Introduction to a Scientometrics Research Perspective in Applied Linguistics

Hussein Meihami and Rajab Esfandiari

1 Scientometrics: Definitions, Distinctions, and Objectives

The ever-increasing complexity of language constructs, the close affinity of applied linguistics with neighboring disciplines such as psycholinguistics, the interdisciplinary nature of the field, the consistent inroad of concepts from other disciplines into the field, the emergence of multilingual contexts, the advent of big data, and technological breakthroughs and globalization and its impacts on the field motivate researchers to redefine the field from time to time, theoretically advancing it. Theoretical advancement of applied linguistics requires the theorization and problematization of the research methods, which, as McKinley (2020) rightly asserted, the field is grappling with to unpack its complexities.

Scientometrics is one way to theorize applied linguistics research. Vassily Vassilievich Nalimov, the Russian mathematician, is generally credited with first coining the term scientometrics and defining it as the application of quantitative methods to all scientific activities in all disciplines, with no distinction between natural sciences, social sciences, and humanities such as the humanities (Gingras 2016; Sooryamoorthy 2021), although, as Sooryamoorthy pointed out, it was initially primarily applied to science and scientific knowledge. Therefore, scientometrics, as De Bellis (2009) neatly summarised, "encompasses all quantitative aspects and models related to the production and dissemination of scientific and technological knowledge", the ultimate goal of which is to address "the quantitative and comparative evaluation of scientists', groups', institutions', and countries' contribution to the advancement of knowledge" (p. 3). Scientometrics uses various sources of scientific research data for analysis, such as the count of publications in

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small and large databases like Scopus (Esfandiari and Saleh 2023; Meihami and Esfandiari 2021; Roemer and Borchardt 2015; Rashidi and Meihami 2018; Sahragard and Meihami 2016) and employs multifarious units of analysis, including, but not limited to, documents such as journal articles as well as groups of scientists, institutes, and countries (De Bellis 2009) at three levels of aggregation: micro (publication outputs of research groups), meso (publication outputs of institutes), and macro (publication outputs of countries) (Glänzel 2003).

Scientometrics draws on a wide variety of instruments and analysis techniques. Because it is fundamentally quantitative, the instruments applied in scientometrics include mathematical processing, comparison, classification and visualization, and advanced statistical procedures such as multi-level analysis to process the data (Ivancheva 2008). It also builds on such techniques as co-citation analysis, co-word analysis, network visualization, resonance analysis, and bibliometric coupling (see Sooryamoorthy 2021, for an outline of these techniques) to establish the relationship between citations in research publications, to map the structure and dynamics of disciplines (Chen 2017), to assess and evaluate research activities and journal impact (Siluo et al. 2020), and identify patterns of collaboration and co-authorship in research activities (Wang et al. 2017).

Since its inception in 1969, scientometrics has matured into a field of research and evolved into an effective instrument for research assessment, evaluation, and impact. These days, researchers are using scientometrics "to analyze, quantify, and measure communication phenomena to build accurate formal representations of their behavior for explanatory, evaluative, and administrative purposes" (De Bellis 2009, p. 3). From this point of view, scientometrics overlaps, and is most often synonymous, with bibliometrics, a term that Pritchard (1969) coined and defined as "the application of mathematics and statistical methods to the analysis of academic publications" (p. 348). However, as Gingras (2016) argued, bibliometrics is limited to the counting and analysis of published documents and their properties and, as such, is a subset of scientometrics, which uses bibliometric data and techniques to study the science of communication (De Bellis 2009). All told, we use both terms interchangeably unless otherwise indicated.

Scientometrics appears to have found its way into applied linguistics, as can be seen from the most recent research publications in applied linguistics-related research journals such as System, Applied Linguistics, and English for Specific Purposes. Though very few, some of these scientometric research papers have used co-citation analysis to diachronically analyse research articles in specific research journals such as System, in such sub-fields as English for specific purposes (ESP), computer assisted language learning (CALL), second language writing, and English language teaching and learning in applied linguistics, to identify the major research themes and topics, landmark publications, and historical research trends to map the structure and dynamics of the sub-fields (Arik and Arik 2017, 2021; Hyland and Jiang 2021; Liu and Hu 2021). Some others have adopted a broader perspective, exploring research productivity and research trends in applied linguistics research journals to identify the most frequently explored research topics and most highly cited publications (including journal articles, books, and book chapters); the most

highly cited authors; and the most productive countries/regions (Amini Farsani et al. 2021; Lei and Liu 2019). Still, other, more recent studies have analyzed topics such as task-based language teaching (Qin and Lei 2022), multilingualism (Lin and Lei 2020), interaction (Hyland and Jiang 2022), and authenticity (Hasrol et al. 2022), among others.

Such research studies have explored some uses and applications of scientometrics in applied linguistics to broaden our understanding of the field. As such, given the significance attached to research productivity, researcher visibility, research assessment and evaluation of researchers' research activities for promotion, research impact, fierce competitiveness of the research world, securing funding, and the ranking of the institutions, a book which introduces major themes, common techniques, and applications of scientometrics to applied linguistics readership is strongly felt.

Adopting a scientometrics research perspective in applied linguistics, therefore, helps us to examine disciplinary research practices quantitatively, statistically measure research development and growth, and textually (and contextually) analyze research documents, including research papers. Such a quantitatively-oriented, statistically-based, and (con)textually documented analysis of applied linguistics research phenomena contributes to the enrichment of research methodology, advancement of research theorization, and professionalization in applied linguistics as an independent field of inquiry, on the one hand, and leads to clearly delineating the boundaries of the field and characterizing its positioning in relation to neighboring disciplines from which it borrows, on the other hand.

Built on the above premises, our edited book covers a diachronic and synchronic empirical analysis of research practices, concepts, and phenomena in applied linguistics. We intend to use Scientometrics research methods, techniques, and concepts such as document co-citation analysis to look into research trends and publications, research orientations and approaches, citation behavior and practices, publication growth, and research productivity, to name just a few. The incorporation of such topics theoretically backed by Scientometrics may open new horizons for further research.

Such a theoretical research perspective and topic treatment in our edited textbook help emerging applied linguistics researchers, researcher-practitioners, and MA and PhD students to better understand where the field was, tracing the major research developments in the field over the past few decades, what research practices are being done now; and what future research directions the field is likely to follow. The book provides these stakeholders with a wealth of research ideas to choose from for further analysis, to strengthen their knowledge of the field, and to help them digest research practices, research publications, research trends, research policies, and research methods. The book will be useful for well-established applied linguistics researchers because it offers insights into reconceptualizing the field, prompting them to view and examine the research topics from a different theoretical research perspective.

Our edited book, therefore, is primarily intended for graduate student writers and novice applied linguistics researchers. For graduate student writers, the book

introduces bibliometric techniques in applied linguistics, which can be exploited to map the structure and dynamics of the field, to trace applied linguistics research growth and development diachronically, and to know the most highly cited research publications, research trends and topics, and authors. From a pedagogical point of view, this will help them to save time (especially if they are first-timers), investing in only those research activities that have appealed to researchers in the field to start their research works. Furthermore, in addition to those conventional quantitative tests in applied linguistics, the book familiarises them with some common analysis and visualization techniques, such as co-network analysis, for the analysis of bibliometric data. Such alternative analyses coupled with more conventional statistics tests such as chi-square tests (widely used in scientometric studies to show statistical relationships between citations and counts of publications) may contribute to meaning construction, validation of analyses of data, and theory building.

We have framed the book to center on the three most frequently cited applications of scientometrics to applied linguistics: Research methodology, research evaluation, and mapping of the discipline (Andrés 2009). The chapters offer readers a wealth of ideas about what scientometrics is, how it differs from neighboring disciplines such as informetrics, and, most importantly, how scientometrics can be used in applied linguistics to theorize the field, extending its boundaries and reconceptualizing it. In the following section of the chapter, we outline the structure of the present volume.

2 Structure of the Present Volume

The present volume includes nine chapters, the summaries of which we present here. In Chapter "Introduction to A Scientometrics Research Perspective in Applied Linguistics", Hussein Meihami and Rajab Esfandiari, the volume editors, introduce scientometrics to readers, differentiate scientometrics from other, similar terms (e.g., bibliometrics), describe the various scientometric research methods for data collection and analysis, explain how it has been used in applied linguistics, justify the rationale behind editing the volume, and outline the objectives of the volume.

In Chapter "Exploring the Evolution of Applied Linguistics: A Bibliometric Survey of Major Research Paradigms", Dahui Dong of the Chang Jung Christian University, Taiwan, and Ming Yuan Dong of Tamkang University, Taiwan, combined bibliometric tools (document co-citation analysis) and mine mapping (co-word analysis), respectively, to identify major applied linguistics (AL) research areas and detect the fundamental paradigms informing the areas in applied linguistics journals over the past 70 years. Building on 23,790 records, Dong and Dong identified 12 major areas, with the earliest years characterized by foreign language requirements and language learning in universities and the most recent years by more diverse areas, including multilingualism, corpus-based studies, and culture and L2 identity. The results of the topic modeling through co-word clustering revealed four major paradigms: positivism, post-positivism, constructivism, and critical theory, with positivism the most dominant one and the coexistence of the

other three paradigms competing for recognition. In Dong and Dong's words, "the coexistence of multiple paradigms emphasizes the importance of open-mindedness and flexibility in approaching research questions and interpreting findings." Drawing on these findings, the authors discuss the implications, limitations, and suggestions for further study.

In Chapter "Research Trends in Applied Linguistics (2017–2021): A Scientometric Review of 42 Journals", Yanhua Liu of the Hong Kong University of Science and Technology, China, and Guangwei Hu of the Hong Kong Polytechnic University, China, have drawn on Liu and Hu's (2021) study to update research trends in applied linguistics. For this purpose, the authors analyzed 7602 applied linguistics articles (with 198,861 unique references) from 42 applied linguistics journals published between 2017 and 2021 to identify the most frequently discussed topics and the most highly cited publications and authors. Results from topic term analysis and document co-citation analysis showed a surge in multilingualism and translanguaging; a growing interest in psychological factors, cognitive and instructional approaches, and teacher-related variables; continued attention to vocabulary learning, pronunciation instruction, and speech fluency; and the surging adoption of new methodological toolkits such as R statistics, mixed-effects models, and thematic analysis, among others. In addition to the research topics and publications, Canagarajah, Garcia, Nation, R Core Team, and Bates were identified to be the most highly cited authors. Using the research trends, Liu and Hu were able to establish relationships between discussed topics, research publications, and cited authors.

In Chapter "Topical Trends and Research Frontiers of Applied Linguistics Research Articles with Different Methodological Orientations: A Bibliometric-Synthetic Review", Mohammad Amini Farsani of Iran University of Science and Technology, Iran, and Hamid R. Jamali of Charles Sturt University, Australia, invest in bibliometric-synthetic methodology to review 3824 empirical articles in 18 applied linguistics research journals from 2009 to 2018 to track research trends (topics and frontiers) in primary (quantitative, qualitative, and mixed-methods) and secondary research. Co-word analyses revealed the following results. Language testing and assessment, discourse analysis and interaction, SLA-related issues, and L2 feedback as research strands were represented in quantitative, qualitative, mixed-methods, and secondary studies, respectively. Although SLA-related issues received the highest focus in quantitative and secondary studies, qualitative and mixed-methods research orientations mainly addressed academic writing. In closing the chapter, the authors discuss several implications the findings of the study may offer in undertaking to conduct primary studies as well as reviewing and synthesizing research.

In Chapter "Research Topics in Applied Linguistics as Keywords from Authors and Keywords from Abstracts: A Bibliometric Study", William S. Pearson of the University of Exeter, England, reports on the findings from the analyses of author-assigned keywords of 23,481 research articles in 42 applied linguistics research journals across three time spans from 2001 to 2021. In terms of the prevalence of keywords, author-provided keywords tended to gradually increase from 40.25%

during the first time interval (2001–2009) to 66.81% during the second time interval (2010–2015), to 73.33% during the third time interval (2016–2021), suggesting the (possible) requirement of the provision of keywords. The applied linguistics authors chose to include between four and six keywords, constituting 79.09% of the papers, with five keywords being the most frequently used (35.36%) with a slight increase of 12.56%, followed by six words (22.79%), and four words (20.94%). This finding, as Pearson commented, reflects the standardization across journals and publishers. As far as keyword lengths (measured by the number of words each keyword contains) are concerned, although keywords from one to five words in length were the most frequently assigned, single-word keywords tended to slightly decrease, with two-and three-word keywords marginally increasing, and four-and five-word keywords being relatively stable over time. The tendency for a larger number of words, as Pearson speculated, suggests an inclination towards greater keyword lengths and, by implication, more precision. Structurally, single noun, adjective + noun, and noun + noun keywords were the most frequently used structure patterns, respectively, albeit with fluctuating frequency counts over time. In terms of constituent word forms, nouns and adjectives were the two most frequently used word classes in keywords. Pearson found a mismatch between author-supplied keywords and abstracts because 48.62% of keywords were not present in the accompanying RA abstract. These findings motivate Pearson to conclude that author-provided keywords "encompass both an important methodological tool to support other measures and a source of insights into the state of a literature body", with implications for future bibliometric analyses.

In Chapter "A Bibliometric Analysis of Mixed Methods Research (MMR) in Applied Linguistics (AL)", Hessameddin Ghanbar of Islamic Azad University, Iran and A. Mehdi Riazi of Hamad Bin Khalifa University, Qatar, report on a timely bibliometric analysis of 256 mixed-methods research (MMR) studies in 18 prominent applied linguistics journals from 1984 to 2022. Investing in citation analysis of impact and author and document co-citation analyses, Ghanbar and Riazi map out the publication trends of MMR studies as well as the frequency of occurrence in the journals to identify the most highly cited institutes, countries, MMR papers and authors. The results of their bibliometric analyses generally show an upward increase in the number of published MMR studies in the field since 2008, but no regular pattern was detected for the number of times they were cited. The highest number of papers (n = 45, 18%) was published in *System*; in contrast, *Second Language Research* received the lowest number of papers (n = 2, 1%). In terms of citation impact, however, *Computer-assisted Language Learning* received the most frequently cited MMR studies. University of Lancaster, Macquarie University, and Iowa State University were the three top universities (out of 300 universities) to publish MMR studies; the United States of America was the first country (out of 43 countries) to publish the highest number of MMR studies (n = 87, 29.7), followed by the United Kingdom (n = 39,13.3), China (n = 29, 9.9), and Iran (n = 19, 6.5). Derwing et al. (2008), a longitudinal study of ESL learners' fluency and comprehensibility development in Applied Linguistics, was the most frequently cited MMR paper (118 times). In terms of document co-citation analysis, the cognitive perspective was the most dominant theme in the 37 most highly cited

references. From an author co-citation perspective, Zoltán Dörnyei, John W. Creswell, Peter MacIntyre, Rod Ellis, and Ken Hyland were the five top-cited authors. The findings of the study point to an empirical discovery that just because MMR studies are the most frequent does not necessarily imply they are the most frequently cited, revealing a mismatch between the frequency of publication trends and citation impact. Ghanbar and Riazi use the findings to discuss implications for submission purposes.

In Chapter "An Analysis of Writing for Publication Research on Novice Anglophone (L1) Academics: A Scientometric Perspective", Pejman Habibie of Western University, Canada, and Ismaeil Fazel University of British Columbia in Vancouver, Canada, have focused on a comparatively less research subarea in applied linguistics: Writing for publication research. Following manual coding and bibliometric techniques, Habibie and Fazel have analyzed a relatively small corpus of 50 research articles and book chapters of Anglophone novice scholars (graduate students and early career academics) across various disciplinary and geographical settings from 2001 to 2023. The authors organize the findings into five major categories: (1) publication trends and authorship patterns, (2) contexts and participants, (3) research foci and theoretical frames, (4) research design and data sources, and (5) practical implications and recommendations. They find that writing for publication research has witnessed an increasing number of publications, the majority of which include research articles from single and multiple-authored early career researchers in countries such as Australia, New Zealand, and many European countries. Almost three-fourths of the studies focused on experiences with scholarly publication, and qualitatively oriented studies (n = 41, 80%) outnumbered quantitative and mixed-methods studies, which tended to be marginalized. The majority of studies asked for explicit pedagogical training in writing for scholarly publication, the need for scaffolded support provided by supervisors, and further transparency and clarity in terms of policies for candidates and supervisors. The results of the co-word analysis showed that doctoral education, research translation, and early career researchers were the three top research topics receiving scholarly attention.

In Chapter "Bibliometrix: Science Mapping Analysis with R Biblioshiny Based on Web of Science in Applied Linguistics", Babak Daneshvar Ghorbani of Iran University of Science and Technology, Iran, uses Bibliometrix, an R-based, open-source computer program for bibliometric analyses, to explain, step by step, the procedures for the analysis of bibliographical data. For this purpose, Ghorbani draws on 881 articles in English language teaching and technology from 1538 authors between 2013 and 2022. The author demonstrates how it is possible to use bibliometric techniques, including network analysis, co-citation analysis, co-word analysis, and biographic coupling, among others, to identify the most highly cited authors, themes, publications, and countries; to establish the relationships between publications; and to sketch out international collaboration. As such, this book chapter provides hands-on information for newcomers to Scientometrics who intend to do bibliometric analyses on publications. Daneshvar Ghorbani finds that although the largest number of articles (n = 122) was published in 2022, no regular pattern was detected concerning a symmetric distribution of articles across the years.

Computer-assisted Language Learning, International Journal of Computer-assisted Language Learning and Teaching, and *System* published the highest number of articles (n = 362) and received the highest number of citations (3780). Wy Hwang, LJ Jiang, and S. Ebadi were the most highly cited authors, and the majority of the authors were from Islamic Azad University in Iran (n = 36), National Taiwan Normal University in China (n = 26), Education University in Hong Kong (n = 20), and Iowa State University in the United States of America (n = 19). China, the United States of America, and Iran were the three top countries in which the authors collaborated with other authors to produce the highest number of articles. The author builds on Lotka's law and Bradford's law to interpret the findings. Daneshvar Ghorbani closes the chapter, reminding us of the numerous advantages the special-purpose computer package Bibliomtrix can offer.

Last but not least, in the concluding Chapter "Concluding Remarks: Recommendations and Future Directions", Rajab Esfandiari and Hussein Meihami use the information in the chapters in this volume to provide an overview of scientometrics in applied linguistics. In doing so, we discuss the theoretical, pedagogical, and research implications that applying scientometrics may carry for applied linguistics and offer suggestions for future research.

References

Andrés, Ana. 2009. *Measuring academic research: How to undertake a bibliometric study*. Elsevier.

Arik, Beril T., and Engin Arik. 2017. Second language writing publications in web of science: A bibliometric analysis. *Publications* 5 (1): 4.

Arik, Engin, and Beril Tezeller Arik. 2021. The different aspects of English language teaching and learning: A scientometric analysis. *Journal of Scientometric Research* 10 (1): 84–93.

Carter, R. 2005. Review of book applied linguistics as social science, by A. Sealey & B. Carter. *International Journal of Applied Linguistics* 15 (2): 248–251.

Chen, Chaomei. 2017. Science mapping: A systematic review of the literature. *Journal of Data and Information Science* 2 (2): 1–40.

De Bellis, Nicola. 2009. *Bibliometrics and citation analysis: From the science citation index to Cybermetrics*. Scarecrow Press.

Derwing, Tracey M., Murray J. Munro, and Ron I. Thomson. 2008. A longitudinal study of ESL Learners' fluency and comprehensibility development. *Applied Linguistics* 29 (3): 359–380.

Esfandiari, Rajab, and Sahar Saleh. 2023. Structural and functional characterization of citation practices in academic research writing: A concordance-informed analysis. *Journal of Applied Linguistics and Applied Literature: Dynamics and Advances*.

Farsani, Mohammad Amini, Hamid R. Jamali, Maryam Beikmohammadi, Babak Daneshvar Ghorbani, and Ladan Soleimani. 2021. Methodological orientations, academic citations, and scientific collaboration in applied linguistics: What do research synthesis and bibliometrics indicate? *System* 100: 102547.

Gingras, Yves. 2016. *Bibliometrics and research evaluation: Uses and abuses*. MIT Press.

Glänzel, Wolfgang. 2003. *Bibliometrics as a Research Field a Course on Theory and Application of Bibliometric Indicators*. Retrieved from http://yunus.hacettepe.edu.tr/~tonta/courses/spring2011/bby704/bibliometrics-as-a-research-field-Bib_Module_KUL.pdf 21 May 2019.

Hasrol, Syazwani Binti, Azrifah Zakaria, and Vahid Aryadoust. 2022. A systematic review of authenticity in second language assessment. *Research Methods in Applied Linguistics* 1 (3): 100023.

Hyland, Ken, and Feng Kevin Jiang. 2021. Delivering relevance: The emergence of ESP as a discipline. *English for Specific Purposes* 64: 13–25.

———. 2022. Interaction in written texts: A bibliometric study of published research. *Studies in Second Language Learning and Teaching*.

Ivancheva, Ludmila. 2008. Scientometrics today: A methodological overview. *Collnet Journal of Scientometrics and Information Management* 2 (2): 47–56.

Lei, Lei, and Dilin Liu. 2019. Research trends in applied linguistics from 2005 to 2016. *Applied Linguistics* 40 (3): 540–561.

Lin, Zhong, and Lei Lei. 2020. The research trends of multilingualism in applied linguistics and education (2000–2019): A bibliometric analysis. *Sustainability* 12 (15): 6058.

Liu, Yanhua, and Guangwei Hu. 2021. Mapping the field of English for specific purposes (1980–2018): A co-citation analysis. *English for Specific Purposes* 61: 97–116.

McKinley, J. 2020. Introduction: Theorizing research methods in the golden age of applied linguistics research. In *The Routledge handbook of research methods in applied linguistics*, ed. Jim McKinley and Heath Rose, 1–12. Routledge.

Meihami, Hussein, and Rajab Esfandiari. 2021. Citation practices among Iranian applied linguists: A narrative inquiry. *MEXTESOL Journal* 45 (3): 1–10.

Pritchard, Alan. 1969. Statistical bibliography or Bibliometrics. *Journal of Documentation* 25: 348–349.

Qin, Jie, and Lei Lei. 2022. Research trends in task-based language teaching: A bibliometric analysis from 1985 to 2020. *Studies in Second Language Learning and Teaching* 12 (3): 381–404.

Rashidi, Naser, and Hussein Meihami. 2018. Informetrics of Scientometrics abstracts: A rhetorical move analysis of the research abstracts published in Scientometrics journal. *Scientometrics* 116: 1975–1994.

Roemer, R. C., and Borchardt, R. 2015. *Meaningful metrics: A 21st century Librarian's guide to bibliometrics, altmetrics, and research impact*. Association of College and Research Libraries.

Sahragard, Rahman, and Hussein Meihami. 2016. A diachronic study on the information provided by the research titles of applied linguistics journals. *Scientometrics* 108: 1315–1331.

Sooryamoorthy, R. 2021. *Scientometrics for the humanities and social sciences*. Routledge.

Wang, Lili, Xianwen Wang, and Niels J. Philipsen. 2017. Network structure of scientific collaborations between China and the EU member states. *Scientometrics* 113: 765–781.

Yang, Siluo, Qingli Yuan, and Jiahui Dong. 2020. Are Scientometrics, Informetrics, and Bibliometrics different? *Data Science and Informetrics* 1 (01): 50–72.

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