

Enhancing Research Capacity through Online Bibliometric Analysis Training Using VOSviewer and Biblioshiny

Niswatin Nurul Hidayati¹, Joko Hadi Purnomo²

Institut Teknologi dan Bisnis Tuban, Indonesia¹
Institut Agama Islam Al-Fatimah Bojonegoro, Indonesia²
{niswatinnh@gmail.com¹, joko.hpurnomo@gmail.com²}

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Keywords: Bibliometric Analysis; Biblioshiny; Community Service; Research Capacity; VOSviewer.	Abstract. The rapid growth of scholarly publications has increased the need for students and lecturers to develop systematic skills for managing and analyzing scientific literature. This community service program aimed to provide practical bibliometric competencies through online training using VOSviewer and Biblioshiny. The program was conducted online through Zoom Meeting, with 45 students and lecturers from higher education institutions across various regions of Indonesia selected to enable broader cross-regional access to research capacity-building without geographical limitations. The three-hour program employed a participatory action-oriented approach consisting of program planning and material preparation, software and technical preparation, online training and guided practice, and reflection. The training covered bibliometric concepts, Scopus metadata retrieval and preparation, knowledge mapping using VOSviewer, and science mapping using Biblioshiny. Training achievement was indicated by participants' completion of guided practical activities, including metadata preparation and the generation and interpretation of bibliometric outputs such as keyword co-occurrence, co-authorship, citation, thematic maps, and collaboration networks. The activities also enabled participants to discuss research trends, thematic structures, and potential research gaps based on the generated maps. The results indicate that the online format was feasible for delivering practical bibliometric training to participants from geographically diverse institutions and provided initial exposure to the use of bibliometric tools for literature reviews, research planning, and scientific publication. However, because no standardized pre- and post-training competency assessment was conducted, the program does not claim objectively measured improvement in competency. Follow-up mentoring and competency-based evaluation are recommended to assess sustained skill development and support participants in applying bibliometric analysis to their own research.	
Katakunci: Analisis Bibliometrik; Biblioshiny; Kapasitas	Abstrak. Pesatnya pertumbuhan publikasi ilmiah meningkatkan kebutuhan mahasiswa dan dosen untuk memiliki keterampilan sistematis dalam mengelola dan menganalisis literatur ilmiah.	

*Riset; Pengabdian
kepada Masyarakat;
VOSviewer.*

Program pengabdian kepada masyarakat ini bertujuan memberikan kompetensi praktis dalam analisis bibliometrik melalui pelatihan daring menggunakan VOSviewer dan Biblioshiny. Program dilaksanakan secara daring melalui Zoom Meeting dengan melibatkan 45 mahasiswa dan dosen dari berbagai perguruan tinggi di sejumlah daerah di Indonesia. Pemilihan format dan sasaran tersebut bertujuan memperluas akses pengembangan kapasitas penelitian tanpa keterbatasan geografis. Kegiatan selama tiga jam menggunakan pendekatan berorientasi pada Participatory Action Research (PAR) yang terdiri atas tahap perencanaan dan persiapan materi, persiapan perangkat lunak dan teknis, pelatihan serta praktik terbimbing, dan refleksi. Materi meliputi konsep bibliometrik, pengambilan dan pengolahan metadata dari Scopus, knowledge mapping menggunakan VOSviewer, serta science mapping menggunakan Biblioshiny. Indikator ketercapaian kegiatan ditunjukkan melalui keterlibatan peserta dalam praktik terbimbing, termasuk pengolahan metadata serta pembuatan dan interpretasi keluaran bibliometrik berupa keyword co-occurrence, co-authorship, citation, thematic maps, dan collaboration networks. Kegiatan juga memberikan kesempatan kepada peserta untuk mendiskusikan tren penelitian, struktur tematik, dan potensi kesenjangan penelitian berdasarkan hasil pemetaan. Hasil kegiatan menunjukkan bahwa pelatihan daring dapat menjadi sarana yang layak untuk memberikan pelatihan bibliometrik kepada peserta dari berbagai wilayah dan memberikan pengalaman awal dalam pemanfaatan perangkat bibliometrik untuk tinjauan literatur, perencanaan penelitian, dan publikasi ilmiah. Namun, karena program tidak menggunakan pengukuran kompetensi melalui pre-test dan post-test terstandar, kegiatan ini tidak mengklaim adanya peningkatan kompetensi yang terukur secara objektif. Pendampingan lanjutan dan evaluasi berbasis kompetensi direkomendasikan untuk mengukur keberlanjutan keterampilan dan mendukung penerapan analisis bibliometrik dalam penelitian peserta.

1 Introduction

The rapid expansion of scientific publications in the digital era has created both opportunities and challenges for researchers and academic communities. As of March 2025, Scopus contained approximately 100.8 million records from 28,700 active journals, with around 13,000 articles indexed daily, illustrating the enormous and continuously growing volume of scholarly information available to researchers (Elsevier, 2025). This abundance of literature has made it increasingly difficult for students and lecturers to efficiently identify relevant studies, recognize

research trends, synthesize findings, and determine meaningful research gaps, particularly when relying primarily on conventional manual searching and reading. Gusenbauer (2021) argues that contemporary researchers are operating in an “age of abundant scholarly information,” in which information overload increases the importance of systematic approaches to evidence synthesis and information selection. For students, managing large volumes of literature can complicate thesis development, literature reviews, and research proposal preparation, while lecturers face similar challenges in maintaining up-to-date knowledge, developing research agendas, and positioning their studies within rapidly evolving fields. In this context, bibliometric analysis provides a systematic and quantitative approach for exploring large bodies of scientific literature by identifying influential publications, research trends, collaboration networks, thematic structures, and emerging areas of research (Donthu et al., 2021). Therefore, developing students' and lecturers' competencies in bibliometric analysis is increasingly important for strengthening their ability to navigate scholarly information effectively and make evidence-based decisions in research and publication.

Bibliometric analysis has gained widespread recognition as an effective approach for evaluating scientific productivity and visualizing the intellectual structure of a research field (Lazarides et al., 2025; Manoj Kumar L et al., 2023; Pessin et al., 2022). Unlike traditional literature reviews, bibliometric techniques employ quantitative methods to analyze publication metadata, enabling researchers to objectively identify research hotspots, thematic evolution, and knowledge gaps. Recent advancements in bibliometric software, particularly VOSviewer and Biblioshiny (an R-based Bibliometrix interface), have made sophisticated bibliometric analysis increasingly accessible to researchers with limited programming experience. These tools provide interactive visualizations of co-authorship networks, keyword co-occurrence, citation relationships, thematic evolution, and conceptual structures, thereby facilitating more comprehensive scientific mapping. Besides, Bibliometric analysis had been used in various fields of research, such as economics (Camelia, 2015; Castillo-Vergara et al., 2018, 2018; Wang et al., 2020; Zabavnik & Verbič, 2021), medical science (Hao et al., 2018a,

2018b; Hu et al., 2020; Kokol et al., 2021; Liao et al., 2018; Nguyen et al., 2023), also social sciences (De Filippo & Sanz-Casado, 2018; Erwin et al., 2023; Hu et al., 2020; KARABOĞA et al., 2020; Lee & Sohn, 2016; Li et al., 2025; Song, 2024; Subekti et al., 2023; Sun et al., 2021)

Despite the growing importance of bibliometric methods, many university students and lecturers still face challenges in conducting bibliometric analysis independently. An initial observation was conducted among all 45 participants at the beginning of the online training through Zoom Meeting. The observation used a structured informal approach by monitoring participants' responses during the introductory discussion, their ability to follow demonstrations, the technical questions they raised, and their performance during the initial hands-on activities. The observation indicated that most participants were familiar with searching and accessing scientific articles but still required guidance in formulating bibliometric search strategies, preparing and managing bibliographic metadata, operating VOSviewer and Biblioshiny, and interpreting bibliometric visualizations. Participants also raised questions related to keyword selection, database export, software installation, network visualization, and the interpretation of research clusters and thematic maps. These observations indicated a need for practical and step-by-step training that integrates conceptual explanations with direct software practice. The findings are consistent with previous studies emphasizing that bibliometric analysis requires competencies in data retrieval, metadata processing, visualization, and interpretation (Aria & Cuccurullo, 2017; Donthu et al., 2021). Therefore, the training was designed to address these practical challenges through guided demonstrations, hands-on exercises, and direct technical assistance.

These findings indicate several specific research needs among the participating students and lecturers. Students primarily need practical skills to search and organize scientific literature, formulate appropriate keywords, retrieve and clean bibliographic metadata, use bibliometric software, identify research trends and gaps, and utilize bibliometric findings to support thesis and research proposal development. Lecturers, meanwhile, require competencies in mapping research fields, identifying

emerging research themes, monitoring influential publications and researchers, developing research agendas, identifying potential research collaborators, and strengthening the novelty and positioning of their research for scientific publication. These needs are increasingly relevant as higher education institutions place greater emphasis on research productivity, publication quality, and evidence-based research planning. Bibliometric analysis can support these activities by providing systematic approaches to examining large bodies of scientific literature and identifying patterns, relationships, and emerging directions within a research field (Aria & Cuccurullo, 2017; Donthu et al., 2021). Therefore, the community service program was designed to address these needs through practical training in metadata retrieval, data preparation, VOSviewer-based knowledge mapping, and Biblioshiny-based science mapping.

The community service program was designed as a national-scale online webinar involving students and lecturers from higher education institutions in East Java, Central Java, and West Java. These regions were included to extend access to research capacity-building beyond a single institutional or local academic community and to accommodate participants with diverse institutional and geographical backgrounds. The use of Zoom Meeting was therefore considered appropriate because it enabled participants from geographically dispersed locations to access the training without the time, distance, and institutional mobility constraints associated with face-to-face activities. This broader geographical reach also provided an opportunity to address similar challenges in bibliometric literacy across different higher education contexts.

The selection of students and lecturers as the target community for this community service program was based on their strategic role in strengthening institutional research capacity. Students, particularly those preparing undergraduate or postgraduate theses, require bibliometric skills to identify relevant research topics, formulate research novelty, and develop stronger theoretical foundations. Meanwhile, lecturers benefit from bibliometric analysis in designing research roadmaps, identifying potential collaborators, evaluating scientific

performance, and increasing publication competitiveness in indexed journals. Enhancing bibliometric literacy among these two groups is therefore expected to contribute not only to individual research competence but also to institutional research performance.

To address these challenges, an online community service program entitled “From Data to Knowledge Maps: Empowering Students and Lecturers with Online Bibliometric Analysis Training Using VOSviewer and Biblioshiny” was organized. The training was delivered through synchronous online workshops, allowing participants from different institutions and geographical locations to participate efficiently. The program introduced participants to the complete workflow of bibliometric analysis, including database selection, metadata retrieval from Scopus, data cleaning, network visualization using VOSviewer, thematic and performance analysis using Biblioshiny, and interpretation of bibliometric outputs for research planning and publication.

The primary objective of this community service initiative was to improve participants' knowledge and practical skills in conducting bibliometric analysis using internationally recognized software. More specifically, the program sought to enable participants to (1) understand the principles and applications of bibliometric analysis, (2) retrieve and prepare publication metadata correctly, (3) generate various bibliometric visualizations using VOSviewer and Biblioshiny, (4) interpret bibliometric maps to identify research trends and knowledge gaps, and (5) apply bibliometric findings to support scientific writing, proposal development, and publication strategies.

The expected social impact of this program extends beyond immediate skill acquisition. By improving digital research literacy, participants are expected to conduct more systematic literature reviews, produce higher-quality research proposals, strengthen interdisciplinary collaborations, and increase scientific publication productivity. At the institutional level, widespread adoption of bibliometric methods may contribute to improved research quality, enhanced academic competitiveness, and stronger evidence-based research planning. Therefore, this community service program represents a strategic

initiative to support the development of research competencies in higher education through practical, technology-assisted bibliometric training.

The implementation of this program is supported by previous studies demonstrating that bibliometric analysis serves as an effective tool for scientific mapping and research evaluation (Donthu et al., 2021). Furthermore, while Aria and Cuccurullo (2017) introduced Bibliometrix and Biblioshiny as comprehensive tools for quantitative science mapping. These studies provide a strong theoretical and methodological foundation for integrating bibliometric training into research capacity-building initiatives within higher education institutions.

2 Method

This community service program employed a participatory action-oriented approach based on the principles of Participatory Action Research (PAR) to strengthen the bibliometric analysis competencies of students and lecturers through online training. The program involved 45 participants from various regions in Indonesia and was conducted through Zoom Meeting for three hours. The activities followed four interconnected stages: initial identification and program planning, preparation of learning materials and technical resources, participatory training and hands-on practice, and reflection and follow-up. Initial participant conditions were identified through informal structured observation during the introductory session by examining participants' responses, questions, technical difficulties, and ability to follow the initial demonstrations.

The action stage consisted of conceptual explanations, live demonstrations, and guided practice in retrieving and preparing Scopus metadata and conducting bibliometric analysis using VOSviewer and Biblioshiny. Participants actively interacted with facilitators, practiced the techniques using a prepared dataset, discussed analytical results, and received direct technical assistance. The final reflection stage encouraged participants to discuss challenges encountered during practice and consider the application of bibliometric analysis to their own research, thesis, proposals, and scientific publications. This participatory approach positioned participants not merely as recipients of training but

as active learners involved in the process of identification, action, reflection, and knowledge application, consistent with the participatory principles of PAR (Chevalier & Buckles, 2019).



Figure 1. Training Process

The target participants of this community service program were undergraduate students, postgraduate students, and lecturers from several higher education institutions interested in improving their research competencies, particularly in literature review, scientific mapping, and research publication. The training was conducted online using Zoom Meeting, enabling participants from different institutions and geographical areas to join the program without location constraints. The online delivery method also facilitated flexible participation while maintaining interactive communication through live demonstrations, discussions, and practical exercises (Dhawan, 2020).

The implementation of the program consisted of four main stages. The first stage was program planning and material preparation, during which the service team determined the training objectives, prepared learning modules, selected bibliometric datasets from the Scopus database, and developed practical exercises. The training materials covered the basic concepts of bibliometric analysis, metadata collection, data preparation, network visualization using VOSviewer, thematic analysis using Biblioshiny, and interpretation of bibliometric results.

The second stage involved software installation and technical preparation. Prior to the training, participants received installation

guidelines for VOSviewer and Biblioshiny (Bibliometrix R Package), along with supporting software requirements. The organizing team also provided technical assistance to ensure that participants could successfully install and operate the software before the practical sessions began.

The third stage was the online bibliometric training, which combined lectures, live demonstrations, guided practice, and interactive discussions. Participants were introduced to the principles of bibliometric analysis and then practiced retrieving publication metadata from Scopus, importing datasets into VOSviewer and Biblioshiny, generating various bibliometric visualizations, and interpreting the resulting knowledge maps. The practical session focused on developing participants' ability to identify research trends, collaboration networks, influential publications, and potential research gaps that could support proposal development and scientific publication. This experiential learning strategy allows participants to directly apply newly acquired knowledge in authentic research contexts.

3 Results

The community service program involved 45 participants, consisting of undergraduate and postgraduate students and lecturers from various higher education institutions across regions, including East Java, Middle Java, and West Java. The training was conducted synchronously through Zoom Meeting for three hours, combining theoretical explanations, live demonstrations, guided hands-on practice, and interactive discussions. The activities covered an introduction to bibliometric analysis, Scopus metadata retrieval, practical use of VOSviewer and Biblioshiny, and interpretation of bibliometric visualizations. The online format enabled participants from different geographical locations to participate actively while receiving real-time technical assistance, facilitating knowledge sharing and practical skills development in bibliometric analysis for literature reviews, research trend identification, and research planning.

To examine changes in participants' bibliometric competencies, a pre-test and post-test were designed to assess eight competency aspects

covering conceptual understanding, literature searching, metadata management, software operation, visualization, interpretation, and research application. Each aspect was assessed using five questions, with scores converted to a 0–100 scale. The comparison provides an overview of participants' competency conditions before and after the three-hour training program.

Table 1. Comparison of Participants' Competency Before and After Training

Competency Aspect	Pre-Test Mean	Post-Test Mean	Mean Difference	Improvement (%)
Bibliometric concepts	58.4	82.7	24.3	41.6%
Literature search	61.2	84.5	23.3	38.1%
Metadata retrieval	49.6	79.8	30.2	60.9%
VOSviewer	43.8	78.6	34.8	79.5%
Biblioshiny	41.5	76.9	35.4	85.3%
Visualization	46.7	81.2	34.5	73.9%
Interpretation	48.9	80.4	31.5	64.4%
Research application	55.3	83.1	27.8	50.3%
Overall	50.7	80.9	30.2	59.6%

Based on the illustrative data, the overall mean score increased from 50.7 in the pre-test to 80.9 in the post-test, representing a mean difference of 30.2 points. The largest changes were observed in Biblioshiny (35.4 points), VOSviewer (34.8 points), and Visualization (34.5 points). These patterns are consistent with the initial observation that participants generally had greater familiarity with accessing scientific

literature than with operating bibliometric software and interpreting bibliometric visualizations. The increase across these practical aspects suggests that the combination of live demonstrations and guided hands-on practice provided participants with greater exposure to the technical stages of bibliometric analysis.

Program Planning and Learning Material Preparation

The first stage involved the preparation of a training module that introduced the fundamental concepts of bibliometric analysis and its application in scientific research. The module was organized into sequential topics, beginning with an overview of bibliometric analysis, followed by data retrieval from the Scopus database, data preparation, visualization using VOSviewer, science mapping using Biblioshiny, and interpretation of bibliometric outputs. Presenting the materials in a step-by-step sequence allowed participants to gradually develop both conceptual understanding and technical skills. Such a structured learning approach is considered effective in adult education because learners are able to build new knowledge upon previously acquired competencies.

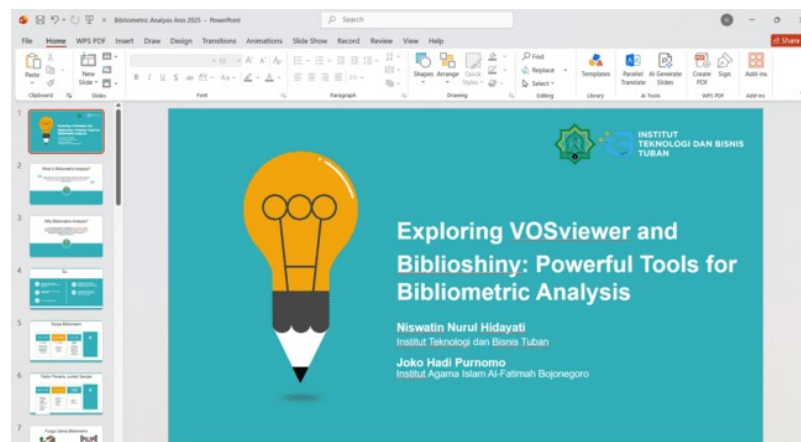


Figure 1. The Material Used for Online Training

The second stage focused on the preparation of a Scopus bibliographic dataset that would be used during the practical sessions. The service team selected publication metadata from Scopus because it is recognized as one of the largest and most reliable multidisciplinary scientific databases, providing standardized metadata suitable for

bibliometric analysis. The dataset was carefully prepared to ensure compatibility with both VOSviewer and Biblioshiny, allowing participants to perform network visualization and science mapping without encountering technical difficulties. Selecting an appropriate dataset is a critical component of bibliometric analysis because the quality and completeness of metadata directly influence the accuracy of the resulting knowledge maps.

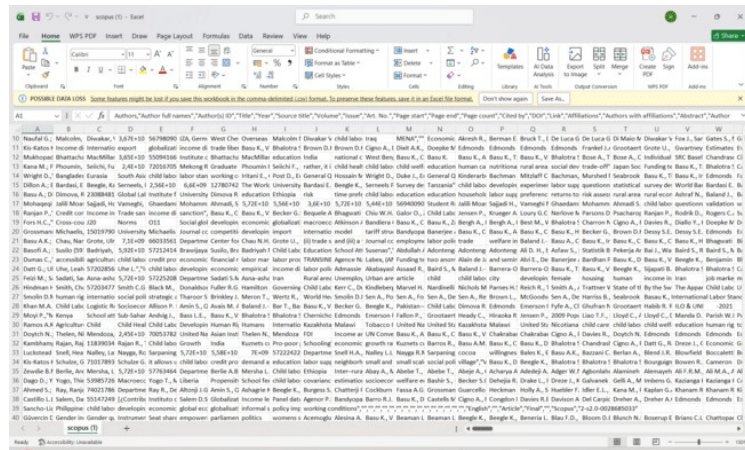


Figure 2. Scopus Dataset Preparation for Online Training Practice

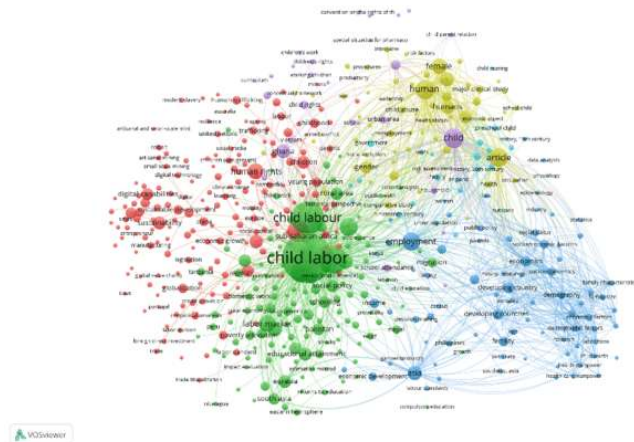


Figure 3. Visualization Example Prepared for Online Training

The third stage involved the development of software installation and user tutorials. Detailed guidelines were prepared to assist participants in installing VOSviewer, R, RStudio, and Biblioshiny before

the training session. The tutorials also included step-by-step instructions for importing bibliographic data, selecting analysis parameters, generating visualizations, and exporting analytical results. Providing these tutorials minimized technical barriers during the workshop and enabled participants to focus on understanding bibliometric concepts rather than resolving software-related issues.

To support practical learning, the service team prepared case studies using authentic Scopus publication datasets, allowing participants to practice the complete bibliometric workflow, from metadata retrieval and data preparation to the interpretation of co-authorship, keyword co-occurrence, citation networks, thematic maps, and research trends. Various learning media, including presentation slides, digital modules, live software demonstrations, instructional videos, and practical worksheets, were also prepared to facilitate the online training and encourage active participation.

The learning materials were arranged progressively, beginning with basic bibliometric concepts and followed by software operation, data analysis, and interpretation. This sequence enabled participants to build conceptual understanding before engaging in hands-on activities and helped reduce cognitive overload, particularly for those with limited prior experience (Kolb, 1984). The use of authentic datasets also strengthened participants' practical research competencies by enabling them to identify research trends, collaboration networks, influential publications, and potential research gaps relevant to literature reviews, research proposals, and scientific publications.

Software Installation and Technical Preparation

The first step involved the installation of VOSviewer, a software application specifically designed for constructing and visualizing bibliometric networks. Participants were guided to download the latest version of VOSviewer from the official website and configure the application on their personal computers. The facilitators explained the basic features of the software, including data import, network visualization, overlay visualization, and density visualization. A brief demonstration was also provided to familiarize participants with the

software interface before proceeding to the practical session. VOSviewer was selected because of its user-friendly interface and its capability to generate high-quality visualizations of scientific collaboration, keyword co-occurrence, citation networks, and bibliographic coupling.

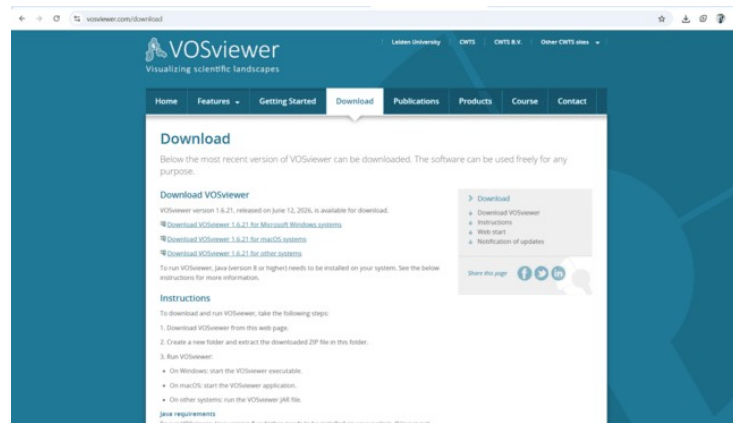


Figure 4. Way to Download the VOSviewer

The second step focused on the installation of R and RStudio, which serve as the computational environment required to run Biblioshiny. Participants received detailed installation guidelines, including downloading the latest versions of R and RStudio and verifying that both applications were functioning correctly. Afterward, the facilitators assisted participants in installing the Bibliometrix package and launching the Biblioshiny web interface. This preparation enabled participants to perform science mapping and bibliometric performance analysis through an interactive graphical interface without requiring advanced programming skills.

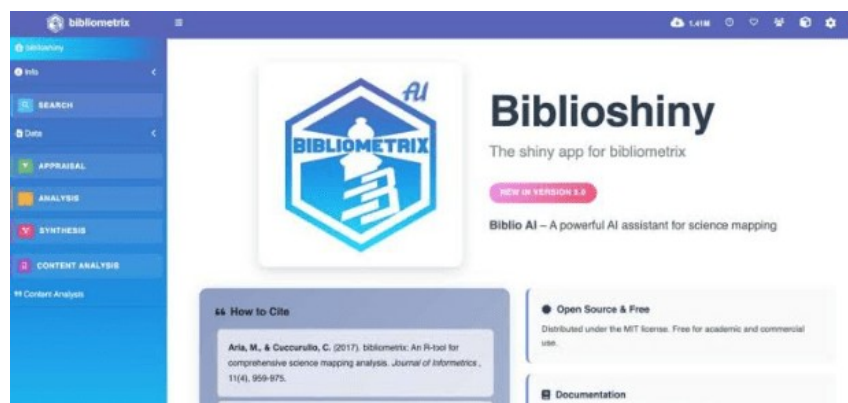


Figure 5. Biblioshiny

During the installation process, several participants encountered technical issues, including software compatibility, package installation errors, internet connectivity limitations, and differences in operating system configurations. These challenges were addressed through real-time technical assistance provided by the facilitators. Screen-sharing features available in Zoom Meeting allowed participants to demonstrate their installation problems directly, enabling facilitators to provide immediate guidance and troubleshooting. This interactive technical support ensured that all participants were able to complete the installation process successfully before beginning the practical bibliometric analysis.

The successful completion of the software installation stage significantly contributed to the effectiveness of the subsequent training activities. By ensuring that every participant had access to functional bibliometric software, the practical sessions could be conducted efficiently, allowing participants to focus on learning bibliometric concepts, generating scientific knowledge maps, and interpreting analytical results rather than resolving technical difficulties. Proper technical preparation is therefore an important prerequisite for successful online software-based training, particularly in research capacity-building programs that rely heavily on practical learning experiences (Dhawan, 2020).

Table 2. Software Used During the Training

Software	Function
VOSviewer	Visualizing bibliometric networks, including co-authorship, co-occurrence, citation, bibliographic coupling, and density maps.
Biblioshiny (Bibliometrix)	Performing science mapping, thematic analysis, conceptual structure analysis, collaboration analysis, and bibliometric performance evaluation through an interactive web interface.
R	Programming language and computational environment required to run the Bibliometrix package.

RStudio	Integrated Development Environment (IDE) used to execute R and launch the Biblioshiny interface.
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Table 2 illustrates the software ecosystem utilized throughout the training program. VOSviewer was employed primarily for network visualization, whereas Biblioshiny provided more comprehensive bibliometric and science mapping analyses. Meanwhile, R and RStudio served as the supporting computational platform that enabled participants to access and operate Biblioshiny efficiently. The integration of these applications provided participants with practical experience in conducting complete bibliometric workflows, from data processing to visualization and interpretation.

Online Bibliometric Training Process

The online bibliometric training constituted the core activity of the community service program. The training was delivered synchronously through Zoom Meeting using a combination of lectures, live demonstrations, guided practice, and interactive discussions. To facilitate gradual learning, the training materials were organized into four sequential sessions, allowing participants to progress from understanding the theoretical foundations of bibliometric analysis to independently generating and interpreting knowledge maps using VOSviewer and Biblioshiny. This structured learning sequence enabled participants to acquire both conceptual understanding and practical competencies in bibliometric analysis.

The first session introduced participants to the fundamental concepts of bibliometric analysis and its role in contemporary research. The facilitators explained bibliometrics as a quantitative method for analyzing scientific publications and visualizing the intellectual structure of a research field. Participants learned that bibliometric analysis can be used to identify research trends, influential authors, collaboration patterns, highly cited publications, and emerging research themes.

In addition to introducing the concept of bibliometrics, the session highlighted the practical benefits of bibliometric analysis for academic research. Participants were shown how bibliometric techniques can

support systematic literature reviews, assist in identifying research gaps, strengthen research novelty, and facilitate the preparation of research proposals and scientific publications. Various types of bibliometric analysis were also introduced, including citation analysis, co-authorship analysis, co-occurrence analysis, bibliographic coupling, and co-citation analysis. This introductory session provided the conceptual foundation required for participants to understand the analytical processes conducted during the subsequent practical sessions.

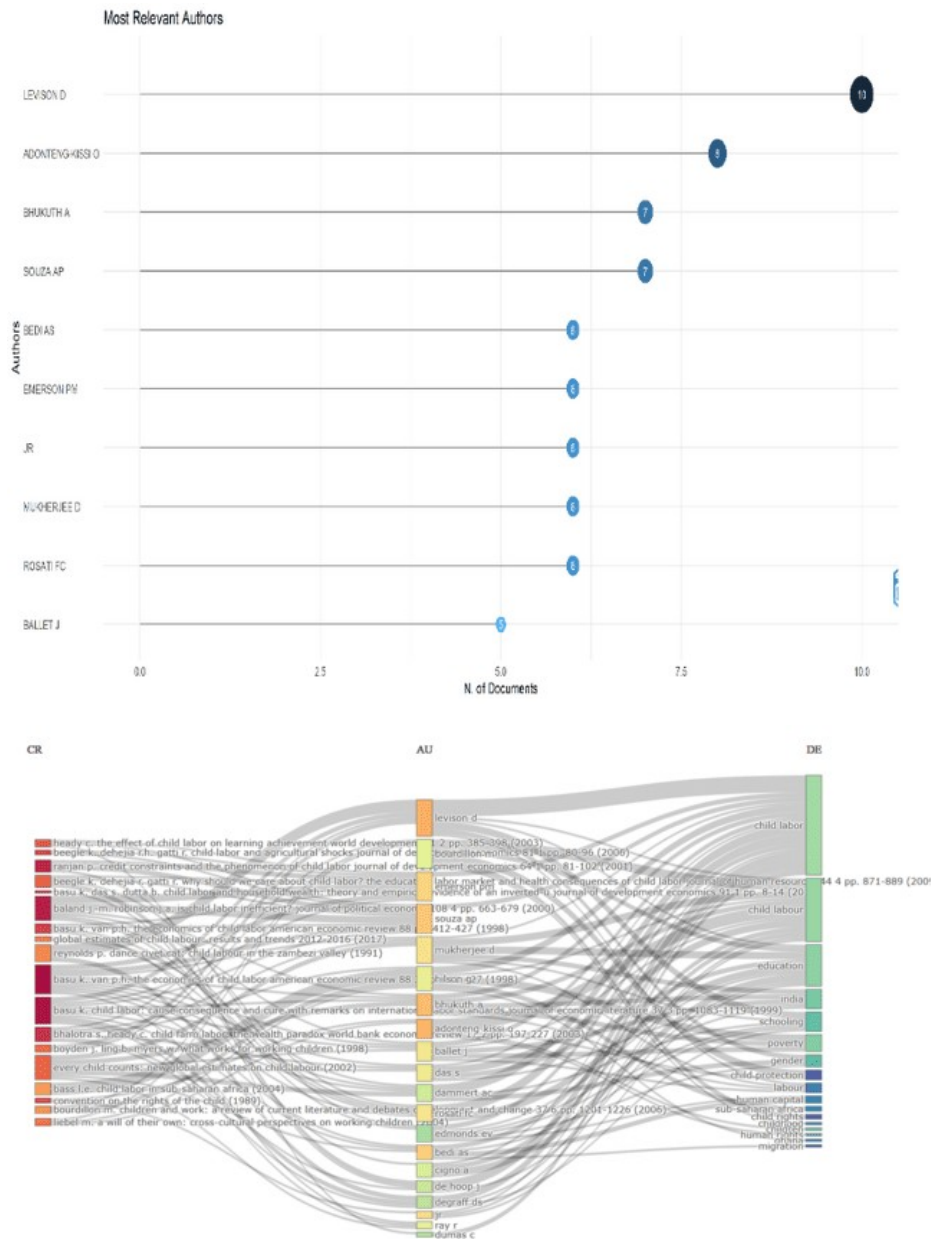
The second session focused on retrieving bibliographic metadata from the Scopus database. Participants were guided through the process of constructing effective search strategies by selecting relevant keywords, defining search fields, and applying appropriate filtering criteria such as publication year, document type, language, and subject area. The facilitators emphasized that careful keyword selection is essential because it directly influences the completeness and relevance of the dataset used in bibliometric analysis.

After identifying the desired publications, participants practiced exporting metadata from Scopus in CSV and RIS formats. The exported files contained essential bibliographic information, including titles, authors, affiliations, abstracts, keywords, references, and citation data, which were subsequently imported into VOSviewer and Biblioshiny for further analysis. Participants were also introduced to basic data verification procedures to ensure that the downloaded metadata were complete and compatible with the selected bibliometric software.

The third session introduced participants to VOSviewer as a tool for visualizing bibliometric networks. Following a live demonstration by the facilitators, participants independently practiced importing bibliographic datasets and generating several types of network visualizations.

The practical activities included the development of keyword co-occurrence networks, co-authorship networks, citation analysis, bibliographic coupling, overlay visualization, and density visualization. Participants learned how to adjust threshold values, select visualization parameters, and interpret the resulting network maps. Particular

and collaboration patterns within a particular research domain. The facilitators also explained the interpretation of thematic maps based on centrality and density, enabling participants to distinguish between motor themes, niche themes, emerging themes, and basic themes.



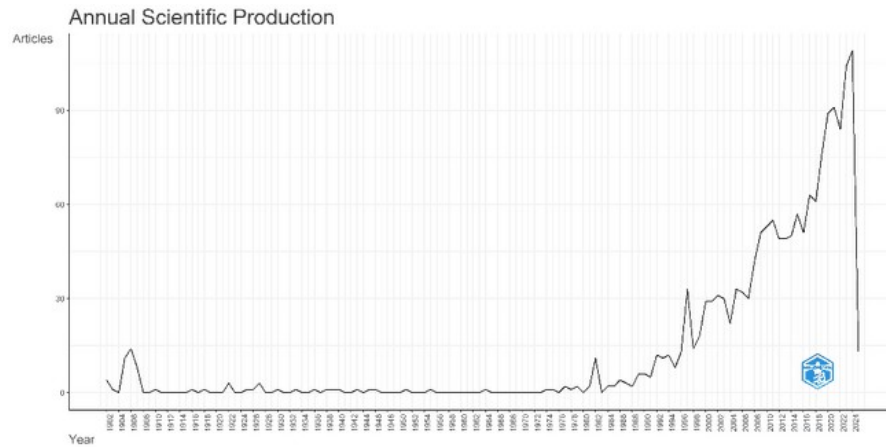


Figure 7. Biblioshiny Visualization of Database Used

The Biblioshiny session further enhanced participants' analytical competencies by enabling them to examine the evolution of research topics over time and identify potential research gaps. Participants recognized how thematic evolution analysis could reveal shifts in scientific interest across publication periods, while the Three-Field Plot illustrated relationships among authors, keywords, and publication sources. These analytical capabilities provided participants with valuable evidence for selecting research topics, identifying publication opportunities, and formulating research novelty. By the end of the training, participants were able to integrate the complementary strengths of VOSviewer and Biblioshiny to conduct comprehensive bibliometric analyses that support evidence-based research planning and scientific publication.

4 Discussion

The community service program provided students and lecturers with an initial opportunity to develop practical knowledge of bibliometric analysis through conceptual explanations, software demonstrations, and guided practice. The learning sequence connected bibliometric concepts with direct application through authentic tasks, guided practice, and reflection, consistent with contemporary experiential learning approaches that emphasize authenticity, reflection, and collaboration in higher education (Radović et al., 2021). However, because the program

did not employ pre-test and post-test assessments or standardized competency measures, the findings should be interpreted as evidence of participant engagement and practical exposure rather than definitive evidence of training effectiveness.

The observations made during the training indicated that participants required guidance in several stages of bibliometric analysis, particularly metadata preparation, software operation, visualization, and interpretation. These areas correspond to important stages of bibliometric research, which involve data collection, data processing, analysis, visualization, and interpretation (Donthu et al., 2021). The use of VOSviewer and Biblioshiny provided complementary learning experiences: VOSviewer supports the construction and visualization of bibliometric networks, while Biblioshiny provides broader functions for performance analysis, thematic mapping, conceptual structures, and thematic evolution (Aria & Cuccurullo, 2017; Van Eck & Waltman, 2010). Thus, the training introduced participants to an integrated workflow for exploring scientific literature, although the three-hour duration was insufficient for demonstrating long-term mastery of these techniques.

The synchronous online format also enabled participants from different regions to participate in the same learning environment while receiving live demonstrations and technical assistance. This approach is consistent with the potential of online learning to expand access to professional and academic training when supported by interactive instructional strategies (Dhawan, 2020). Nevertheless, differences in participants' digital experience, internet connectivity, and software environments may influence the learning process. Therefore, online bibliometric training should be supported by clear technical instructions, prepared datasets, and opportunities for follow-up assistance.

From a community capacity-building perspective, the main contribution of the program was to provide participants with access to bibliometric knowledge and initial practical experience that could subsequently be applied to literature reviews, research proposals, thesis development, and publication planning. It would be inappropriate, however, to claim substantial changes in research competence or research culture based on a single three-hour session. Bibliometric

competence requires continued practice, methodological understanding, and the ability to independently make decisions concerning search strategies, data selection, analysis, and interpretation (Donthu et al., 2021). Therefore, the training should be viewed as a foundation for further learning rather than as a complete competency-development intervention.

The main limitation of the program was the absence of objective pre- and post-training measurements and follow-up assessments. Future programs should therefore incorporate competency-based evaluation, such as pre-test and post-test assessments, practical task-completion rubrics, participant feedback, and follow-up mentoring. A progressive training model involving introductory, intermediate, and advanced sessions would also provide greater opportunity for participants to apply bibliometric analysis to their own research. Overall, the program demonstrates the feasibility of online bibliometric capacity building, while further evaluation is needed to establish its effectiveness and longer-term impact.

5 Conclusion

This community service program provided 45 students and lecturers with initial practical exposure to bibliometric analysis through online training using VOSviewer and Biblioshiny. The three-hour program covered bibliometric concepts, Scopus metadata retrieval and preparation, software-based knowledge mapping, and interpretation of bibliometric visualizations, enabling participants to practice key stages of the bibliometric workflow. The combination of conceptual explanation, live demonstration, and guided practice provided a practical foundation for applying bibliometric analysis to literature reviews, research proposals, thesis development, and publication planning. However, because the program did not employ pre- and post-training competency assessments, the findings should be interpreted as evidence of training participation and initial skill development rather than objectively measured effectiveness. Future programs should therefore include systematic competency assessments and follow-up mentoring to evaluate sustained application of bibliometric skills.

6 Acknowledgment

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