



**Revisiting Three Decades of L2 Vocabulary
Research in Higher Education (1992–2025):
A Multidimensional Bibliometric Analysis**

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Received 06/08/2025	ABSTRACT This study presents a multidimensional bibliometric and thematic analysis of L2 vocabulary learning research in higher education from 1992 to 2025. Leveraging a two-database framework that integrates data from Scopus and the Web of Science Core Collection, the paper applies Hallinger and Kovačević’s Four-Dimensional Bibliometric Framework to analyze the evolution, intellectual landscape, and methodological trends of the field. 557 peer-reviewed journal articles were quantitatively mapped, and thematic clusters were identified using Bibliometrix (R) and VOSviewer. The findings reveal three stages of scholarly development, diversification of institutions and regions involved, and varying methodological orientations between databases. Seven thematic clusters emerged, including technology-enhanced vocabulary
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	instruction, modeling vocabulary knowledge, and incidental acquisition processes. In addition to validating dominant research paradigms, the paper places special focus on emerging and yet-to-be-explored domains such as informal digital learning, psychological network analysis, and vocabulary pedagogy for equity. A comparison of Scopus and WoS suggests a need for dual-source indexing to justify large-scale bibliometric synthesis. The study concludes by proposing an agenda for future research that is inclusive in methodology, theory-driven, and context-sensitive in its responsiveness to global language learning dynamics. Keywords: L2 vocabulary development in higher education; bibliometric analysis; Scopus; Web of Science; thematic mapping; four-dimensional framework
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Introduction

Vocabulary knowledge is central to L2 proficiency across skills (Schmitt, 2010; Sukying, 2023). This centrality is also supported by evidence that vocabulary size and depth significantly predict L2 speaking performance, particularly the lexical resource and fluency dimensions among university EFL learners (Enayat & Derakhshan, 2021). Over the past decades, research has refined constructs of vocabulary size and depth and expanded into technology-mediated learning (Meara, 1996; Nation, 2022; Xodabande & Hashemi, 2022). Vocabulary acquisition has been studied and recognized as a fundamental concept, and numerous studies have examined the distinction between receptive and productive knowledge and developed models to estimate vocabulary size and depth. Recent construct-oriented work has further confirmed that L2 vocabulary knowledge is best understood through intersecting dimensions, such as breadth/depth and receptive/productive knowledge, rather than as a single undifferentiated construct (Edmonds et al., 2022; Sukying, 2025; Zareva, 2005). Vocabulary acquisition has been significantly influenced by technological innovation, MALL, multimodal input, and, most recently, AI instructional tools (Xodabande & Hashemi, 2022). This trend is consistent with recent review evidence showing sustained expansion of mobile-assisted vocabulary learning as a distinct and increasingly mature subfield within technology-enhanced language education (Dağdelen, 2023).

Despite the steady increase in L2 vocabulary research output, there is limited longitudinal, field-wide synthesis on the structural and longitudinal evolution of vocabulary research in higher education. Previous research has

emphasized the lack of cross-contextual comparison (Alharthi et al., 2020), the predominance of short-term interventions (Dujardin et al., 2021), and the uneven incorporation of emergent technologies (Yang et al., 2021), indicating a rising output with little increase in conceptual and methodological diversity.

Although recent bibliometric synopses have analyzed the topical and pedagogical trends of vocabulary research in higher education (i.e., Tran et al., 2025), they primarily focus on these developments in vocabulary research in higher education (HE), particularly with regard to technology-mediated vocabulary research, mobile-assisted language research, and corpus-based vocabulary research using a single database. Such research can be considered partial and coverage-dependent, given the limited scope of the databases used and the narrow pedagogical focus of the research. As a result, the multidimensional structural evolution of L2 vocabulary research in HE remains insufficiently integrated within a unified analytical framework.

To fill this research gap, the current study aims to conduct a systematic bibliometric analysis of L2 vocabulary research in HE environments, based on publications before July 2025. The study is based on two databases, Scopus and Web of Science Core Collection. In addition, it is based on the Four-Dimensional Bibliometric (4D) approach suggested by Hallinger & Kovačević (2023). The 4D approach considers four dimensions: size, time, spatiality, and composition. The dual database approach provides a more comprehensive picture of the field. In addition, it allows a comparison of differences in coverage, emphasis, and thematic concentration. More specifically, the study investigates whether it conceptualizes L2 vocabulary research in HE environments as a structurally consolidated and gradually diversifying research domain. This domain is influenced by institutional demands, methodological preferences, and technological development. Rather than merely documenting growth patterns, this study interrogates how the structural configuration of vocabulary research in higher education reflects broader epistemic consolidation within applied linguistics. By integrating size, time, spatiality, and composition, the analysis moves beyond productivity-oriented bibliometrics to examine how quantitative expansion interacts with methodological stabilization and thematic diversification. This shift reframes vocabulary research not simply as an expanding domain, but as a field undergoing structural intensification under digitally mediated and intervention-oriented paradigms.

This study aims to: (i) Map the publication trends in L2 higher education vocabulary studies from 1992 to July 2025, and elaborate on the implications in terms of the development of the research field (Size and Time); (ii) Identify the prominent authors, institutions, and countries in the research field, and examine their spatiality in Scopus and Web of Science databases; (iii) Examine the prominent research design and methodology in

the research field, and investigate the evolution of the research design and methodology in the research field over time; (iv) Identify the prominent thematic domains and intellectual clusters in the research field, as well as identify the unexplored domains in the research field and the future research opportunities in the research domain; and (v) Examine the database representation and structural representation in the research field in Scopus and Web of Science databases, and elaborate on the implications in the two databases (Meta-Structure). Hence, the research aims to answer the following research questions:

1. What are the annual publication trends in vocabulary-related research in L2 HE from 1992 to 2025 across Scopus and Web of Science, and what do these trends suggest about the intellectual maturity and temporal evolution of the field? (Size and Time)
2. Which authors, institutions, and countries have made the most significant contributions to vocabulary research, and how do patterns of scholarly collaboration, co-authorship, and institutional visibility differ between Scopus and Web of Science? (Spatiality)
3. What types of research designs and methodological approaches are most frequently employed in vocabulary research, and how have these patterns shifted over time? (Composition)
4. What are the major thematic domains and intellectual clusters in L2 vocabulary research, and which underexplored or emerging themes indicate potential directions for future inquiry? (Composition)
5. How do Scopus and Web of Science differ in the coverage, classification, and emphasis of vocabulary research in L2, and what are the implications for bibliometric synthesis and methodological conclusions? (Meta-Structure)

By presenting a theory-based, methodologically transparent, and longitudinal explanation of vocabulary research in L2 instruction, the study aims to enable both scholarly progress and practical application. To address this, it focuses on the growing demand for empirically grounded and methodologically diverse scholarship that is also responsive to the needs of globally networked, digitally supported language learning.

Four-Dimensional Bibliometrics as an Analytical Framework

To provide a comprehensive picture of research in L2 vocabulary development, the present study employed Hallinger and Kovačević's (2023) 4D framework as the primary research perspective. This framework integrates four primary dimensions. Size, Time, Spatiality, and Composition

provide a multidimensional view of a given field's development, spread, and intellectual structure.

The four analytical dimensions, Size, Time, Spatiality, and Composition, were operationalized using traditional bibliometric mapping techniques in Bibliometrix and VOSviewer. In the Size dimension, descriptive metrics were generated using Bibliometrix, including annual publication counts, total citations, average citations per document, and source productivity. Citation data were considered for descriptive purposes only, with consideration of possible citation window effects for more recent documents. The Time dimension was explored through annual publication output trends from 1992 to 2025, during which phases of expansion and stabilization were detected. The analysis was conducted for descriptive purposes, with emphasis on longitudinal mapping rather than predictive modeling. In the Spatiality dimension, co-authorship networks for authors, institutions, and countries were generated using VOSviewer. Collaboration intensity was measured through Total Link Strength (TLS), which represents the strength of the links between nodes. The Composition dimension was analyzed through co-word mapping based on author keywords from the finalized corpus (N = 557). Association strength normalization was applied, with a minimum keyword occurrence threshold of 5 to enhance cluster stability. Clustering was conducted using VOSviewer's modularity-based algorithm, and thematic labels were assigned interpretively based on dominant cluster terms. Methodological typologies were coded manually at the abstract level in Excel, enabling analysis of methodological distribution and temporal shifts.

The four dimensions are conceptualized not as isolated bibliometric indicators but as interacting structural coordinates through which disciplinary evolution can be interpreted. While size and time capture expansion and longitudinal shifts, spatiality and composition reveal the relational and epistemic architecture of knowledge production. Together, these dimensions enable a multidimensional interpretation of how research fields consolidate, diversify, and stabilize over time. By applying this 4D model, the present study can move beyond descriptive statistics toward a more integrated and theory-informed understanding of L2 vocabulary development research. The framework not only enables a systematic mapping of the field's historical trajectory but also facilitates the identification of intellectual gaps and emerging areas for scholarly inquiry.

Research Methodology

Research Design

This study employed a dual-database bibliometric design to examine the structural evolution of L2 vocabulary research conducted in higher education (HE) contexts from 1992 to July 2025. Guided by Hallinger and Kovačević's (2023) Four-Dimensional (4D) Bibliometric Framework, comprising Size and Time, Spatiality, Composition, and Meta-Structure, the study integrated descriptive bibliometric indicators with science mapping techniques to provide a multi-layered structural analysis of the field. The research design went beyond the descriptive analysis of trends to investigate how publication dynamics, collaboration structures, methodological commitments, and thematic arrangements interact to influence the epistemological development of higher education vocabulary research. To improve the representativeness of the study and ensure the accuracy of citation data, the search was conducted in both Scopus and the Web of Science Core Collection (SSCI and ESCI), thus reducing the risk of database indexing bias.

Data Sources and Search Strategy

The research was undertaken in July 2025, including publications from 1992 to July 2025. This ensured the inclusion of more than three decades of research in the field. A structured Boolean approach was developed to identify articles on the following four main conceptual domains in vocabulary research: vocabulary acquisition, lexical development, vocabulary knowledge, and vocabulary instruction. These were combined with the following descriptors in the context of second language research: EFL, ESL, L2, second language, and foreign language. In the Scopus database, the subject area was limited to social sciences and arts & humanities. The search in Scopus was conducted in the Title–Abstract–Keyword fields using the following Boolean logic:

TITLE-ABS-KEY ("vocabulary acquisition" OR "lexical development" OR "vocabulary knowledge" OR "vocabulary instruction") AND TITLE-ABS-KEY ("EFL" OR "ESL" OR "L2" OR "second language" OR "foreign language") AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (PUBYEAR <= 2026)

The search in the Web of Science Core Collection was conducted using the Topic (TS) field with parallel Boolean logic:

TS = (("vocabulary acquisition" OR "lexical development" OR "vocabulary knowledge" OR "vocabulary instruction") AND ("EFL" OR "ESL" OR "L2" OR

“second language” OR “foreign language”)) AND DOCUMENT TYPES: (Article) AND LANGUAGE: (English) AND INDEXES: (SSCI OR ESCI) Timespan: <= 2026

Although the query syntax allowed retrieval up to 2026, the dataset was subsequently restricted to records published up to July 2025 during screening. These queries ensured inclusion of peer-reviewed journal articles published in English before July 2025 when the searches were conducted. Importantly, the higher education criterion was intentionally not embedded in the Boolean string to avoid excluding relevant university-based studies that lack explicit “higher education” metadata markers. The initial retrieval yielded 1,557 records (Scopus $n = 961$; WoS $n = 596$). After database-level filtering for document type, language, and relevant subject areas, 1,292 records remained (Scopus $n = 788$; WoS $n = 504$).

Eligibility Screening and Operationalization of Higher Education Context

Eligibility screening was conducted at the title–abstract level to ensure both conceptual and contextual alignment. Records were retained if they explicitly addressed L2 vocabulary acquisition, lexical development, vocabulary knowledge, or vocabulary instruction. Studies in which vocabulary appeared only tangentially within broader language-skills research were excluded. Crucially, the higher education (HE) criterion was operationalized during this eligibility stage rather than after database merging. The HE contexts were defined as research conducted in universities, colleges, postgraduate institutions, or tertiary-level EAP/ESP settings. Studies clearly situated in primary or secondary education contexts were excluded at this point. This integrated conceptual and contextual screening ensured that only vocabulary studies conducted in L2 higher education contexts progressed to the merging stage. Following this stage, a total of 693 records were identified as meeting the inclusion criteria. Of these, Scopus contributed 471 records, and WoS contributed 222. To enhance transparency in procedures and avoid subjective bias, approximately 10% of the records were verified. Inconsistencies were addressed by re-evaluating the abstracts and, if necessary, the full texts.

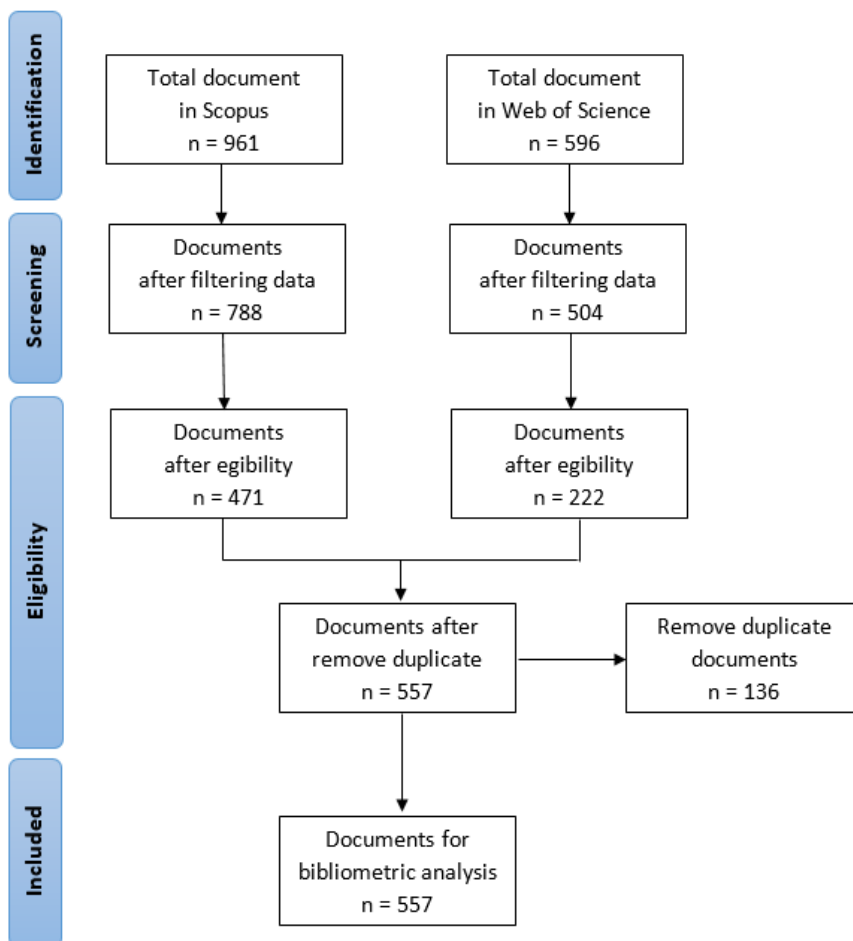
Database Merging and Deduplication

The 693 eligibility-confirmed records were subsequently merged into a unified dataset. Deduplication followed a structured two-step protocol to ensure methodological transparency. First, DOI matching was performed to identify exact duplicates across both databases. Second, title-year matching

was applied to detect duplicate entries lacking DOI identifiers or containing minor metadata discrepancies. This process identified and removed 136 duplicate records. Consequently, after the deduplication stage, the consolidated publication dataset consisted of 557 unique publications. Since the higher education criterion had been applied during the eligibility screening stage, no contextual exclusion was required. Thus, the final analytical corpus consisted of 557 publications located exclusively in the L2 higher education context, as shown in Figure 1.

Figure 1

Structured Workflow for Database Identification, Screening, Eligibility Assessment, and Deduplication



Although this study did not constitute a systematic review or meta-analysis, a structured multi-stage screening workflow was implemented to enhance transparency and replicability in database merging and eligibility decisions.

Data Cleaning and Analytical Procedures

Before analysis, metadata were standardized to ensure internal consistency and reliability of visualization outputs. Author names, institutional affiliations, and journal titles were normalized using OpenRefine and manually verified to reduce fragmentation caused by indexing variations. A thesaurus file was implemented in VOSviewer to merge synonymous keywords (e.g., “L2 learning” and “second language learning”; “CALL” and “computer-assisted language learning”) to enhance conceptual coherence in co-occurrence mapping. The finalized HE dataset ($N = 557$) was analyzed using the Bibliometrix R package and VOSviewer. Bibliometrix generated descriptive statistics on annual publication trends, citation performance, source productivity, and country contributions, addressing the Size and Time and Spatiality dimensions of the 4D framework. VOSviewer was employed to construct co-authorship networks, institutional and country collaboration maps, and keyword co-occurrence clusters. Full counting was applied in co-authorship analyses, while association strength normalization was used in keyword mapping. The minimum keyword occurrence threshold was set at five, and clustering was generated using VOSviewer’s modularity-based algorithm under default resolution parameters. All analytical procedures were descriptively interpreted and explicitly aligned with the study’s five research questions to ensure coherence between data preparation and bibliometric interpretation.

Table 1 presents the alignment between each research question, its analytical dimension within the 4D Framework, and the bibliometric techniques employed.

Table 1*Alignment Between Research Questions and Analytical Procedures*

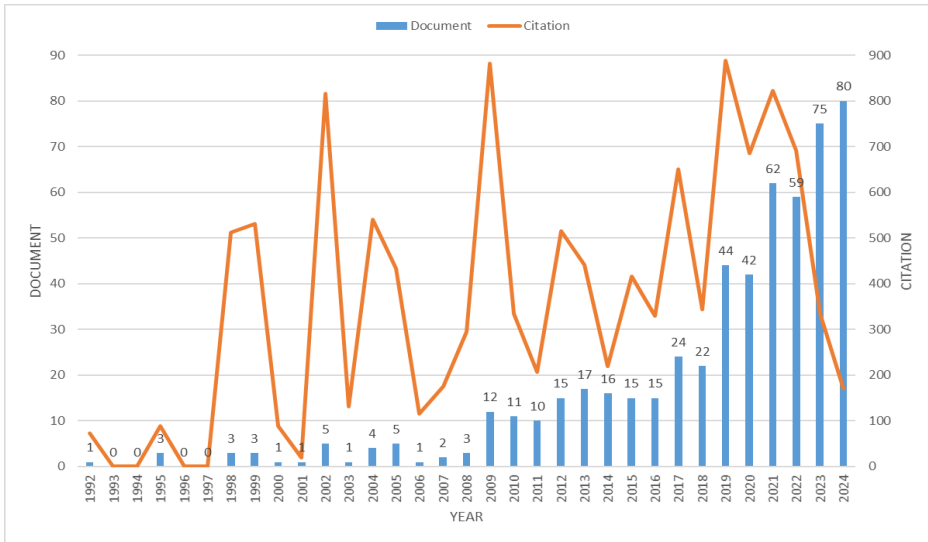
RQ	Analytical Dimension	Data Source	Analytical Technique
RQ1	Size and Time	Scopus + WoS	Annual publication counts, citation trends
RQ2	Spatiality	Scopus + WoS	Co-authorship networks, institutional & country mapping
RQ3	Composition	Unified HE corpus (N = 557)	Methodological classification, statistical profiling
RQ4	Composition	Unified HE corpus (N = 557)	Keyword co-occurrence clustering
RQ5	Meta-Structure	Scopus vs WoS comparison	Coverage comparison, methodological divergence analysis

The complete raw search strings and retrieval logs are available upon request to ensure procedural replicability.

Findings and Discussion

Annual Publication Trends and Temporal Evolution (RQ1: Size and Time)

Following the Size and Time dimensions of Hallinger and Kovačević's (2023) 4D model, the current study aimed to investigate the diachronic progression of L2 vocabulary research in higher education from 1992 to July 2025. The results showed a steady increase in the number of publications and citations each year from Scopus and Web of Science databases. There was a notable increase in the latter part of the research period. The continuous increase in publications and citations reveals not only the growth of research on L2 vocabulary but also its visibility and consolidation in applied linguistics, as shown in Figure 2.

Figure 2*Annual Production (1992-2025)*

Three distinct phases could be distinguished in the temporal progression of the field. The first phase was the “Formative Period” (1992-2008), during which the annual output was relatively low. The focus was heavily on psycholinguistic theory, vocabulary depth and breadth, and receptive-productive dichotomies. The research was mostly measurement-oriented and sometimes laboratory-based. The “Growth Period” (2009-2018) saw a steady increase in research output and diversity. Vocabulary research was increasingly connected with communicative language teaching and learner-centered approaches. The focus is also on MALL, gamification, and multimodal input. The “Acceleration Period” (2019–July 2025), which comprised the majority of the research output, shows a steep increase in publication and citation rates. The technology-sensitive expansion identified here is compatible with robust synthesis work on audiovisual and caption-based input, which has consistently shown vocabulary gains in instructed L2 settings (Perez et al., 2013; Peters et al., 2016). Although it overlapped with the global shift toward digital education, it could be seen as a sign of a broader interest in vocabulary learning in both contextual and technological terms. The post-2019 acceleration did not merely indicate numerical expansion; rather, it reflected the stabilization of vocabulary research as a sustained intervention-oriented paradigm within higher education. Although technological mediation intensified during this period, the underlying experimental architecture remained largely intact. This suggested cumulative

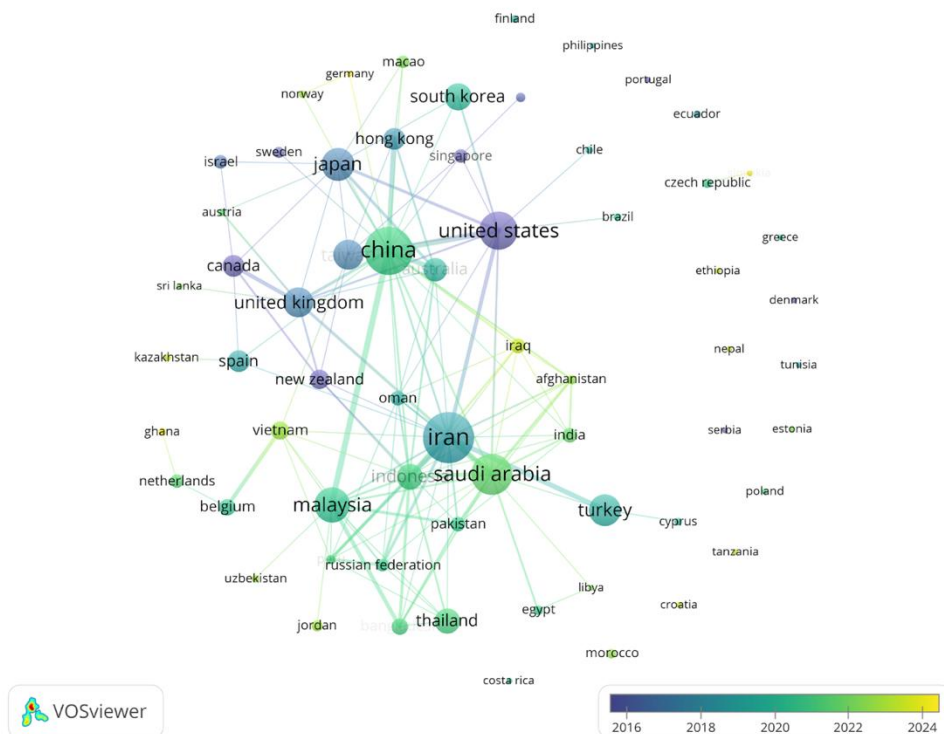
intensification rather than paradigmatic transformation. The progression shows a shift from theory-oriented research toward a denser and technologically sensitive research environment. It was from this progression that the methodological characteristics discussed in RQ3 emerge.

Scholarly Contributions and Collaboration Networks (RQ2: Spatiality)

Building on the spatial dimension of Hallinger and Kovačević's (2023) 4D framework, this analysis examined the geographical and institutional configuration of L2 vocabulary research in higher education. As depicted in Figure 3, a science map of 64 countries from 1992 to July 2025 showed that the world is increasingly interconnected in science research. The collaboration clusters in Asia, the Middle East, and North America are particularly dense. Countries like Iran, China, the US, and Korea had prominent nodes in the science map, indicating co-authorship.

Figure 3

Science mapping of 64 countries during 1992-2025



Productivity and citation impact, however, had different paths. As indicated in Table 2, Asian and Middle Eastern countries led in publication output, while North American and Western countries led in citation visibility. This indicated that the growth of publication output and recognition may not follow a similar trajectory. There may be structural factors that mediate research visibility and citation accumulation. The spatial pattern, therefore, indicated both globalization and inequalities in academic capital.

Table 2

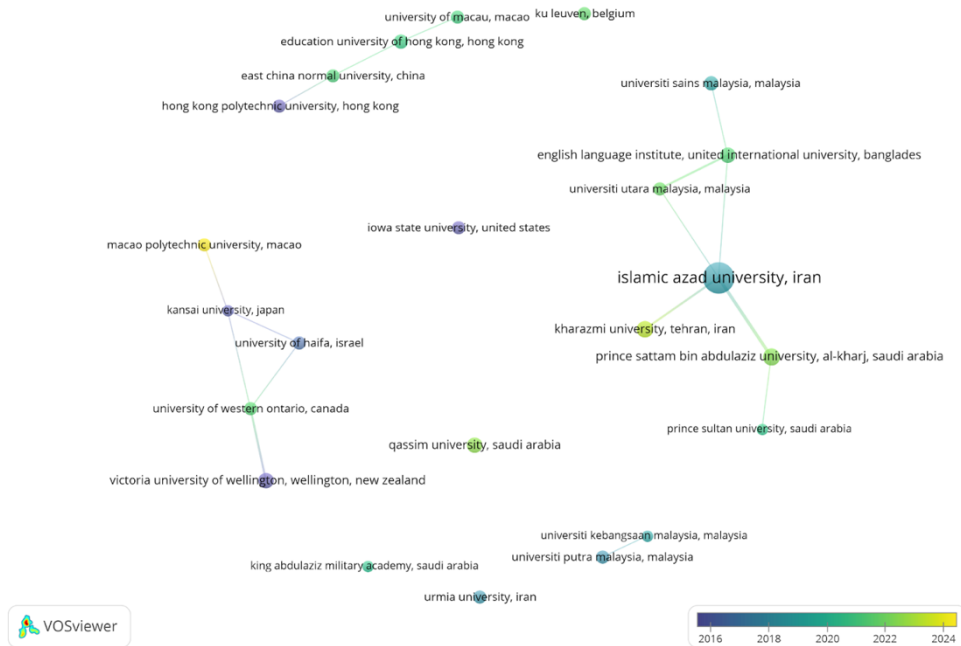
Top 10 Leading Countries in Publications

ID	Country	Document	ID	Country	Citation
1	Iran	83	1	United States	1,691
2	China	74	2	Canada	1,117
3	Saudi Arabia	54	3	China	970
4	United States	47	4	Japan	963
5	Malaysia	39	5	Iran	881
6	Japan	34	6	United Kingdom	859
7	Turkey	32	7	Taiwan	840
8	United Kingdom	29	8	Hong Kong	779
9	Taiwan	29	9	New Zealand	556

At the institutional level, Figure 4 and Table 3 demonstrate a similarly dual-layered structure.

Figure 4

Science Mapping of 23 Affiliations during 1992-2025



While several institutions in Iran and Saudi Arabia contributed prominently to publication volume, citation leadership is concentrated in globally established universities. This pattern reinforced the distinction between production density and citation centrality, indicating that institutional reputation and international integration remain critical determinants of research impact.

Table 3*Top 10 Leading Affiliations in Publications*

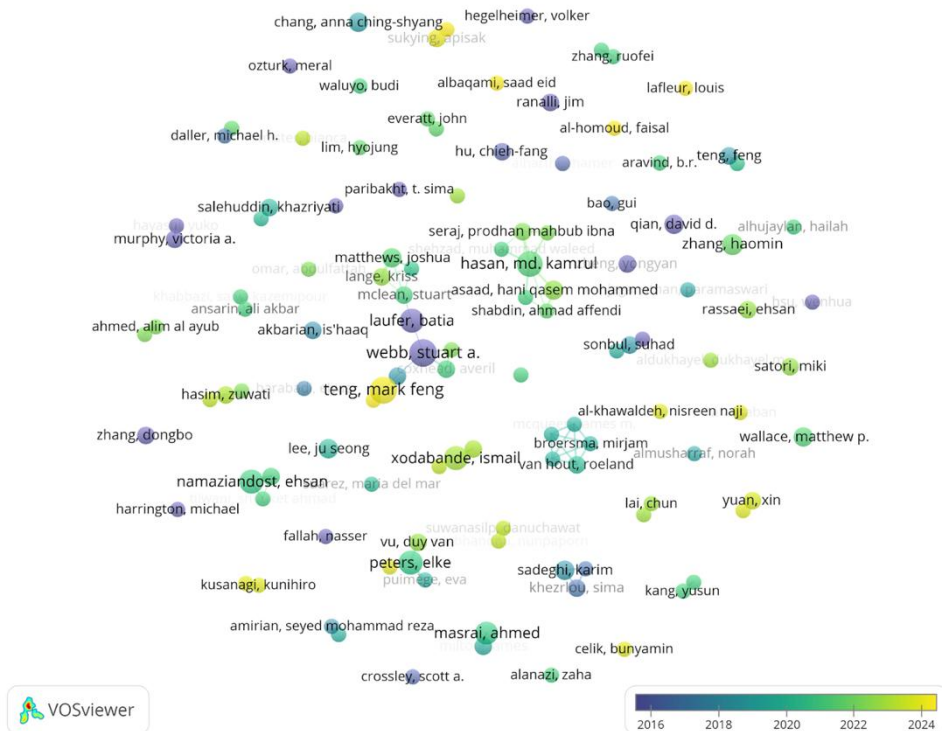
Id	Affiliation	Document	Id	Affiliation	Citation
1	Islamic Azad University, Iran	27	1	Hong Kong Polytechnic University, Hong Kong	598
2	Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia	10	2	University of Haifa, Israel	528
3	Kharazmi University, Tehran, Iran	9	3	Victoria University of Wellington, Wellington, New Zealand	483
4	Victoria University of Wellington, Wellington, New Zealand	8	4	Iowa State University, United States	401
5	United International University, Bangladesh	8	5	Department of English Language and Literature, Israel	
6	Qassim University, Saudi Arabia	8	6	Nanyang Technological University, Singapore	372
7	Education University of Hong Kong, Hong Kong	7	7	University of Copenhagen, Denmark	306
8	Universiti Sains Malaysia, Malaysia	7	8	University of Ottawa, Canada	301
9	Hong Kong Polytechnic University, Hong Kong	6	9	Koran Women's Junior College, Japan	283
10	University of Haifa, Israel	6	10	Ku Leuven, Belgium	241

Author-level mapping (see Figure 5 and Table 4) also verified this hierarchical structure. The most productive authors were geographically dispersed, indicating the globalization of vocabulary research. In contrast, citation influence remained concentrated among authors whose work defined

the vocabulary assessment and lexical modeling paradigms. The temporal trend in Figure 5 indicated a new generation of research, with increasing contributions from new institutional clusters. However, the visibility gap was also seen in the citation differences.

Figure 5

Science mapping of 116 authors during 1992-2025 (each has two documents)



A preliminary cross-database comparison indicated substantial agreement between Scopus and Web of Science in identifying leading contributors. However, Scopus appeared to capture a broader range of institutions from emerging research contexts, reinforcing the value of dual-database integration for spatially comprehensive mapping (Donthu et al., 2021; Lim et al., 2024).

Table 4*Top 10 Relevant Authors*

Id	Author	Affiliation	Document	Id	Author	Affiliation	Citation
1	Webb Stuart A.	Western University, Canada	10	1	Laufer Batia	University of Haifa, Israel	942
2	Teng Mark Feng	Macao Polytechnic University, Macao	9	2	Qian David D.	Hong Kong Polytechnic University, Hong Kong	887
3	Hasan Md. Kamrul	United International University, Bangladesh	8	3	Webb Stuart A.	Western University, Canada	765
4	Laufer Batia	University of Haifa, Israel	7	4	Goldstein Zahava	University of Haifa, Israel	372
5	Peters Elke	Ku Leuven, Belgium	7	5	Peters Elke	Ku Leuven, Belgium	370
6	Xodabande Ismail	Kharazmi University, Iran	7	6	Stæhr Lars Stenius	Københavns Universitet, Denmark	301
7	Namazandost Ehsan	Islamic Azad University, Iran	7	7	Paribakht T. Sima	Institute Des Langues Officielles Et Du Bilinguisme, Canada	283
8	Masrai Ahmed	Prince Sattam Bin Abdulaziz University, Saudi Arabia	6	8	Lee Ju Seong	The Education University of Hong Kong, Hong Kong	240
9	Zhang Haomin	City University	5	9	Barr Christopher D.	University of Houston, The US	231

		of Macau, Macao				
10	Qian David D.	Hong Kong Polytechnic University, Hong Kong	4	10	Dobbs, Christina L.	Boston University, The US
						231

Together, a preliminary cross-database comparison revealed agreement between Web of Science and Scopus in identifying leading authors and institutions. Local institutions, particularly those in Iran and Saudi Arabia, emerged more frequently in Scopus, once again advocating for the use of a dual-database methodology to capture the field's full spatial extent. This aligns with previous bibliometric recommendations to integrate data from different sources to improve field mapping and exposure (Donthu et al., 2021; Lim et al., 2024).

Methodological Trends in HE Vocabulary Research (RQ3: Composition)

To address RQ3, this study examined the methodological configurations of L2 vocabulary research conducted in higher education contexts prior to July 2025. The analysis was structured across three complementary analytical layers: (i) primary methodological orientation, (ii) dominant analytical practices, and (iii) intervention ecology. Together, these layers illuminate not only procedural tendencies but also the epistemological center of gravity underpinning the field.

Primary Methodological Orientation

The mutually exclusive classification of studies is provided in Table 5 and visually summarized in Figure 6. At this macro level, each publication (N = 557) was given a single dominant methodological orientation. The macro-level results suggested that the field remains firmly anchored in quantitative/interventionist paradigms. The dominance of experimental, quasi-experimental, and statistically modeled designs suggested a continued commitment to quantifiably derived lexical gains/inferences.

Although there was clear growth in the proportion of qualitative/mixed-methods research, these appear to serve more as additive interpretive layers rather than paradigmatic alternatives. The position of corpus-based research and lexical modeling approaches, while theoretically attractive, was relatively marginal. The overall pattern in Table 5 suggests that

growth in publication volume has reinforced existing traditions rather than challenged the field's fundamental methodological architecture.

Table 5

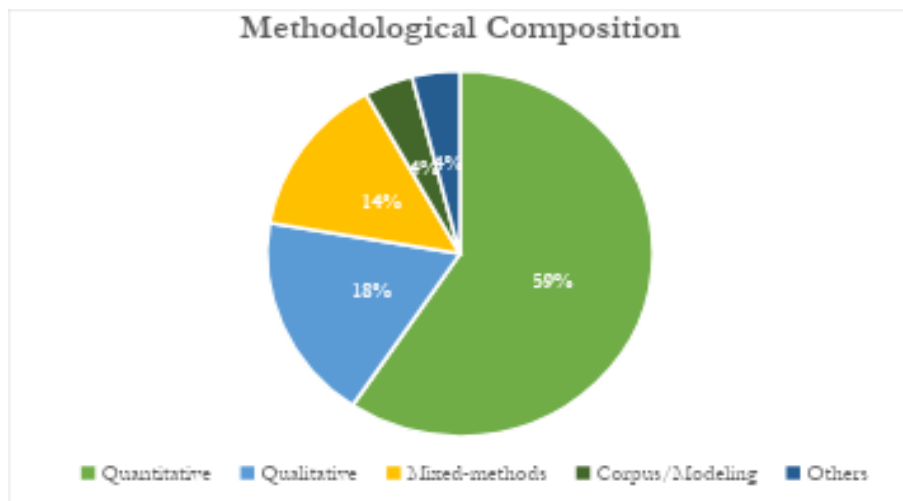
Primary Methodological Orientation (N = 557)

Category	Documents	Percentage (%)
Quantitative (experimental, quasi-experimental, statistical modeling, test validation)	331	59.43
Qualitative (interviews, focus groups, think-aloud, case studies)	102	18.31
Mixed Methods (sequential explanatory, convergent, embedded designs)	79	14.18
Corpus-based / Lexical Modeling (corpus analysis, lexical threshold modeling)	23	4.13
Others (eye-tracking, psychological network analysis, IDLE, CLIL exploratory designs, bilingual CLI tasks)	22	3.95
Total	557	100%

Figure 6 further illustrates this structural imbalance, visually reinforcing the centrality of quantitative approaches within higher education vocabulary research.

Figure 6

Methodological Composition of HE Vocabulary Research



Methodological Approaches and Analytical Multiplicity

Whereas Table 5 reflects a mutually exclusive categorization, Table 6 provides a more granular account of methodological features coded at the level of analytical practices and research procedures. Importantly, studies were allowed to be coded under multiple methodological approaches where applicable. Many publications also used hybrid approaches that combined elements of several methods, e.g., combining experiments with survey methods, regression analysis, or qualitative interviewing. As a result, the figures in Table 6 exceed the total corpus size ($N = 557$).

Table 6 indicates that there is a very high concentration of research using experimental and quasi-experimental designs in both databases. In the case of Scopus, there is also a very high representation of classroom-based task experiments and technology-mediated interventions. Classical inferential methods such as t-tests, ANOVA, ANCOVA, and regression analyses dominate the research landscape. In addition, survey methods are frequently used in conjunction with experiments to measure perceptions or motivation variables.

The frequency of these statistical methods suggests an analytical consolidation rather than an expansion of methods in the field. Advanced modeling techniques like psychological network analysis or dynamic computational modeling are used very rarely in the corpus.

Table 6

Number of documents based on method approaches

Methodological Approach	WoS		Scopus	
	document	Percent (%)	document	Percent (%)
Experimental / Quasi-experimental Design	87	39.19	220	46.71
T-test or ANOVA or ANCOVA	52	23.42	184	39.07
Survey-based (Questionnaire)	36	16.22	142	30.15
Mixed Methods	30	13.51	-	-
Qualitative (Interviews or Focus Groups, or Think-aloud)	29	13.06	68	14.44
Regression / Correlation Analyses	27	12.16	78	16.56

Corpus-based or Lexical Analysis	13	5.86	68	14.44
Mobile-assisted Language Learning (MALL)	13	5.86	-	-
Strategy Instruction or Metacognitive Training	7	3.15	-	-
Spaced Learning or Distributed Practice	5	2.25	-	-
Eye-tracking or Cognitive Processing	4	1.80	-	-
Lexical Threshold or Vocabulary Modeling	4	1.80	-	-
Self-regulated or Personalized Learning	3	1.35	-	-
CLIL or Interdisciplinary Tasks	2	0.90	-	-
Google Search or Data-driven Writing	2	0.90	-	-
Idiom or Collocation Testing	2	0.90	-	-
Informal Digital Learning of English (IDLE)	2	0.90	-	-
Bilingual Lexical CLI Tasks	1	0.45	-	-
Psychological Network Analysis	1	0.45	-	-
Task-based Experiments (cloze, writing, editing...)	-	-	128	27.18
CALL / Game-based / Email-based / DDL interventions	-	-	102	21.66
Test Validation & Development	-	-	96	20.38
Collaborative Learning (jigsaw, pair work, feedback interventions)	-	-	54	11.46

Intervention Ecology and the Digital Turn

A substantial portion of the corpus was structured around pedagogical intervention, particularly task-based and technology-mediated

designs. This intervention-heavy profile is mirrored in contemporary empirical work on captioned viewing, where vocabulary development is typically examined through controlled instructional comparisons and learner-related covariates (Teng, 2022). As reflected in Table 6, CALL-based interventions, gamified learning environments, mobile-assisted vocabulary instruction, and data-driven learning approaches were increasingly visible. This pattern signals a broader digital turn in research on higher education vocabulary.

However, even this was usually done within a conventional, experimentally based logic, in which digital media are used as a treatment variable in comparison rather than as a catalyst for methodological innovation. Thus, although research tools became more varied, the fundamental architecture of research design remains predominantly interventionist and inferential.

Emerging methodologies, eye-tracking, lexical threshold modeling, psychological network analysis, and corpus-driven methodologies, although promising, are relatively rare. This was a measure of the untapped potential of cognitive and computational modeling for a longitudinal perspective on lexical development. The sustained dominance of quasi-experimental and inferential statistical designs suggests that the field has reached methodological maturity. However, such consolidation may also indicate paradigmatic saturation, where methodological variation narrows despite thematic diversification. This tension between thematic expansion and methodological stabilization represents a defining structural feature of contemporary L2 vocabulary research in higher education.

Taken together, the results depict a methodological ecology that is both consolidated and in transition. It is evident in Tables 5 and 6 that it remains dependent on quantitative intervention designs and classical statistical inference. However, it is also in transition, with incremental assimilation of mixed methods, digital mediation, and new analytical approaches.

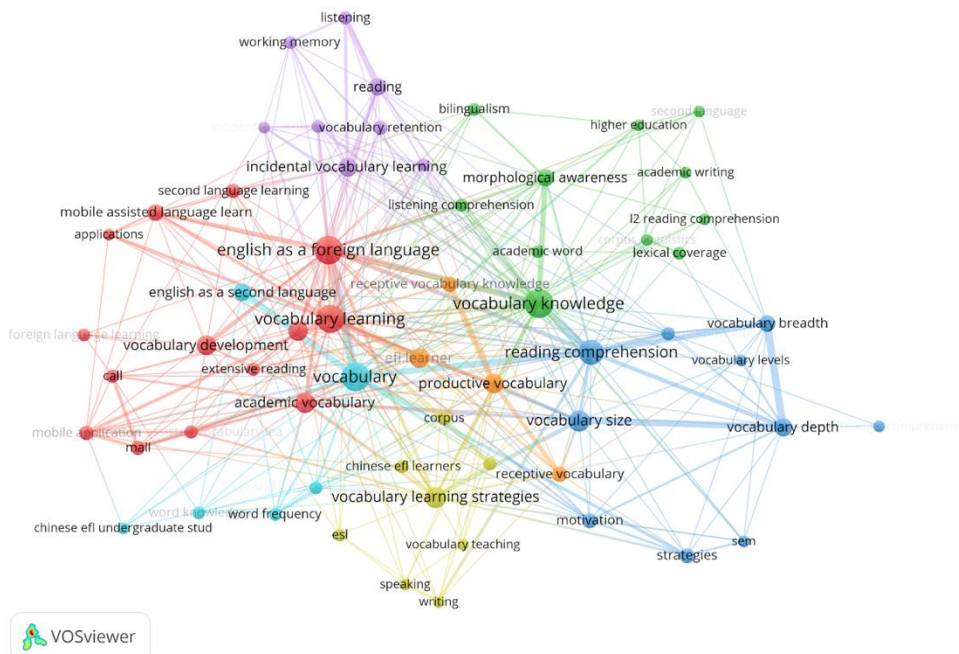
When considered alongside the publication growth trajectory outlined in RQ1, the expansion of HE vocabulary studies appears cumulative rather than transformational. Productivity gains have reinforced existing methodological paths, and diversification has been a gradual and incremental process. Consequently, the development of higher education vocabulary studies is a process of intensification within existing paradigms rather than a radical transformation of methodological foundations. Future development is likely to lie less in technological innovation and more in epistemological transformation, towards longitudinal modeling, cognitive integration theory, and multi-level representations of lexical development that transcend treatment-effect paradigms.

Thematic Domains and Emerging Research Areas (RQ4: Composition)

Guided by the Composition dimension of Hallinger and Kovačević's (2023) 4D framework, this analysis maps the intellectual structure of L2 vocabulary research through keyword co-occurrence patterns. A co-word network of the 61 most frequent keywords was generated and algorithmically clustered into seven thematic domains (see Figure 7). These clusters collectively delineate the field's conceptual architecture, highlighting dominant research priorities and emerging trajectories.

Figure 7

Science Mapping of 61 Keywords



Across the clusters, three macro-orientations are identifiable. Firstly, a technology-mediated instructional strand appears central within the macro-network. A group of keywords associated with mobile-assisted language learning, computer-assisted language learning, academic vocabulary, and extensive reading converges to form a domain in which the development of vocabulary is embedded in the context of digitally enhanced learning environments. This concentration of themes around a common domain

reflects the field's heightened sensitivity to the affordances of technology in higher education.

Secondly, a cognitive-linguistic strand appears to be foundational. Clusters centered on vocabulary knowledge, morphological awareness, lexical coverage, and reading comprehension suggest a continued preoccupation with psycholinguistic constructs and measurement traditions. Recent genre-sensitive evidence from undergraduate EFL readers also suggests that lexical coverage remains a meaningful predictor of comprehension, with expository texts often demanding higher coverage than narrative texts (Song & Reynolds, 2022). Vocabulary size, depth, and breadth, often linked to reading and academic literacy, continue to provide the theoretical basis for the field. These domains suggest the continued influence of the lexical assessment paradigm and cognitive modeling. This cluster interpretation is strengthened by higher-education evidence showing that morphological awareness is closely related to vocabulary knowledge, reading comprehension, and even broader academic achievement in L2 university settings (Stoffelsma et al., 2020).

Thirdly, a pedagogical-strategic strand foregrounds the learner's strategies, incidental learning, contextualized instruction, and skill integration. Clusters such as data-driven learning, metacognitive strategy use, retention, and incidental learning suggest the attempt to contextualize vocabulary learning within the larger picture of communicative and skill-based learning. This line of development can be extended beyond teacher-provided input, as recent corpus-based evidence from university EFL classrooms shows that student talk itself can function as a meaningful source of incidental vocabulary learning (Dang & Dao, 2024). The presence of terms related to speaking, writing, and multilingual learners suggests a gradual shift away from receptive-focused paradigms toward more integrated skill development.

Although these three macro-domains exhibit a certain level of structural coherence, there are several relatively peripheral areas. As suggested in Table 6, new areas such as informal digital learning, translanguaging, and psychological network analysis are only weakly connected in the broader co-word network. Although technology-based instruction is prominent, informal out-of-class lexical engagement through social media or the student's own digital space is underrepresented in the literature's keyword network. Moreover, computer- and network-based studies of lexical connectivity, although potentially powerful methodologically, remain peripheral to the co-word structure within the overall research agenda. This underrepresentation is notable because university-based CALL research has increasingly shown that informal digital learning of English is associated with meaningful variation in learners' vocabulary development and related outcomes (Lai & Wang, 2025; Zhang & Liu, 2022).

Table 6*Research Themes, Representative Keywords, and Authors*

Theme	Representative Keywords (Frequency)	Representative Authors
1. Technology-Enhanced L2 Vocabulary Instruction	English as a foreign language (48), vocabulary learning (47), academic vocabulary (20), vocabulary acquisition (19), vocabulary development (18), mobile assisted language learning (12), MALL (8), mobile application (8), second language learning (8), CALL (7), extensive reading (7), mobile assisted vocabulary learning (7), foreign language learning (6), applications (5)	Teng Mark Feng, Xodabande Ismail, Masrai Ahmed
2. Vocabulary Knowledge and Cognitive-Linguistic Constructs	Vocabulary knowledge (52), morphological awareness (13), listening comprehension (7), academic word (6), bilingualism (6), lexical coverage (6), academic writing (5), corpus linguistics (5), higher education (5), L2 reading comprehension (5), second language (5)	Laufer Batia, Qian David D., Stæhr Lars Stenius
3. Reading-Based Vocabulary Depth and Motivation	Reading comprehension (34), vocabulary size (22), vocabulary depth (15), vocabulary breadth (12), motivation (9), strategies (9), depth of vocabulary knowledge (7), academic reading comprehension (5), SEM (5), vocabulary levels (5)	Webb Stuart A., Dobbs Christina L., Goldstein Zahava
4. Strategy-Based Learning and Learner Contexts	Vocabulary learning strategies (23), corpus (8), Chinese EFL learners (7), data-driven learning (7), ESL (6), speaking (5), vocabulary teaching (5), writing (5)	Peters Elke, Namaziandost Ehsan, Zhang Haomin
5. Incidental Vocabulary Acquisition and Cognitive Processing	Incidental vocabulary learning (17), reading (14), vocabulary retention (8), frequency (7), listening (7), collocation (6), working memory (6), incidental learning (5)	Hasan Md. Kamrul, Barr Christopher D., Stæhr Lars Stenius
6. General Vocabulary and Learner Typologies	Vocabulary (49), English as a second language (14), second language acquisition (6), word frequency (6), word knowledge (6), Chinese EFL undergraduate students (5)	Paribakht T. Sima, Lee Ju Seong, Namaziandost Ehsan
7. Receptive vs. Productive Vocabulary Knowledge	EFL learner (19), productive vocabulary (19), receptive vocabulary (10), receptive vocabulary knowledge (10)	Webb Stuart A., Laufer Batia, Qian David D.

Equity and global participation also emerge as latent concerns. Although certain regions contribute substantially to technology-mediated research, issues of digital access, infrastructural disparity, and multilingual

realities receive limited bibliometric prominence. Affective and motivational aspects, though present, take a secondary position to cognitive and instructional constructs. The thematic landscape overall portrays a field that is both consolidated and evolving. Traditional domains of lexical measurement, cognitive processing, and strategy instruction remain prominent, while the incorporation of technologies and interdisciplinarity slowly extends the field's boundaries. The co-word structure thus reflects both continuity and cautious innovation within higher education vocabulary research.

Database Structure and Implications for Field Synthesis (RQ5: Meta-Structure)

To address RQ5, a comparative structural analysis was conducted on L2V research articles in the Scopus and Web of Science Core Collection databases. The resulting harmonized corpus comprised 557 publications, of which 335 were in Scopus and 222 in Web of Science. This is because, prior to merging and removing duplicates, a filtering process was carried out targeting publications from higher education sources. As a result, cross-database comparisons were conducted within structurally equivalent, methodologically harmonized contexts, thereby minimizing structural inconsistencies.

Regarding the scope of publications included in the databases, it was noted that Scopus contributed more to the final corpus. The reason for this is Scopus's broader scope in indexing publications, particularly applied and pedagogically focused ones. Regarding Web of Science, it was noted that it had a narrower scope than Scopus but a denser concentration of citations among included publications. The reason for this was the greater focus on publications with a strong citation history and reputation. The results suggest that it is not simply a matter of quantitative difference, but rather a difference in indexing philosophies. Scopus prioritizes breadth and diversity of scope, particularly in practice-sensitive and regionally diverse contexts.

Methodologically, Scopus demonstrates greater representation of classroom-based experimental studies, task-oriented interventions, and technology-mediated research. Web of Science shows comparatively stronger representation in statistically rigorous and cognitively oriented research traditions. However, such patterns should be treated with caution. The observed divergence might be partly due to editorial policy, publication selection, and indexing constraints, rather than to any epistemological incommensurability in the field. This decision is also methodologically aligned with recent review guidelines, arguing that bibliometric synthesis is strengthened when Scopus and WoS are combined through transparent query

design, data cleaning, deduplication, and theory-linked interpretation (Marzi et al., 2024).

Furthermore, the thematic mapping also suggests structural complementarity. For instance, the presence of technology-enhanced and practice-oriented themes in the Scopus-indexed publications appears more prominent. In contrast, those of cognitively grounded constructs and lexical modeling traditions appear more concentrated in WoS publications. Similar patterns at the author and institution levels also suggest greater regional inclusion in the Scopus database and greater citation concentration in the WoS database. These findings demonstrate that database selection is not a neutral technical decision but an epistemic filter that shapes the perceived architecture of a research field. Variations in indexing scope, citation thresholds, and disciplinary coverage influence thematic prominence and network centrality, thereby affecting structural interpretations of knowledge development.

The above patterns suggest that the two databases provide structurally complementary yet non-substitutable information. Using either database alone results in a partial representation of the field. By integrating both sources and applying harmonized screening, deduplication, and contextual criteria, the present study provides a more balanced and structurally robust bibliometric synthesis of research on higher education L2 vocabulary.

By integrating both sources through harmonized cleaning and classification procedures, this study offers a more balanced and structurally comprehensive mapping of higher education vocabulary research. Nonetheless, observed differences likely reflect indexing policies and journal selection criteria as much as substantive epistemological variation. Structural divergence should therefore be interpreted with caution. Table 7 provides a summary comparison of key database characteristics.

Table 7*Comparative Summary of Scopus and Web of Science in L2 Vocabulary Research*

Dimension	Scopus	Web of Science (WoS)	Implications
Coverage	Higher volume (N=335); broader coverage of applied linguistics and regional journals (e.g., Middle East, Asia)	Lower volume (N=222); selective inclusion favoring high-impact, Western-oriented journals	Scopus captures broader global and institutional representation; WoS may underrepresent emerging contexts
Top Institutions (Fig. 4, Table 2)	Islamic Azad University (Iran), Prince Sattam Bin Abdulaziz University (Saudi Arabia), Kharazmi University (Iran)	University of Haifa (Israel), Victoria University of Wellington (NZ), Iowa State University (USA)	Scopus reflects regional innovation; WoS reflects citation concentration and elite institutional visibility
Top Authors (Fig. 5, Table 3)	Teng, Xodabande, Namaziandost (focus on MALL, teaching practice)	Laufer, Qian, Goldstein (focus on lexical knowledge, psycholinguistics)	Differences in authorial emphasis align with pedagogical vs. cognitive focus
Methodological Diversity (Fig. 6, Table 5)	More applied and instructional: Task-based (27.18%), CALL/Game-based (21.66%), Validation studies (20.38%)	More theoretical/statistical: Mixed methods (13.51%), Qualitative (13.06%), Regression/ANOVA (35%)	Scopus highlights classroom innovations; WoS reflects theory-heavy paradigms
Thematic Emphasis (Fig. 7, Table 6)	Mobile-assisted learning, instructional strategies, informal learning (Theme 1, Theme 4)	Vocabulary knowledge, morphological awareness, L2 comprehension (Theme 2, Theme 3)	Each database emphasizes different paradigms; integration ensures thematic completeness
Regional Representation (Fig. 3, Table 1)	Higher representation of the Global South (Iran, Saudi Arabia, Malaysia)	Stronger representation from Western and high-ranking institutions	Dual inclusion helps address geographic and epistemic inequity
Data Curation Philosophy	Inclusive, practice-driven, educationally focused	Selective, theory-driven, citation-focused	Highlights the need for dual-database bibliometric approaches

Conclusion

Concluding Remarks

This article offers a longitudinal bibliometric and thematic synthesis of L2 vocabulary research in higher education from 1992 to July 2025. It is based on an integrated Scopus/Web of Science dataset and employs Hallinger & Kovačević's (2023) 4D framework for bibliometric and thematic synthesis. The findings indicate that although the rate of publication increase has been accelerating, especially in the last few years, it has also been increasingly consolidated in terms of methodology. Specifically, quantitative interventionist methodologies remain the most prominent in L2 vocabulary studies in higher education, perpetuating a tradition of empirical research centered on measurable lexical development. The thematic clustering analysis also indicates a prominent focus on pedagogical intervention, evaluation, and technology-supported learning. However, new areas of study, such as informal digital engagement and cognitive network modeling, remain on the periphery.

Beyond descriptive mapping, this study contributes theoretically by demonstrating how a 4D bibliometric architecture, size, time, spatiality, and composition, can function as an integrated analytical lens rather than a reporting template. Rather than considering these aspects, publication growth, collaboration networks, thematic clustering, and methodological patterns as separate entities, the 4D framework facilitates a structurally integrated comprehension of the interplay between these factors in defining the research trajectory of L2 vocabulary studies in higher education.

The results indicate that output growth, measured in terms of publications (size) and over time (time), does not necessarily relate to epistemological diversification. Instead, there is a trend toward methodological consolidation in interventionist and statistically inferential approaches, while thematic expansion occurs in technology-oriented and pedagogically focused research streams.

Moreover, the combined database approach, using both Scopus and Web of Science, adds a meta-structural layer to the bibliometric investigation. The differences in coverage, citation density, and thematic focus suggest that the choice of database shapes the representation of the research field. By integrating both indexing systems through harmonized screening and deduplication procedures, this study advances bibliometric practice from single-source mapping toward structurally balanced knowledge profiling. Together, these contributions reposition bibliometric inquiry from trend description toward theory-informed structural interpretation of disciplinary evolution.

Limitations of the Study

However, there are a few limitations that need to be pointed out. Firstly, the study used only Scopus and the Web of Science Core Collection. Although these two sources ensure the quality of indexing and international accessibility, they may not provide equal representation for regional journals, conference proceedings, and other non-indexed literature. This means that the dataset represents globally indexed research, not the entire global range of vocabulary research.

Secondly, the study considered only English-language journal articles, which might give a biased representation of Anglophone publication culture. Thirdly, the accuracy of bibliometric mapping is dependent on the consistency of metadata representation. Differences in keyword reporting, affiliations, and indexing might affect network visualization and clustering.

Fourthly, the study used descriptive bibliometric statistics instead of inferential modeling. The observed publication trend and methodological trend were interpreted structurally, without examining causal relationships. Finally, HE contexts were operationalized via title-abstract screening using explicit contextual cues (e.g., university/college/tertiary EAP/ESP), which may have excluded tertiary studies with insufficient contextual signaling and studies that take place in a tertiary environment but are not explicitly cited as such.

These limitations suggest that the current study provides a macro-structural mapping of the research, rather than an evaluative assessment of research quality or teaching efficacy.

Recommendations for Future Research

Future studies could take this research in several directions. Methodologically, further diversification is necessary, including longitudinal modeling, lexical analytics using computational methods, and network analyses that capture the dynamic nature of vocabulary development beyond intervention effects. A greater emphasis on affective, multilingual, and equity-based aspects could also take this research in new directions.

From a substantive perspective, informal digital learning environments and out-of-class lexical engagement are understudied areas, especially in Global South contexts. A combination of bibliometric methods with qualitative review, citation content analysis, or a form of meta-analytic synthesis could shed additional light not only on structural aspects but also on theoretical and quality aspects.

To take this research in a new direction for the study of vocabulary in higher education, a balance must be struck between methodological

consolidation and epistemological innovation, moving from cumulative expansion to integrative, multi-layered models of lexical development in increasingly digital and globalized learning environments.

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