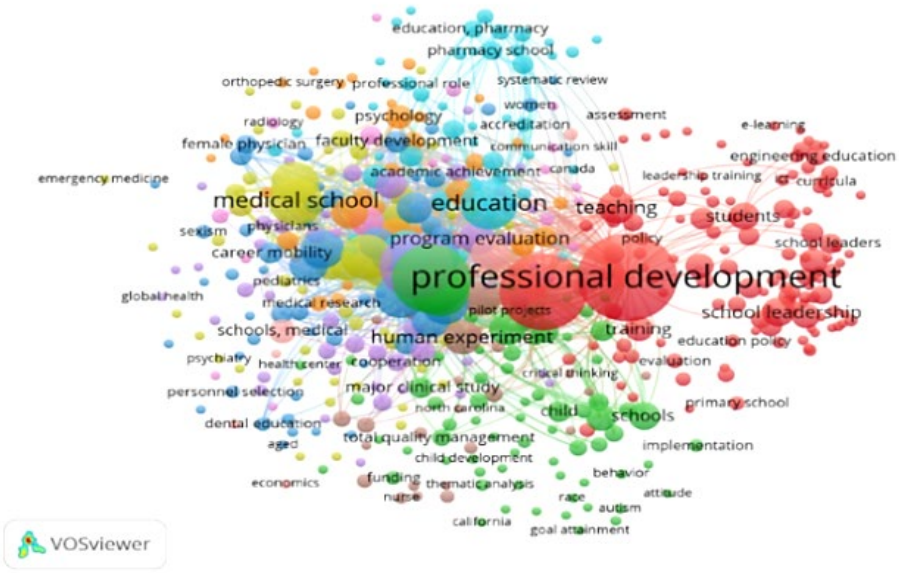


**Figure 8**: The co-occurrence network visualization

Table 1 presents the top-level highlights of professional development research based on eight visualizations. Annual publications peaked in 2020 with approximately 100 documents, and the most prolific authors were Aas, M., and Valachovic, R. W. The University of Johannesburg and the University of Minnesota Twin Cities scored the highest among institutions with 10 documents each, while by country, the United States led the others with 350 publications. The majority of document types were journal articles with 78.4%, and the leading subject area was social sciences with 50.3%. In the author collaboration network, the central contributors included Christie Kodama, Jeffrey Disca, Alexandra Mosey, and Leah Jacobs. Also, the keyword co-occurrence network identified "professional development" as the largest thematic cluster within medical education. This table portrays the development and trends of productivity, collaboration, and themes in the research field.

**Table 1:** Summary of top highlights from figures 1–8 on professional development research

| Figure | Focus | Leading Entity/Feature | Value/Count/Percentage |
|---|---|---|---|
| 1 | Annual publications (2014–2024) | Peak year | 2020 (~100 documents) |
| 2 | Publications by author | Leading authors | Aas, M. & Valachovic, R.W. (highest count) |
| 3 | Publications by institution | Leading institutions | University of Johannesburg & University of Minnesota Twin Cities (10 documents each) |
| 4 | Publications by country | Leading country | United States (350 publications) |
| 5 | Publications by document type | Leading type | Journal articles (78.4%) |
| 6 | Publications by subject area | Leading subject | Social Sciences (50.3%) |
| 7 | Author collaboration network | Most central contributors | Christie Kodama, Jeffrey Disca, Alexandra Mosey, Leah Jacobs (central nodes with multiple co-authorship links) |
| 8 | Keyword co-occurrence network | Main keyword / cluster | "Professional development" / Medical education cluster (largest thematic cluster) |

### 3.2 Discussion

Initially, research production has shown a gradual upward trend from 2014 to 2024 as indicated by document trends which sometimes exhibit variations due to changes in academic priority areas including funding variations and external influences on research productivity. Academic research about return to work rapidly expanded in 2023 and 2024 because policymakers made policy changes and technological advances while society addressed post-pandemic obstacles. The domain expansion brings more researchers into the field resulting in increased scientific output (Oleksiyenko et al., 2021). Prior to 2020 researchers experienced funding pattern changes including institutional objective alterations and the COVID-19 pandemic-induced slowdown that triggered increased scholarly attention. This aligns with Kareff et al.'s (2023) revolutionary conditions for scientific transformations because stagnation has ceased. Professional development trends and

demonstrates a positive progression of cross-disciplinary collaboration generating stronger policy effects and opens new research pathways emphasizing the fundamental role of evidence-based practices in development training and leadership performance.

The authors demonstrate the most significant influence in the field of professional development research through their extensive publications (Ullah & Ameen, 2021). The research follows the pattern identified by Lotka's Law of Scientific Productivity (Sahu & Jena, 2022) which describes how scientific production mainly comes from only a few authors while a large number of researchers produce fewer outputs. The various authors show that researchers actively participate in broad fields including education including leadership, healthcare, and psychology because PD operates across multiple disciplines. The presence of multiple authors with comparable document counts implies the formation of co-authorship networks as well as research groups which match the idea of invisible colleges and universities (Young et al., 2024). This trend leads to improved knowledge sharing and combines with greater policy impact and network formation between experts who drive innovations in educational and leadership development. Moreover, sustained scholarly productivity acts as a signal to signal the authors' potential influence to influence institutional and policy frameworks thus highlighting the critical role of sustained scholarly work in evidence-based professional development.

Subsequently, the documents by affiliation show the most scholarly contributions. The institutions' research emphasis on professional development likely reflects their dedication to training faculty and developing leaders along with conducting education policy research (Pham, 2021). Health sciences education research documents the connection between medical education and professional development with Harvard Medical School and Emory University School of Medicine exemplifying the ongoing necessity for competency-based learning for healthcare professionals and continuous training (Tun et al., 2020). The institutional affiliations across North American and African demonstrate worldwide academic involvement in professional development research (Heng et al., 2020). These developments result in better opportunities for institutional collaborations among researchers and create potential influences on policies that enhance knowledge exchange between international academic networks thus demonstrating professional development serves as a global multidisciplinary field.

Thereafter, the research documents indicate that the United States leads all other nations with its extensive output significantly surpassing all other nation. The United States established itself as a leading nation in educational research because of its advanced academic structure supported by generous funding and strong institutional backing for professional development (Hite & Milbourne, 2022). Research publications from Canada, Australia, and the United Kingdom demonstrate academic success through their superior programs for teacher education, and educational research initiatives (Deuchar, 2022). The nations of South Africa together with Malaysia and China sustain rising interest in their PD programs since they understand that human capital development combined with educational transformation drives national economic growth and social development (Brooks & Brooks, 2024). PD research exhibits a worldwide knowledge gap mostly observed in Latin American, African, and Asian nations except for select countries suggesting resource limitations combined with restricted research funding as well as low research output in those regions (Chapman et al., 2022). It needs to receive international collaboration including inclusive academic networks and capacity-building projects to enhance outcomes to educators and professionals across different socio-economic and geopolitical environments.

In addition to this, documents reveal that articles make up the largest category of publications, indicating peer-reviewed journal research serves as the primary method for knowledge dissemination (Evans et al., 2022). Journal article prevalence in scholarly work reflects trends in the wider academic publishing field because the peer review process including citation impact shapes academic recognition and knowledge sharing (Fauzi, 2023). Other forms of documents that influence knowledge development include book chapters, reviews, and conference papers. The data indicates that researchers prefer shorter peer-reviewed documents (books and editorials) because these pieces are more accessible and have shorter turnaround times (Chen et al., 2024). Professional development research features empirical datasets combined with short surveys and letters because the field relies predominantly on theoretical analysis and case studies along with longitudinal assessments rather than solely on raw data. This research output distribution demonstrates the worldwide preference for organized evidence-based research which upholds peer-reviewed articles as the standard for shaping educational practices, policy development, and faculty development worldwide.

Meanwhile, medical research makes up the second-largest subject category reflecting a strong interest in medical education including health practitioners CPD (Continuing Professional Development) programs and competency-based healthcare worker training (Kurunsaari et al., 2022). The study reveals how business and management including psychology and arts and humanities contribute significantly to PD reflecting professional development's interdisciplinary nature barrowing from corporate training and cognitive learning

approaches and reflective practices from the creative fields (Smolinska & Dzyubynska, 2020). Research activities in health professions combined with computer science and engineering along with pharmacology comprise 10.6% of studies that examine skill learning, technological implementation, and regulatory compliance in these sectors (Miller et al., 2021). The sparse presence of nursing in the study sample indicates profession-based development over research-based advancement in nursing. Research in developing fields makes up the publications in the "Other" disciplines as it adds new dimensions to the discourse about professional development. Professional development remains a complex field of study because it stems from education and social sciences and has branched into business sectors, STEM, and healthcare domains to match the requirements of modern knowledge economies.

At this point, the VOS viewer network visualization shows PD co-authorship relationships among scholars to display the level of interconnections within academic PD research. Knowledge production in this domain depends on interdisciplinary partnerships and co-authorship networks since the research network shows dense clustering of nodes and links (Urbano & Ardanuy, 2020). Intellectual sharing through numerous connections generates an environment that spreads scientific concepts across authors and institutions to develop scholarly unity (Jin et al., 2022). Academic development research benefits from multi-author research by producing more innovative ideas, higher citation impact and faster research development (Kuperman & Sokol, 2024). Researchers tend to cluster specific research fields which include three major domains including educational management, workforce training and leadership development. The established connections of network nodes located on the perimeter reveal up-and-coming academics who help advance current academic discussions because long-term collaboration creates mentoring systems within academic institutions (Fu et al., 2022). The network visualization demonstrates why academic connections drive systematic, interdisciplinary investigation through collaborative writing that enables the advancement of professional development research.

Currently, an interactive network display created with VOSviewer demonstrates the research concepts of PD by visualizing relationships between academic literature keywords. Professional growth requires both mentorship, cognitive development, and evaluation methodologies according to Zhang et al. (2024) in their assessment of academic achievement and psychological assessment clusters. An evolving lifelong learning model in workforce training integrates reflective practices through words like "critical thinking" and "career mobility" and "communication skills" (Seevaratnam et al., 2023). Technology integration processes and e-learning developments follow global digital transformation trends at the same pace as evidence-based professional development initiatives (Lazarenko & Hapchuk, 2024). The visual tool provides a framework for researchers and policymakers who need to identify future research areas with potential collaboration possibilities and vital development fields for PD structures across various domains.

Finally, policy priorities, funding allocation, and post-pandemic educational reforms are important elements that have greatly influenced the growth in PD research. The peak publication rate in 2020 was often emblematic of the urgent need for teacher upskilling and organizational resilience (Eradze et al., 2023). Major authors coupled with major institutions demonstrate that well-resourced universities serve as nodes for knowledge production wherein agendas for national and international trends in research are set (Meyer et al., 2023). The dominant output of the United States underlines the effect of strong research systems, whereas the prevalence of journal articles and Social Sciences publications highlights continued attention to policy development, organizational change, and instructional improvement. Collaboration networks and keyword co-occurrence, including clusters referring to medical education, illustrate the interdisciplinary and collaborative nature of research into professional development, reflecting responses to workforce needs and the requirements for competency-based practice. These findings have significant implications for policy and practice. Academic leaders and policymakers are called to invest in research-informed PD, provide strategic support for international and interdisciplinary collaboration, and link funding decisions to evidence-based practice. This approach would better enable academic institutions to promote program quality, enhance scalability, and ensure that professional development opportunities remain responsive to changing sectoral and workforce needs.

## 4. CONCLUSION

In light of the findings and insights in this study, it is therefore concluded that the growth of PD research establishes fundamental changes in collaborative research efforts that affect policy creation and demonstrates shifting research objectives. Research publications are growing substantially underscoring the essential position of evidence-based practices in educational programs, leadership development, and workforce preparation. Strategic networks between experts and multi-global institutional partnerships facilitate best practice exchange while promoting varied research methods and diverse knowledge distribution. Academic

networks must improve their inclusivity to achieve equal access to professional research so educators and professionals across varied socioeconomic and geopolitical environments can fully benefit. Solid peer-reviewed research matters because it directs the creation of institutional policies educational innovations, and faculty development processes. The accelerating coverage of professional development in STEM, healthcare, and business sectors demonstrates how this field adapts to meet knowledge-based economic needs. Professionals engaged in research conclusively demonstrate that continuing professional development functions as an adaptable system that addresses organizational requirements alongside emerging technologies and instructional approaches.

Interdisciplinary work in PD research maximizes its impact through the strengthening of knowledge exchange and innovation with sectoral partners. International partnerships during the capacity-building activities allow for research equality and thus the fair distribution of professional development resources. Educational institutions should support both interdisciplinary research and professional networks as the foundation for the production of policy-enhancing research based on thorough evidence-based studies. This calls for location-based funding agencies and policy framers to prioritize the strategic use of standard peer-reviewed research in informing the design of educational, leadership, and workforce training models. Universities and educators are encouraged to integrate the results of high-impact research into curriculum planning, faculty enhancement, and institutional policy. Knowledge sharing is greatly enhanced through digital transformation and open-access publishing, ensuring greater access to information and thereby maximizing policy impact.

This paper represents the first comprehensive Scopus-based bibliometric analysis of PD research for the period 2014–2024, integrating cross-sectoral data from education, healthcare, and business. It identifies new research gaps and emerging clusters, thus providing practical insight for policymakers, universities, and educators on where to invest in collaborative initiatives and capacity-building efforts. Future research should focus on emerging trends in PD, including the integration of artificial intelligence into learning systems, adaptive learning technologies, and competency-based educational models. These strategic approaches will permit PD research to continue evolving as an impactful means for educational improvement, leadership development, and workforce training throughout the world.

## 5. LIMITATIONS

This study is limited to the Scopus database and only includes English language documents, hence it may be biased by the non-inclusion of research outcomes in languages other than English and those not indexed by this database. This might lead to underrepresentation of some regions, disciplines, or trends in research topics.

## 6. PRACTICAL IMPLICATIONS

The findings present a number of actionable insights for PD designers, educational administrators, and funding bodies. PD designers will be able to use identified research trends and interdisciplinary clusters to inform and develop evidence-based, innovative programs. This should prompt administrators to prioritize institutional collaborations and capacity-building initiatives based on high-impact research hubs. Funding bodies should allocate resources with a strategic eye toward supporting projects that address emergent research gaps and foster global knowledge exchange.

## 7. FUTURE RESEARCH DIRECTIONS

Future research should focus on AI-supported PD, adaptive learning technologies, and competency-based education. Strategies for improving equity in global collaboration merit investigation to ensure that underrepresented regions and disciplines can both contribute to and learn from PD research. Additionally, bibliometric analyses across several databases and non-English publications are needed to contextualize a richer, more complex view of the global PD landscape.

## REFERENCES


Ahmadian, I., & Ashouri, H. (2024). Designing a paradigm model for teachers' professional development based on the foundation's databased approach. *Perspective of Human Resource Management, 1*(1), 47–63.

Alsharif, A. H., Salleh, N., & Baharun, R. (2020). Research trends of neuromarketing: A bibliometric analysis. *Journal of Theoretical and Applied Information Technology, 98*(15), 2948–2962. https://www.jatit.org/volumes/Vol98No15/6Vol98No15.pdf

Andersen, N. (2021). Mapping the expatriate literature: A bibliometric review of the field from 1998 to 2017 and identification of current research fronts. *The International Journal of Human Resource Management, 32*(22), 4687–4724. https://doi.org/10.1080/09585192.2019.1661267

Asterhan, C. S., & Lefstein, A. (2024). The search for evidence-based features of effective teacher professional development: A critical analysis of the literature. *Professional Development in Education, 50*(1), 11–23. https://doi.org/10.1080/19415257.2023.2283437

Brooks, R. E., & Brooks, A. K. (2024). An emerging transformative learning journey to foster sustainability leadership in professional development programs. *Journal of Transformative Education, 22*(4), 415–432. https://doi.org/10.1177/15413446241255909

Chapman, N., Thomas, E. E., Tan, J. T., Inglis, S. C., Wu, J. H., Climie, R. E., Picone, D. S., Blekkenhorst, L. C., Wise, S. G., Colafella, K. M. M., Calkin, A. C., & Marques, F. Z. (2022). A roadmap of strategies to support cardiovascular researchers: From policy to practice. *Nature Reviews Cardiology, 19*(11), 765–777. https://doi.org/10.1038/s41569-022-00700-1

Chen, S., Noh, J., Jang, J., Kim, S., Gu, G. H., & Jung, Y. (2024). Reaction templates: Bridging synthesis knowledge and artificial intelligence. *Accounts of Chemical Research, 57*(14), 1964–1972. https://doi.org/10.1021/acs.accounts.4c00261

Deuchar, A. (2022). The problem with international students' 'experiences' and the promise of their practices: Reanimating research about international students in higher education. *British Educational Research Journal, 48*(3), 504–518. https://doi.org/10.1002/berj.3779

Ensslin, L., Dutra, A., Ensslin, S. R., Moreno, E. A., Chaves, L. C., & Longaray, A. A. (2022). Sustainability in library management in higher education institutions: A bibliometric analysis. *International Journal of Sustainability in Higher Education, 23*(7), 1685–1708. https://doi.org/10.1108/ijshe-07-2021-0302

Eradze, M., De Martino, D., Tinterri, A., Albó, L., Bardone, E., Sunar, A. S., & Dipace, A. (2023). After the pandemic: Teacher professional development for the digital educational innovation. *Education Sciences, 13*(5), Article 432. https://doi.org/10.3390/educsci13050432

Eroglu, M., & Donmus Kaya, V. (2021). Professional development barriers of teachers: A qualitative research. *International Journal of Curriculum and Instruction, 13*(2), 1896–1922. https://eric.ed.gov/?id=EJ1292257

Evans, W. D., Gerard, R., Symington, L., Shaikh, H., & Agha, S. (2022). Implementation practice models for development in low- and middle-income countries: Systematic review of peer-reviewed literature. *BMC Public Health, 22*(1), Article 1157. https://doi.org/10.1186/s12889-022-13530-0

Fauzi, M. A. (2023). Knowledge hiding behavior in higher education institutions: A scientometric analysis and systematic literature review approach. *Journal of knowledge management, 27*(2), 302–327. https://doi.org/10.1108/jkm-07-2021-0527

Fu, Y. C., Marques, M., Tseng, Y. H., Powell, J. J., & Baker, D. P. (2022). An evolving international research collaboration network: Spatial and thematic developments in co-authored higher education research, 1998–2018. *Scientometrics, 127*(3), 1403–1429. https://doi.org/10.1007/s11192-021-04200-w

Gao, Y., Wong, S. L., Md. Khambari, M. N., & Noordin, N. (2022). A bibliometric analysis of online faculty professional development in higher education. *Research and Practice in Technology Enhanced Learning, 17*(1), Article 17. https://doi.org/10.1186/s41039-022-00196-w

Heng, K., Hamid, M., & Khan, A. (2020). Factors influencing academics' research engagement and productivity: A developing countries perspective. *Issues in Educational Research, 30*(3), 965–987. https://search.informit.org/doi/abs/10.3316/INFORMIT.465283943914964

Hite, R. L., & Milbourne, J. D. (2022). Divining the professional development experiences of K-12 STEM master teacher leaders in the United States. *Professional Development in Education, 48*(3), 476–492. https://doi.org/10.1080/19415257.2021.1955733

Jin, N., Yang, N., Fawad Sharif, S. M., & Li, R. (2022). Changes in knowledge coupling and innovation performance: The moderation effect of network cohesion. *Journal of Business & Industrial Marketing, 37*(11), 2380–2395. https://doi.org/10.1108/jbim-05-2021-0260

Kareff, S. A., Sridhar, A., Dhawan, N., Anampa-Guzmán, A., Singhi, E. K., & Velazquez, A. I. (2023). The democratization of hematology-oncology medical education during the COVID-19 pandemic. *Cancer Investigation, 41*(6), 548–558. https://doi.org/10.1080/07357907.2023.2230495

Kuperman, V. Y., & Sokol, G. H. (2024). On the causes and ramifications of multi-authorship in science. *Scientometrics, 129*(4), 2205–2225. https://doi.org/10.1007/s11192-024-04963-y

Kurunsaari, M., Tynjälä, P., & Piirainen, A. (2022). Stories of professional development in physiotherapy education. *Physiotherapy Theory and Practice, 38*(11), 1742–1755. https://doi.org/10.1080/09593985.2021.1888341

Lazarenko, N., & Hapchuk, Y. (2024). E-learning and artificial intelligence as key factors in the digital transformation of higher education: Challenges, opportunities and development prospects. *Pedeutology, 2*(1), 7–13.

Liu, S., & Phelps, G. (2020). Does teacher learning last? Understanding how much teachers retain their knowledge after professional development. *Journal of Teacher Education, 71*(5), 537–550. https://doi.org/10.1177/0022487119886290

Magwenya, R. H., Ross, A. J., & Ngatiane, L. S. (2023). Continuing professional development in the last decade – a scoping review. *Journal of Adult and Continuing Education, 29*(2), 408–437. https://doi.org/10.1177/14779714221147297

Mao, J. J., Pillai, G. G., Andrade, C. J., Ligibel, J. A., Basu, P., Cohen, L., Khan, I. A., Mustian, K. M., Puthiyedath, R., Dhiman, K. S., Lao, L., Ghelman, R., Guido, P. C., Lopez, G., Gallego-Perez, D. F., & Salicrup, L. A. (2022). Integrative oncology: Addressing the global challenges of cancer prevention and treatment. *CA: A Cancer Journal for Clinicians, 72*(2), 144–164. https://doi.org/10.3322/caac.21706

Meyer, J. L., Waterman, C., Coleman, G. A., & Strambler, M. J. (2023). Whose agenda is it? Navigating the politics of setting the research agenda in education research-practice partnerships. *Educational Policy, 37*(1), 122–146. https://doi.org/10.1177/08959048221131567

Miller, A. M., Behan, R., Smith, I., Griffin, M., Keane, F., Langan, J., O'Rourke, C., McAleenan, N., Pandit, A., & Watson, M. (2021). A multidisciplinary approach to online support for device research translation: Regulatory change and clinical engagement. *Health Policy and Technology, 10*(1), 95–103. https://doi.org/10.1016/j.hlpt.2020.10.005

Molnár, T., Jenei, S., Moreno, E., Lakshmi, V. P., Malatyinszki, S., & Dávid, L. D. (2024). The role of lifelong learning in labour market competitiveness. *Journal of Ecohumanism, 3*(8), 7743–7761. https://doi.org/10.62754/joe.v3i8.5396

Oleksiyenko, A., Blanco, G., Hayhoe, R., Jackson, L., Lee, J., Metcalfe, A., Sivasubramaniam, M., & Zha, Q. (2021). Comparative and international higher education in a new key? Thoughts on the post-pandemic prospects of scholarship. *Compare: A Journal of Comparative and International Education, 51*(4), 612–628. https://doi.org/10.1080/03057925.2020.1838121

Paudel, R., & Sherm, A. (2024). Exploring the theoretical landscape: Implications of remote work on employee performance and well-being. *Indonesian Journal of Applied and Industrial Sciences (ESA), 3*(3), 263–278. https://doi.org/10.55927/esa.v3i3.8954

Pham, D. H. (2021). The professional development of academic staff in higher education institution. *Journal of Teacher Education for Sustainability, 23*(1), 115–131. https://doi.org/10.2478/jtes-2021-0009

Sahu, A., & Jena, P. (2022). Lotka's law and author productivity pattern of research in law discipline. *Collection and Curation, 41*(2), 62–73. https://doi.org/10.1108/cc-04-2021-0012

Seevaratnam, V., Gannaway, D., & Lodge, J. (2023). Design thinking-learning and lifelong learning for employability in the 21st century. *Journal of Teaching and Learning for Graduate Employability, 14*(1), 182–201. https://doi.org/10.21153/jtlge2023vol14no1art1631

Sharma, H., Jain, V., Mogaji, E., & Babbilid, A. S. (2024). Blended learning and augmented employability: A multi-stakeholder perspective of the micro-credentialing ecosystem in higher education. *International Journal of Educational Management, 38*(4), 1021–1044. https://doi.org/10.1108/ijem-12-2022-0497

Sims, S., & Fletcher-Wood, H. (2021). Identifying the characteristics of effective teacher professional development: A critical review. *School Effectiveness and School Improvement, 32*(1), 47–63. https://doi.org/10.1080/09243453.2020.1772841

Smolinska, O., & Dzyubynska, K. (2020). Professional self-development of a teacher of a higher education institution: Interdisciplinary aspect. *Journal of Vasyl Stefanyk Precarpathian National University, 7*(1), 41–47. https://doi.org/10.15330/jpnu.7.1.41-47

Sydorenko, S., Kuzminska, O., Mazorchuk, M., & Barna, O. (2022). Bibliometric analysis in determining the research directions of early career researchers. *Information Technologies and Learning Tools, 5*(91), 113–129. https://doi.org/10.33407/itlt.v91i5.4944

Tun, S., Wellbery, C., & Teherani, A. (2020). Faculty development and partnership with students to integrate sustainable healthcare into health professions education. *Medical Teacher, 42*(10), 1112–1118. https://doi.org/10.1080/0142159x.2020.1796950

Ullah, A., & Ameen, K. (2021). Relating research growth, authorship patterns and publishing outlets: A bibliometric study of LIS articles produced by Pakistani authors. *Scientometrics, 126*(9), 8029–8047. https://doi.org/10.1007/s11192-021-04081-z

Urbano, C., & Ardanuy, J. (2020). Cross-disciplinary collaboration versus coexistence in LIS serials: Analysis of authorship affiliations in four European countries. *Scientometrics, 124*(1), 575–602. https://doi.org/10.1007/s11192-020-03471-z

Vasilev, I. (2024). A model of design and implementation micro-credentials in TVET: A promising and flexible pathway to employment and skill development. *International Journal of Current Science Research and Review, 7*(12), 8807–8819. https://doi.org/10.47191/ijcsrr/v7-i12-18

Young, G., Serbati, A., & Sim, K. N. (2024). Collaboration and co-authorship in academic development: What should we be considering? *International Journal for Academic Development, 29*(3), 301–307. https://doi.org/10.1080/1360144x.2024.2397418

Zhang, S., Ma, X., Xu, H., & Lu, J. (2024). The influence of mentorship in workplace on teachers' professional development a meta-analysis based on 66 experiments. *Journal of Managerial Psychology, 39*(6), 815–831. https://doi.org/10.1108/jmp-11-2022-0588