



The Compleat Lextutor Application Tool for Academic and Technological Lexical Learning: Review and Bibliometric Approach

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ABSTRACT

This research aims to portray the current representation of the term “technology” in association with other related terms in language education. The method used for this study is the combination of content analysis representation of both compleat lextutor analytical tool and bibliometric approach. The finding of the research is that four basic areas relate to language and technology in language training: multiculturalism and technology become a central theme; the technology in language skill, knowledge, and assessment; technology and thinking; and technology in language and linguistics. This research implies that educators should be able to utilize available practical technological tools for teaching, learning, analyzing, and modeling language education. Further, this research has been limited to the area of published manuscripts of language education which may cover specifically non-empirical primary data. Therefore, further empirical research may bolster the current findings of the bibliometric research on language and technology in language education.

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1. INTRODUCTION

The use of technology-assisted language learning and analysis has become one of the important tools in the current global digital wave for many reasons. Firstly, technology can assist in the publication of the paper and provide an alternative solution for academic writing (Ali et al., 2022). Secondly, the use of digital technology in a language context can be a source for learning and help measure the impact on language learners (Sauda et al., 2020). Thirdly, language digital technology can help teachers monitor the development of language learners' vocabulary and pronunciation (Hussein, 2021).

Fourthly, digital technology in language can trigger the intercultural sensitivity of the cultures of learners (Syarifuddin et al., 2017) so that they can increase their intercultural knowledge and skills. Fifthly, language digital technology can provide various sources of text-based- teaching and learning for language learners, language teachers, and activists (Maman et al., 2023).

For these reasons, the use of technology-assisted language learning plays a major role in supporting language development, language competency, intercultural learning, and language learning resources. Therefore, it is worthy of further investigation of the use of technology-assisted language learning for both global and national contexts. Globally, one of the technologies that assist language learning is compleat lextutor application (CLA). Research into the use of compleat lextutor tool has been done globally. For example, Coxhead (1999) has investigated the in-depth level of word acquisition using concordance as the basis data for CLA.

Then, Coxhead (2000) identified the importance of mastery of academic word lists. These academic word lists then are integrated into the website of CLA website. In addition, Cobb (2004) published the compleat lexical tutor fourth edition that described a detailed elaboration of the CLA and its features. This investigation shows the

importance of CLA for language research, language learning, and concordance. The CLA has been used widely including in Indonesian contexts.

Nationally, the research into the use of CLA has been conducted by several investigators. For example, Abduh and Rosmaladewi (2017) investigated the use of CLA for assessing university students' vocabulary levels majoring in Business English at a public Indonesian university. Viera (2022) researched lexical diversity by comparing abstracts from published manuscripts written in English-speaking countries and non-English-speaking nations. Further, Wiranty (2022) portrayed the vocabulary profile that is used in the reading passage of the national entrance tests of Indonesian public universities.

There is increasing awareness of language educators using CLA in their language teaching and learning purposes. However, the research into the sample application of CLA for determining the levels of vocabulary in a reading passage, identifying the appropriate concordance used in published manuscripts, and educational purposes have become less attention among researchers. Consequently, not many published papers found on the use of CLA for research purposes and education goals.

To respond to the limited availability of research in the area of CLA, this paper aims to contribute to the further development of CLA for vocabulary research, learning, and educational purposes. The following sections describe the key concept of vocabulary learning using technology, methodology, findings and discussion, and conclusion.

2. METHOD AND MATERIALS

For the lextutor analysis, the sample is the published papers that are connected with the term "technology" in the area of language education. The total published manuscripts for this category are 21 papers. In addition, to the need for bibliometrics, the contents of the paper relate to different themes as

shown in **Table 1**. The analysis of this paper used thematic analysis (Clarke *et al.*, 2015). where the major themes above are used to search in the published manuscripts of the International Journal of Language Education. To support the analysis, we used bibliometric analysis, in which detailed information for the bibliometric analysis is explained in previous literature (Al Husaeni & Nandiyanto, 2022; Azizah *et al.*, 2021).

3. RESULTS AND DISCUSSION

3.1. Concept of CLA

Compleat Lextutor Application is an application for multi-purpose vocabulary learning, research, and assessment. Cobb (2004) describes it as an online application for teachers, tutors, and researchers. This means that CLA provides platforms for educators to teach different ranges of lexical items so that learners can understand different categories of words aiming to expand their vocabulary level. Further, CLA provides interactive web-design templates for tutors that are particularly designed for self-access learning modes. In addition, CLA for researchers provides different ranges of tools and sections, particularly commencing on building simple vocabulary profiles, patterns of words, and frequency of words.

From the reviews, it is obvious that CLA is an interactive design application that helps learners, educators, and researchers in learning, teaching, and researching lexical paradigms including level, frequently used lexical items, specific terminologies, and academic word lists. Thus, this research on CLA aims to provide evidence of the

interactive and applicable tools for lexical learning and development aiming to achieve certain language proficiency in English as the target language and aiming for the ability to grasp the meaning and messages of academic texts naturally and comprehensively.

3.2. Concept of Bibliometric Approach

An accurate technique for discovering and analyzing huge amounts of scientific data is bibliometric analysis (Donthu *et al.* 2021). This definition means that bibliometric analysis allows a large amount of data to be categorized, analyzed, and modeled in the form of statistics and a diverse range of bibliometric designs. The essential part of the bibliometric analysis is that it can be used as an approach to conducting content analysis of large amounts of data.

Specifically, the bibliometric approach is a way to deal with the linking content or lexical linking among large amounts of data. The lexical linking makes bibliometric resemble compleat lextutor analysis. Both of these analytical tools connect one another using lexical bonds and connections. The previous studies on bibliometrics are shown in **Table 2**. The simple results from our findings using Scopus-based bibliometric using keywords of lexical learning (see **Figure 1**). It contains from the Scopus database, 11,467 documents, consisting of Article of 6,996, Conference paper of 3,401, Book chapter of 376, Review of 300, Conference review of 280, Book of 60, Note of 13, Short survey of 13, Editorial of 9, Erratum of 8, Retracted of 6, and Letter of 5.

Table 1. Themes appeared for bibliometric analysis.

No	Themes	Number of manuscripts in total (2021, 2022, 2023)
1	Multiculturalism and technology	16
2	Technology and reading	10
3	Writing and technology	7
4	Young learners, vocabulary, and technology	8
5	Technology and assessment	6

Table 1 (Continue). Themes appeared for bibliometric analysis.

No	Themes	Number of manuscripts in total (2021, 2022, 2023)
6	Technology and Critical thinking	11
7	Speaking and technology	10
8	Language, linguistics, and technology	16
	Sum	84

Table 2. Previous studies on bibliometric analysis.

No	Title	Ref.
1	Dental suction aerosol: Bibliometric analysis.	Ramadahan et al. (2022)
2	A bibliometric analysis of Covid-19 researches using VOSViewer.	Hamidah et al. (2020)
3	The latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: Literature review and bibliometric analysis	Setyo et al. (2021)
4	A bibliometric analysis of management bioenergy research using VOSviewer application	Soegoto et al. (2022)
5	Oil palm empty fruit bunch waste pretreatment with benzotriazolium-based ionic liquids for cellulose conversion to glucose: Experiments with computational bibliometric analysis	Mudzakir et al. (2022)
6	Bibliometric analysis of nano metal-organic frameworks synthesis research in medical science using VOSViewer	Shidiq et al. (2023)
7	Past, current and future trends of salicylic acid and its derivatives: A bibliometric review of papers from the Scopus database published from 2000 to 2021.	Ruzmetov et al. (2021)
8	Correlation between process engineering and special needs from bibliometric analysis perspectives.	Nordin (2022a)
9	Bibliometric analysis for understanding the correlation between chemistry and special needs education using VOSviewer indexed by Google.	Bilad (2022)
10	Computing bibliometric analysis with mapping visualization using VOSviewer on "pharmacy" and "special needs" research data in 2017-2021.	Sudarjat (2023)
11	Nutritional research mapping for endurance sports: A bibliometric analysis.	Firdaus (2023)
12	Bibliometric and visualized analysis of scientific publications on geotechnics fields.	Mulyawati and Ramadhan (2021)
13	A bibliometric analysis of computational mapping on publishing teaching science engineering using VOSviewer application and correlation.	Nordin (2022b)
14	What is the correlation between chemical engineering and special needs education from the perspective of bibliometric analysis using VOSviewer indexed by Google Scholar?	Wiezal and Putra (2022)
15	Counselling guidance in science education: Definition, literature review, and bibliometric analysis.	Solehuddin et al (2023)
16	Phytochemical profile and biological activities of ethylacetate extract of peanut (<i>Arachis hypogaea</i> L.) stems: In-vitro and in-silico studies with bibliometric analysis.	Sahidin et al. (2023)
17	A bibliometric analysis of materials research in Indonesian journal using VOSViewer	Nandiyanto and Al Husaeni (2021)
18	Research trend on the use of mercury in gold mining: Literature review and bibliometric analysis	Nandiyanto et al. (2023)
19	Bibliometric analysis of educational research in 2017 to 2021 using VOSViewer: Google Scholar indexed research.	Al Husaeni et al. (2023a)

Table 2 (Continue). Previous studies on bibliometric analysis.

No	Title	Ref.
20	Bibliometric analysis of special needs education keyword using VOSviewer indexed by Google Scholar	Al Husaeni et al. (2023b)
21	Sustainable development goals (SDGs) in science education: Definition, literature review, and bibliometric analysis.	Maryanti et al. (2022)
22	Computational bibliometric analysis of research on science and Islam with VOSViewer: Scopus database in 2012 to 2022.	Al Husaeni and Al Husaeni (2022a)
23	Resin matrix composition on the performance of brake pads made from durian seeds: From computational bibliometric literature analysis to experiment.	Nandiyanto et al. (2022)
24	Bibliometric Analysis of Briquette Research Trends During the Covid-19 Pandemic.	Al Husaeni (2022)
25	Computational Bibliometric Analysis on Publication of Techno-Economic Education.	Ragadhita and Nandiyanto (2020)
26	How bibliographic dataset portrays decreasing number of scientific publications from Indonesia	Nandiyanto et al. (2020)
27	Research trends from the Scopus database using keyword water hyacinth and ecosystem: A bibliometric literature review	Nandiyanto et al. (2024)
28	Bibliometric analysis of high school keyword using VOSviewer indexed by google scholar	Al Husaeni and Nandiyanto (2023)
29	How to calculate bibliometric using VOSviewer with Publish or Perish (using Scopus data): Science education keywords	Al Husaeni and Al Husaeni (2022b)
30	Bibliometric analysis for understanding "science education" for "student with special needs" using VOSViewer	Nursaniah and Nandiyanto (2023)
31	Bibliometric analysis of research development in sports science with VOSViewer.	Al Husaeni (2023)
32	Bibliometric analysis of engineering research using VOSviewer indexed by Google Scholar	Nandiyanto and Al Husaeni (2022)
33	Bibliometric computational mapping analysis of publications on mechanical engineering education using VOSViewer	Al Husaeni and Nandiyanto (2022)
34	Introducing ASEAN Journal of Science and Engineering: A Bibliometric Analysis Study	Nandiyanto et al. (2023a)
35	Introducing ASEAN Journal of Science and Engineering Education: A Bibliometric Analysis Study for Understanding Internationalization	Al Husaeni et al. (2022)
36	Exploring Iron Oxide's Role in Hydrogen Production: Bibliographic and Bibliometric Analysis	Nandiyanto et al. (2023b)
37	How Technology Can Change Educational Research? Definition, Factors for Improving Quality of Education and Computational Bibliometric Analysis	Al Husaeni et al. (2024)
38	Is Universitas Pendidikan Indonesia Ready for Internationalization? A Bibliometric Analysis in The Science and Technology-Related Publications	Nandiyanto et al. (2023c)
39	Social Impact and Internationalization of "Indonesian Journal of Science and Technology" the Best Journal in Indonesia: A Bibliometric Analysis	Nandiyanto et al. (2023d)
40	Mapping of nanotechnology research in animal science: Scientometric analysis	Kumar (2021)
41	Involving particle technology in computational fluid dynamics research: A Bibliometric analysis	Nandiyanto et al., (2023b)
42	Strategies in Language Education to Improve Science Student Understanding during Practicum in Laboratory: Review and Computational Bibliometric Analysis	Fauziah et al. (2021)
43	How Language and Technology Can Improve Student Learning Quality in Engineering? Definition, Factors for Enhancing Students Comprehension, and Computational Bibliometric Analysis	Al Husaeni et al. (2022b)

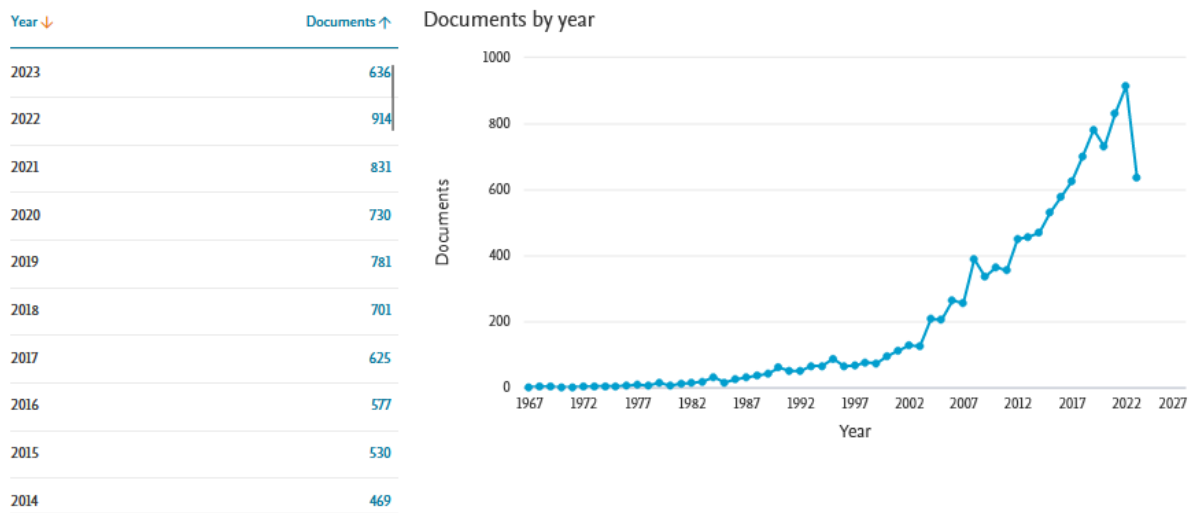


Figure 1. Scopus database results on lexical learning, taken on 18 October 2023.

3.3. Application Feature

The key features of CLA are reconstructed in Figure 2. There has been a significant development of this compleat lextutor site since the initial development of this application. It has transformed and added numerous features that apply to tutors, educators, and researchers.

The construction of CLA is based on the premier sources of compleat lextutor application. It consists of four main domains: domain one contains a list of word learning,

a group of lexical, hypertext, resources assisted reading, corpus grammar, concordance writing, and previous research resources for CLA. Domain two contains multi-words, a range of words, psycho-lexical, vocabulary statistics, generic concordance, and vocabulary profile. Domain three consists of a text tool, coverage calculator, lemmatizer, frequency nuclear, text compare, randomness home, and keywords. Domain four contains clickers, flashcards, vocabulary tests, cloze, dictators, and lexical morphology.

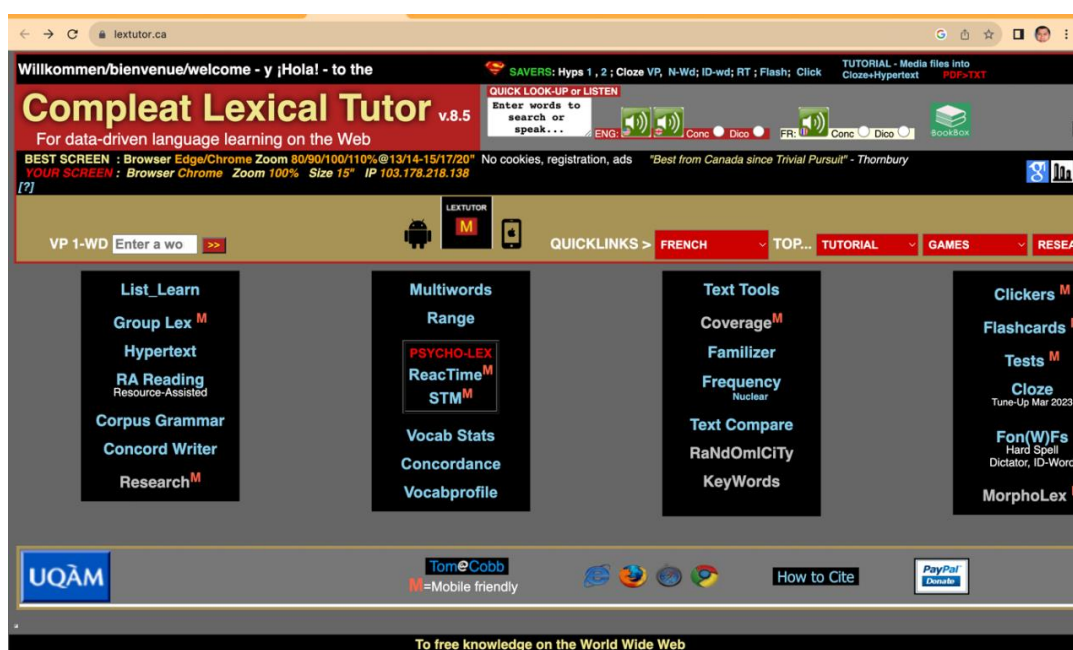


Figure 2. Compleat lextutor entry site, retrieved 22 September 2023: (see <https://www.lextutor.ca/>).

3.4. The term “technology” in the International Journal of Language Education

The term technology in the International Journal of Language Education published by

the Faculty of Languages and Literature, State University of Makassar has covered different areas of language learning and language education. It is clearly stated in **Table 3**.

Table 3. The term “technology” in the International Journal of Language Education.

Volume, issue, and year	Title	Ref
Vol. 2, No. 2, 2018	The Impact of Podcasts on EFL Students’ Listening Comprehension	Abdulrahman et al. (2018)
Vol. 4, No. 1, 2020	Gamification-Based Assessment: The Washback Effect of Quizizz on Students’ Learning in Higher Education	Pitoyo & Asib (2020)
Vol. 3, No. 1, 2019	Undergraduate Students’ Perceptions Toward Blended Learning Through Instagram in English For Business Class	Sari & Wahyudin (2019)
Vol. 3, No. 2, 2019	Facebook as a Formal Instructional Environment in Facilitating L2 Writing: Impacts and Challenges	Alam & Mizan (2019)
Vol. 4, No. 1, 2020	EFL Pre-Service Teachers’ Perception toward the Use of Mobile Assisted Language Learning in Teaching English	Nariyati & Pratiwi (2020)
Vol. 4, No. 1, 2020	TPACK Model Based Instruction in Teaching Writing: An Analysis on TPACK Literacy	Ammade et al. (2020)
Vol. 4, No. 1, 2020	Computer-Assisted Language Instruction in South Yemeni Context: A Study of Teachers’ Attitudes, ICT Uses and Challenges	Ahmed et al. (2020)
Vol. 4, No. 2, 2020	English Lecturers’ Experiences on Professional Development in Indonesian Polytechnics	Rosmaladewi et al. (2020)
Vol. 4, No. 2, 2020	English Medium Instruction in Taiwan: From the Perspective of International Students as Thesis Writer	Puspitasari et al. (2020)
Vol. 4, No. 2, 2020	Forming Tourism Higher School Students’ Readiness for Foreign Language Communication in Ukraine Tertiary level	Halytska & Solovei (2020)
Vol. 5, No. 1, 2021	Effects of Teaching Lexical Bundles on EFL Students’ Abstract Genre Academic Writing Skills Improvement: Corpus-Based Research Design	Birhan (2021)
Vol. 5, No. 1, 2021	Examining Students’ Challenges in Oracy in Academic Context Classes	Wulandari et al. (2021)
Vol. 5, No. 2, 2021	Learners’ Perceptions on WhatsApp Integration as a Learning Tool to Develop EFL Spoken Vocabulary	Khan et al. (2021)
Vol. 5, No. 2, 2021	A Conceptual Model of Analogue Gamification to Enhance Learners’ Motivation and Attitude	Mee et al. (2021)
Vol. 5, No. 3, 2021	ESP Material for Maritime Affairs and Fisheries School in Indonesia	Tahang et al. (2021)
Vol. 5, No. 3, 2021	The Inhibition and Communication Approaches of Local Languages Learning Among Millennials	Hidayat et al. (2021)
Vol. 6, No. 3, 2022	Students’ Acceptance of Technology Use in Learning English Pharmacy	Rosmayanti et al. (2022)
Vol. 6, No. 3, 2022	Digital online Learning by Using Digital Storytelling for Pre-Service Teacher Students	Yuliani and Hartanto (2022)
Vol. 7, No. 2, 2023	Enhancing Students’ Learning Outcomes through MALL in English Intensive Program for Railway Mechanical Technology	Pratiwi et al. (2023)
Vol 7, No. 3, 2023	M-Learning in ELT: Avenues and Challenges that Confront Teaching and Learning at Higher Education	Yuliani et al. (2023)
Vol. 7, No. 2, 2023	Grammarly and Grammatical Errors Reduction: A Case for Non-Native English Teachers’ Professional Learning	Utami and Mahardika (2023)

3.5. The Use of Lextutor to Group Term “Technology” in International Journal of Language Education.

The use of bibliometric compleat lextutor in analyzing words from a sample of the

article that relates to technology (see **Table 4**). The distribution of article one is as stated below in **Figure 3**. From the sample above, the compleat lextutor classifies lexical items that are related to academic words and technology.

Table 4. The example of lextutor word analysis.

Framework Vp-Classic				
	Families	Types	Tokens	Percent
K1 Words (1-1000):	327	461	3329	67.58%
Function:	...	...	(1666)	(33.82%)
Content:	...	...	(1663)	(33.76%)
> Anglo-Sax	...	...	(609)	(12.36%)
K2 Words (1001-2000):	64	88	230	4.67%
> Anglo-Sax	...	...	(44)	(0.89%)
1k+2k	...	...	...	(72.25%)
AWL Words:	151	210	668	13.56%
> Anglo-Sax	...	...	(29)	(0.59%)
Off-List Words:	?	327	699	14.19%
	542+?	1086	4926	100%

AWL types: [151:210:668] abstract_[1] academic_[3] access_[4] accurate_[2] achieve_[1] acknowledgement_[1] acquire_[1] acquisition_[2] adequate_[1] adjusting_[1] affect_[1] aid_[1] alternatives_[1] analysis_[10] analyzed_[1] analyzing_[2] approach_[1] approaches_[2] appropriate_[4] area_[2] areas_[1] assessment_[1] assigned_[1] assignments_[1] assisted_[3] attached_[1] authors_[1] automatically_[1] available_[1] awareness_[2] benefit_[1] benefited_[1] benefits_[1] categorized_[1] challenges_[3] chapter_[1] co-operation_[3] co-operative_[1] colleagues_[1] comment_[2] commented_[1] comments_[2] commitment_[1] communicate_[1] communication_[7] communications_[2] computer_[16] computers_[6] computing_[2] conclusion_[1] conducted_[2] conference_[3] conflict_[1] conflicting_[1] constraints_[1] contemporary_[6] context_[1] contributing_[1] create_[2] creating_[1] creation_[1] culture_[1] data_[13] debate_[1] define_[1] defined_[2] definition_[1] designing_[1] display_[1] economic_[1] elements_[1] emerged_[1] emerging_[1] emphasize_[1] enable_[1] enables_[2] enhance_[1] enhanced_[1] ensuring_[1] environment_[6] environments_[1] equipped_[2] evidence_[1] expert_[2] experts_[2] facilitating_[2] factor_[1] factors_[1] files_[1] financial_[1] flexibility_[1] focuses_[2] fundamental_[1] funding_[2] furthermore_[2] global_[3] goal_[1] grade_[1] grades_[1] hence_[12] highlighted_[1] identifies_[1] identifying_[1] images_[1] impact_[2] index_[2] induce_[1] initiative_[1] innovation_[2] insight_[1] instance_[5] institution_[1] institutions_[2] instruction_[2] instructions_[2] instructors_[1] insufficient_[1] integral_[1] integrating_[3] integration_[9] interactive_[1] involves_[1] issues_[5] journal_[22] journals_[1] lecture_[1] lectures_[1] major_[1] media_[1] medium_[3] method_[7] methodology_[2] methods_[13] minimal_[1] modify_[1] motivate_[1] motivated_[1] motivates_[1] motivation_[1] ongoing_[1] participant_[3] participants_[12] perceptions_[1] perspective_[3] perspectives_[1] phenomena_[1] phenomenon_[5] policy_[2] positive_[3] potential_[1] previously_[2] primarily_[2] primary_[2] principles_[1] procedures_[3] proceeded_[1] proceedings_[1] process_[11] processes_[3] professionals_[1] project_[2] promoting_[1] prospect_[1] publication_[1] published_[1] qualitative_[8] qualitatively_[1] ranging_[1] relevant_[1] rely_[1] research_[28] researcher_[1] researchers_[22] researching_[1] resources_[2] response_[1] retain_[1] role_[10] section_[1] seeks_[1] select_[1] selected_[2] significant_[6] signifying_[1] site_[1] sites_[1] sources_[1] specific_[2] status_[1] strategies_[5] structure_[1] structured_[1] survey_[1] task_[1] technical_[3] technique_[1] techniques_[6] technological_[3] technology_[144] themes_[2] theory_[2] thesis_[1] traditional_[1] trends_[2] utilization_[1] utilize_[6] utilized_[2] visual_[1] vol_[9] volume_[1]

Figure 3. Data analysis.

3.6. Language Education Associated with Multiculturalism Technological Issues

The themes of multicultural and technological issues in the current language education journal have been categorized

based on the following **Table 5**. From the findings, it is clear that language skills, knowledge, and assessment are some of the most important themes that appear from the bibliometric analysis.

Table 5. Themes and authors list.

Themes and Sub-theme classifications		Ref
Multicultural language learning and technology		El Khairat (2021); Sakkir <i>et al.</i> (2021); Mahadini <i>et al.</i> (2021); Apriyanti <i>et al.</i> (2021); Wen <i>et al.</i> (2021); Abduh <i>et al.</i> (2021); Djamdjuri <i>et al.</i> (2021); Izzah, (2021); Abduh <i>et al.</i> (2022); Alkhanani (2022); Nindya <i>et al.</i> (2022); Abduh <i>et al.</i> (2022); Yulian <i>et al.</i> (2022); Pratiwi <i>et al.</i> (2023); Suwastini <i>et al.</i> (2023).
Language, linguistics, and technology		Hidayat <i>et al.</i> (2021); Fauzi (2021); Pamintuan (2021); Anwar & Mustafa (2021); Febriani (2021); Akmaliyah <i>et al.</i> (2021); Jusoh <i>et al.</i> (2021); Rungwaraphong (2021); Agustine <i>et al.</i> (2021); Rahmat <i>et al.</i> (2022); Sairattanain & Thawarom (2022); Sunarsi & Munna (2022); Samad <i>et al.</i> (2022); Dunakhir & Osman (2023); Abdullah <i>et al.</i> (2023); Mohamed & Halim (2023).
Language skills, knowledge and Assessment	Reading and technology	Mardianti <i>et al.</i> (2021); Yang & Mohd (2021); Sukmawan <i>et al.</i> (2021); Mantasiah <i>et al.</i> (2021); Rehman & Perveen (2021); Tahang <i>et al.</i> (2021); Yaacob & Lubis (2022); Pulungan & Hariati (2022); Khadijah <i>et al.</i> (2022); Abejuela <i>et al.</i> (2023).
	Writing and technology	Muslem <i>et al.</i> (2021); Fitriawati & Safitri (2021); Arsyad <i>et al.</i> (2021); Najafi <i>et al.</i> (2021); Bram & Angelina (2022); Nur & Anas (2022); Mulyaningsih <i>et al.</i> (2022).
	Young learners, vocabulary & technology	Diyanti & Madya (2021); Birhan (2021); Abduh <i>et al.</i> (2022); Basri <i>et al.</i> (2022); Farmasari (2022); Rosmayanti <i>et al.</i> (2022); Janah & Cahyono (2022); Al-Husban & Tawalbeh (2023).
	Speaking and technology	Hoinbala (2022); Dinsa <i>et al.</i> (2022); Dinsa <i>et al.</i> (2022); Abduh <i>et al.</i> (2022); Mahmud <i>et al.</i> (2022); Asfihana <i>et al.</i> (2022); Iskandar <i>et al.</i> (2022); Che Mustaffa & Sailin, (2022); Delavari Khalifehkari & Pourhosein Gilakjani, (2022); Ismail <i>et al.</i> (2023).
	Language assessment and technology	Menggo & Gunas (2022); Saud <i>et al.</i> (2022); Takarroucht (2022); Phetsut & Waemusa (2022); Mukminatun & Utami (2022); Gebremariam & Gedamu (2022).
Technology and Critical thinking		Lailiyah & Wediyantoro (2021); Wahyuni <i>et al.</i> (2021); Harahap & Astrid (2021); Riwayatningsih <i>et al.</i> (2021); Wulandari <i>et al.</i> (2021); Jabu <i>et al.</i> (2021); Rasman (2021); Ramadhanti & Yanda (2021); Abduh <i>et al.</i> (2022); Anwas <i>et al.</i> (2022); Tabatadze (2022); Jazadi <i>et al.</i> (2023).

3.7. Discussion

From the key findings, there are four prominent themes relating to language and technology in language education. Firstly, the theme of multiculturalism has become one of the dominant categories in the language education journal. The first reason is that the language education journal accommodates different ideas that are connected with technology and diversifies authors from different geographical backgrounds. One of the most interesting parts of the multicultural and technological themes is that they come from different institutions across the globe such as El Khairat (2021); Sakkir et al. (2021); Mahadini et al. (2021); Apriyanti et al. (2021); Wen et al., (2021). The second reason is that multicultural themes appear to be one of the most interesting categories for authors because it covers different ranges of ideas and discourses in the area of language education and technology such as Abduh et al. (2022); Alkhanani (2022); Nindya et al. (2022); Abduh, Sakkir et al. (2022); Further reason is that multicultural themes become the iconic perceived ideas of the language editors since the transdisciplinary and multidisciplinary lens of science and technology such as Yulian et al. (2022); Pratiwi et al. (2023); Suwastini et al., (2023).

The second group themes that appear to be in common are technology and language skills, knowledge, and assessment such as speaking, reading, writing, and vocabulary. These themes are important discourses in the area of language education because they are the fundamental aspects of language learning and teaching. They have become major debates in the current trends of language learning and teaching because they are connected with new interventions, future innovations, and practical applications for educators. The theme of language skills and knowledge concerning technology is an example of the importance of the integration of skills in the current trend of technology including reading such as Rehman & Perveen,

(2021); Tahang et al. (2021); Yaacob & Lubis (2022); Pulungan & Hariati (2022); Khadijah et al. (2022); Abejuela et al., (2023), in speaking such as Hoinbala (2022); Dinsa et al. (2022); Dinsa et al. (2022), in vocabulary such as Diyanti & Madya (2021); Birhan (2021); Abduh et al. (2022), and in writing such as Muslem et al. (2021); Fitrawati & Safitri (2021); Arsyad et al. (2021); Najafi et al. (2021).

The third group is cognitive and critical thinking. This theme is important because language education aims to promote awareness of critical thinking, to practice critical thinking, and to evaluate and assess critical thinking both from learners and educators. Examples of cognitive and critical thinking are in language education such as Lailiyah & Wediyantoro, (2021); Wahyuni, Maulina, & Mulia, (2021); Harahap & Astrid, (2021); Riwayatningsih et al. (2021); Wulandari et al., (2021).

The last theme relating to technology in language education is language and linguistics. It is concerned with the use of language and linguistics aspects. It connects with lexis, morphological learning, phonological issues, and constraints in language and linguistics. Many of these areas in language and linguistics seem to be neglected in the discourses of language education such as Agustine et al. (2021); Rahmat et al. (2022); Sairattanain & Thawarom (2022); Sunarsi & Munna (2022).

There are several implications of these findings such as:

- (i) The importance of campaigning the increasing awareness of using technology for language learning and language for multiculturalism. Increasing awareness can be done formally and informally depending on the available space and contexts so that educators can understand and increase their awareness and knowledge in the areas of language, technology, and multiculturalism.
- (ii) A need for teachers and educators who can understand and operate current

technology fluently so that they can use technology effectively, efficiently, and practically.

- (iii) The understanding and knowledge of corpus technology such as the Compleat Lextutor Application and Bibliometric Approach are examples of technology that should be recommended for language learners and educators across different levels of education.

4. CONCLUSION

There are four main topics relating to language and technology in language instruction, according to the key findings above. First off, the theme of multiculturalism has taken center stage in the Journal of Language Education. Technology and language abilities, knowledge, and assessments including speaking, reading, writing, and vocabulary appear to be the second group's recurring themes. The third category is critical and cognitive thinking. Language and linguistics are the final topics involving technology in language teaching. It is focused on linguistics and the use of words.

Further research is important to be carried out in the future in the area of language

education and technology, technology and language learners, and technology for language practitioners. Besides, empirical research is essential since the result of the study used a published sample that covers only very limited articles and only one journal which is the International Journal of Language Education. This limitation of the study can open up opportunities for future investigations that combine documentation and empirical evidence that can bolster the current findings and provide holistic perspectives of technology and language education.

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6. AUTHORS' NOTE

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