Volume 2, Issue 4

Innovation Series Quarterly

https://journal.academicapress.org/aps/index.php/isq

Research Article

BiblioLearn: A Biblioshiny-Integrated Experiential Learning Framework for Teaching Bibliometric Analysis

Wahidah Mohd Zain[1], Norhidayu Md Yatim[2], Noor Faraliza Samsudin[3], Izzatil Husna Arshad[4,*], Mohsinin Mohsin[5], and Mohd Ridzuan Ibrahim[6]

[1] Faculty of Information Science, Universiti Teknologi MARA (UiTM), Negeri Sembilan Branch, Rembau Campus; wahidahmohdzain@uitm.edu.my

[2] Faculty of Information Science, Universiti Teknologi MARA (UiTM), Negeri Sembilan Branch, Rembau Campus; norhidayu@uitm.edu.my

[3] Faculty of Information Science, Universiti Teknologi MARA (UiTM), Negeri Sembilan Branch, Rembau Campus; noorf053@uitm.edu.my

[4] Faculty of Information Science, Universiti Teknologi MARA (UiTM), Negeri Sembilan Branch, Rembau Campus; husna672@uitm.edu.my

[5] Faculty of Information Science, Universiti Teknologi MARA (UiTM), Negeri Sembilan Branch, Rembau Campus; mohsinin477@uitm.edu.my

[6] Faculty of Information Science, Universiti Teknologi MARA (UiTM), Negeri Sembilan Branch, Rembau Campus; iridzuan@uitm.edu.my

* Correspondence: husna672@uitm.edu.my.

Keywords:
Bibliometrics
Biblioshiny
No-Code Analytics
Experiential Learning
LIS Education

Copyright: © 2026 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

Abstract: *Students in library and information science (LIS) often learn bibliometrics as theory: they can define indicators such as citation counts, co-authorship and keyword co-occurrence, yet cannot carry out a bibliometric study on their own. This gap is widened by unfamiliarity with R, the language behind many standard bibliometric tools. BiblioLearn addresses the gap through an experiential learning framework that embeds Biblioshiny, the no-code graphical interface of the Bibliometrix R package, into a complete five-stage workflow: Search-Strategy Design, PRISMA-Based Systematic Screening, Data Extraction, Guided Visual Analysis and Reflective Reporting. The framework was piloted in Library Analytics and Metrics (IML630) with 32 Bachelor of Information Science (Hons) Library Management students, who conducted an authentic bibliometric study of 698 Scopusindexed articles on libraries and student participation in open science. Its novelty lies in replacing a passive, theory-only assessment with a repeatable, tool-based research workflow that takes non-programming learners from a research question to a reported bibliometric analysis. BiblioLearn offers a practical and transferable pathway for building research and open-science literacy among future library professionals, with potential for licensing as a teaching module and wider adoption across LIS and other research-methods courses.*

1. INTRODUCTION

Bibliometric analysis has become a core research method for mapping scholarly output, identifying influential authors and sources, and tracing how research themes evolve. For library professionals, it underpins research-support services, collection evaluation, research-impact reporting and advice on open-science practices. LIS programmes therefore need graduates who can not only explain bibliometric indicators but also design and execute a bibliometric study.

In practice, bibliometrics is often taught through lectures and theory-based assessment. Students learn definitions of indicators and laws such as Lotka's and Bradford's, but rarely work through the full research process: formulating a search strategy, screening records, cleaning data, running analyses and interpreting visual outputs. As a result, conceptual knowledge does not translate into practical competence.

Tool-related barriers add to this gap. Bibliometrix is a comprehensive open-source R package for science mapping (Aria & Cuccurullo, 2017), but using it directly requires programming skills that most LIS students do not have. Biblioshiny, its web-based graphical interface, makes the same analyses available through menus and point-and-click controls. BiblioLearn builds on this capability by supplying the missing pedagogical structure: a staged, hands-on workflow grounded in experiential learning (Kolb, 1984) that turns an accessible tool into a complete learning experience.

1.1 Problem Statement

In Library Analytics and Metrics (IML630), bibliometrics has traditionally been delivered through lecture-based theory and assessed through theory-oriented tasks. Students could define bibliometric indicators but were unable to independently execute a real bibliometric study. They had little opportunity to experience how a search string shapes a dataset, how screening decisions affect the final sample, or how visual outputs such as co-occurrence networks and thematic maps should be read.

A second barrier is learners' unfamiliarity with analytic tools. Widely used bibliometric software, particularly Bibliometrix, is built on R, and students without programming backgrounds tend to see such tools as beyond their reach. This perception discourages hands-on engagement before learning begins.

The problem addressed by this innovation is therefore that, although no-code bibliometric tools exist, there is no structured and repeatable pedagogical process that guides non-programming LIS learners through a complete, authentic bibliometric study, from search design to reflective reporting. BiblioLearn was developed within the teaching and learning context of the Faculty of Information Science, UiTM Rembau Campus, to address this gap.

1.2 Objectives

The main objective of this innovation is to develop and implement an experiential learning framework that enables LIS students without programming experience to independently conduct an authentic bibliometric study using no-code analytics. Specifically, this innovation aims to:

1. Design BiblioLearn, a five-stage hands-on workflow (Search-Strategy Design, PRISMABased Systematic Screening, Data Extraction, Guided Visual Analysis and Reflective Reporting) integrated with Biblioshiny.
2. Implement BiblioLearn in IML630 through an authentic group-based bibliometric study using Scopus-indexed literature.

3. Evaluate students' experiences of the framework, particularly changes in their perceptions of bibliometric software and of the programming barrier, through an institutional entrance-exit survey and thematic analysis of group reflections.

1.3 Novelty

BiblioLearn's distinctive contribution lies in organising an existing no-code analytics tool into a complete, staged teaching and learning workflow. Software tutorials typically teach Biblioshiny's menus in isolation, while theory-based courses teach indicators without data. BiblioLearn connects the two: students design the search, screen the records using PRISMA (Page et al., 2021), extract and load the data, analyse it through guided visual tasks, and reflect on what they did and found.

The framework treats the process as being as important as the output. Students experience how methodological choices at each stage shape the final results, which is the core of research literacy. Reflective reporting closes the cycle and turns tool use into a deliberate learning experience rather than a button-clicking exercise.

Because Biblioshiny requires no coding, the framework removes the R programming barrier without simplifying the research itself: students work with a real Scopus dataset and produce analyses comparable to those in published bibliometric studies. Although implemented in IML630, the five stages are adaptable to other research-methods courses, databases and research topics.

2. METHODOLOGY

BiblioLearn was developed and implemented as a teaching and learning innovation in Library Analytics and Metrics (IML630) at the Faculty of Information Science, UiTM Rembau Campus. The methodology comprised framework design, classroom implementation through an authentic bibliometric study, and an initial evaluation through an entrance-exit survey and group reflections.

2.1 Framework Design

BiblioLearn organises a complete bibliometric study into five sequential stages:

1. Search-Strategy Design: students define a research focus, identify keywords and synonyms, and build Boolean search strings for Scopus.
2. PRISMA-Based Systematic Screening: students apply inclusion and exclusion criteria (such as document type, language and subject area) and document each screening decision in a PRISMA flow.
3. Data Extraction: students export the screened records from Scopus in a format compatible with Biblioshiny and load them into the tool.
4. Guided Visual Analysis: students generate and interpret outputs such as annual scientific production, most relevant sources and authors, country collaboration, keyword co-occurrence networks and thematic maps, guided by structured tasks.
5. Reflective Reporting: groups report their findings and reflect on their prior expectations, difficulties encountered and what they learned about bibliometrics and the tool.

2.2 Classroom Implementation

BiblioLearn was piloted with 32 Bachelor of Information Science (Hons) Library Management students in classes 5A and 5B (16 students each) during Semester 2025/2026, working in 8 project groups. All groups worked on a shared authentic research topic: libraries and student participation in open science. The search and screening process produced a dataset of 698 Scopus-indexed articles, which students analysed using Biblioshiny.

2.3 Initial Evaluation

The initial evaluation drew on two sources. The first was the UiTM Entrance-Exit Survey on the institution's official learning platform, in which students rated their attainment of 10 items mapped to three course learning outcomes (CLO1 Explain, CLO2 Describe, CLO3 Discuss and apply) on a five-point scale at the start and end of the semester. All 32 students completed both surveys, giving 320 paired ratings, and each student's mean entrance and exit ratings were compared using the Wilcoxon signed-rank test.

The second source was written reflections submitted by 7 of the 8 groups. These were analysed thematically for prior familiarity with bibliometric software, expectations, challenges, coping strategies, most valued features and perceived impact. Both sources are self-reported, and the survey covers the course's learning outcomes rather than BiblioLearn alone, so the evaluation captured perceived attainment and experience rather than directly measured learning gains.

3. FINDINGS

All 8 groups completed an authentic bibliometric study of 698 Scopus-indexed articles on libraries and student participation in open science, progressing through all five stages from search design to reflective reporting. Students' self-rated attainment of the course learning outcomes rose sharply between the entrance and exit surveys (n = 32 matched students; five-point scale):

Table 1. Entrance-Exit Survey.

Measure	Entrance	Exit
Overall (10 items)	1.39	4.42
CLO1: Explain analytics concepts	1.37	4.41
CLO2: Describe the value of library analytics	1.42	4.42
CLO3: Discuss and apply bibliometric methods	1.39	4.43

The increase was statistically significant (Wilcoxon signed-rank test, $p < 0.001$). Of the 32 students, 31 improved and one was unchanged; none of the 320 paired ratings decreased, and 97% rose by 2 points or more. Confident ratings (4 or 5) rose from 3.1% to 100%, while low ratings (1 or 2) fell from 93.8% to 0%.

Gains were consistent across classes 5A (1.31 to 4.43) and 5B (1.46 to 4.41). Every item rose by about 3 points, from between 1.31 and 1.47 at entrance to between 4.38 and 4.50 at exit, with the largest exit ratings for explaining data science and datafication (4.50) and applying bibliometric methodology (4.47).

Thematic analysis of the 7 group reflections helps explain these gains:

Table 2. Group Reflections.

Theme	Finding	Groups
Prior unfamiliarity	Had never used bibliometric software	7 of 7 (100%)
Perceived programming barrier	Feared that R programming would be required	3 of 7 (43%)
Ease of use	Found Biblioshiny user-friendly	6 of 7 (86%)
Ease of use	Said it was easier than expected	4 of 7 (57%)
Main challenge	Choosing analyses and interpreting visuals	5 of 7 (71%)
Coping strategy	Consulted published bibliometric studies	4 of 7 (57%)
Most valued features	Keyword co-occurrence, collaboration networks and country maps, publication trends	4 of 7 (57%) each
Perceived impact	Improved project quality and efficiency; intend to use it again	7 of 7 (100%)
Improvement needed	Asked for more hands-on guidance	4 of 7 (57%)

Together, the findings show a shift from apprehension to confidence. The hardest part for students was interpreting results rather than operating the software, and most groups learned by modelling their work on published studies. The request for more hands-on guidance informs the next iteration of the framework. These results come from self-reported data in a single pilot cohort without a comparison group, and the entrance-exit survey reflects the course as a whole rather than BiblioLearn in isolation. Nevertheless, they provide encouraging preliminary support for BiblioLearn and a basis for further evaluation of learning outcomes and wider adoption.

4. DISCUSSION

BiblioLearn offers an accessible pathway for learners without programming experience to conduct real research analytics. By guiding them through search design, systematic screening, data extraction, visual analysis and reflection, the framework develops research literacy, open-science awareness and critical interpretation of scholarly evidence. These capabilities prepare future library professionals to support researchers, students and communities in finding and evaluating trustworthy information.

For educators, BiblioLearn provides a structured approach for organising practical, learner-centred research-methods activities using free, existing tools. Its potential adaptation across disciplines and institutions could widen participation in data-driven research training. Libraries, research offices and postgraduate programmes may also apply the methodology to map research trends and support evidence-informed decisions, subject to appropriate training.

Financial accessibility is supported by the free, open-source nature of Biblioshiny and Bibliometrix, which removes software licensing costs; access to a citation database is the main resource required, and open sources may be substituted where Scopus is unavailable. BiblioLearn is protected by a registered MyIPO copyright (No. CRLY2026W08491) and offers a clear commercialisation pathway: packaging the framework as a ready-to-use teaching module with guidebooks, task sheets and assessment rubrics; offering train-the-trainer programmes for educators and librarians; and licensing the module to other higher education institutions and professional training providers. These wider societal and commercial benefits remain potential outcomes requiring evaluation beyond the initial pilot.

5. CONCLUSION

BiblioLearn provides a structured experiential learning approach for teaching bibliometric analysis using existing no-code technology. Its five-stage workflow connects search design, systematic screening, data extraction, visual analysis and reflection, giving LIS learners without programming experience a repeatable process for conducting an authentic bibliometric study. In the pilot, 32 students analysed 698 Scopus-indexed articles, their mean self-rated attainment of the course learning outcomes rose from 1.39 to 4.42 out of 5 ($p < 0.001$), and 6 of 7 reflecting groups found Biblioshiny user-friendly, providing encouraging preliminary evidence for its educational value. Further evaluation is needed to establish learning gains, the quality of student outputs and effectiveness across different cohorts and courses. Future development will focus on a complete, licensable teaching module, reusable learning resources, assessment rubrics and evaluation using BiblioLearn-specific instruments and a comparison group. BiblioLearn therefore offers a practical foundation for building research and open-science literacy among future library professionals.

References

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics,* 11(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Prentice Hall.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. https://doi.org/10.1136/bmj.n71