Research Article

The Global Landscape of Technology-assisted English Language Teaching Research: A Bibliometric Analysis

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ARTICLEINFO

ABSTRACT

The purpose of this study is to provide a comprehensive overview of the development and notable patterns in the field of Technology-Assisted English Language Teaching (TAELT) research by conducting a bibliometric analysis of the domain. Author productivity, citation rate, annual scientific production, average citations, most-cited papers, and frequently-used words are only few of the bibliometric markers that can be examined for a more in-depth picture. This research sheds light on the dynamic nature of academic research in the (TAELT) subject. An impressive rise in research output and citations over time is shown by the statistics, which may indicate (TAELT's) growing significance in academic research discourse. Computers and Education, the Proceedings of the ACM International Conference Proceeding Series, and the International Journal of Emerging Technologies in Learning are three of the most important and relevant journals in this area. These publications stand out because of the important role they play in disseminating high-impact research throughout the (TAELT) community. To further illustrate the complexity and multidimensional nature of utilizing technology in English language education, this article examines fundamental problems such e-learning, interactive learning environments, and English language teaching to provide a thorough knowledge of (TAELT) research.

1. INTRODUCTION

Technology-Assisted English Language Teaching (TAELT)[1] encompasses the incorporation of digital resources and technology breakthroughs into the pedagogical practices of English language education. (TAELT) comprises a diverse array of applications, such as e-learning platforms, computer-assisted language learning (CALL), and a variety of multimedia resources that are specifically designed to augment language learning and teaching processes. This technique utilizes technological capabilities to establish interactive and captivating learning environments, enabling educators to deploy inventive methodologies and resources to aid the acquisition of language. (TAELT) has garnered considerable attention within the realm of education because to its ability to enhance language acquisition results, stimulate student involvement, and cultivate learning experiences that are more tailored and adaptable. In light of the ongoing development in the subject of (TAELT), it is imperative to do a thorough bibliometric analysis to investigate the prevailing trends, research productivity, and prominent themes within this discipline.

The study of (TAELT) holds significant importance in the field of research, as it has the capacity to bring about a transformative impact on language education and cater to the changing requirements of learners in an ever-growing digital society. The integration of technology into several facets of daily life has the potential to enhance the accessibility, interactivity, and efficacy of language learning programs when used to language instruction. (TAELT) has the capacity to accommodate a wide range of learning styles and offer prospects for individualized and adaptable learning experiences. A comprehensive comprehension of the influence and patterns within (TAELT) is of utmost importance for educators,

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policymakers, and researchers in order to make well-informed decisions, devise efficacious pedagogical approaches, and generate inventive resolutions to augment language instruction[2].

The objectives of this bibliometric analysis are to conduct a complete examination of the scholarly output, thematic trends, and prominent contributors in the subject of (TAELT). This study seeks to provide insights into the most relevant research topics, prominent contributors, and developing themes in (TAELT) through the analysis of publishing patterns, influential authors and top-cited publications. In addition, this study aims to ascertain the publications that have the greatest impact, prevalent research subjects, and potential areas of expansion in the field of (TAELT). This study seeks to enhance comprehension of the present state and prospective avenues of research in (TAELT) by addressing these objectives.

2. METHODOLOGY

2.1. Data Collection

The Scopus database was used as the primary source of literature for the bibliometric analysis in this study. The selection of Scopus was based on its extensive coverage of scholarly publications, conference proceedings, and other relevant sources across a wide range of academic fields. The study spans a diverse range of topic areas, such as Social Sciences, Computer Science, and Arts and Humanities, which are in line with the scope of this research. In addition, Scopus offers comprehensive coverage of international papers, so guaranteeing a worldwide outlook on the field of research pertaining to (TAELT).

2.2. Search Strategy

The search method employed the use of carefully selected keywords in order to access pertinent academic publications. The search query utilized the following terms: ("technology-assisted" OR "computer-based" OR "computer/software") AND ("English" AND "learning" OR "English" AND "teaching"). This compilation was specifically curated to encompass research endeavors that center on the convergence of technology and the field of English language instruction.

2.3. Data Collection and Analysis

Upon performing the search query, a comprehensive total of 297 documents were obtained from the Scopus database. The subject areas were constrained to Social Sciences, Computer Science, and Arts and Humanities, so guaranteeing that the analysis remained confined to the stated focus of this study.

2.4. Metadata Extraction

In order to obtain the requisite data for analysis, the researchers employed RStudio, in conjunction with the R programming language, and adhered to the methodology outlined by [3] . The biblioshiny tool in RStudio was used to extract figures and tables from the Scopus database. Nevertheless, it is important to acknowledge that the Scopus bibliography does possess significant limitations. Significantly, challenges were experienced in accurately exporting all metadata, as evidenced in Table 1.

2.5. Handling Missing Metadata

In the process of addressing the issue of missing metadata, the study did not only depend on the incomplete data to formulate its results. In order to enhance the precision and dependability of the bibliometric analysis, diligent measures were taken to cross-reference and validate the data using numerous sources, whenever feasible.

TABLE I. SUMMARY OF METADATA QUALITY

Description	Metadata	Missing %	Missing counts	Status
Abstract	AB	0	0	Excellent
Author	AU	0	0	Excellent
Document Type	DT	0	0	Excellent
Journal	SO	0	0	Excellent
Language	LA	0	0	Excellent
Publication Year	PY	0	0	Excellent
Title	TI	0	0	Excellent
Total Citation	TC	0	0	Excellent
Affiliation	C1	4.38	13	Good
DOI	DI	15.15	45	Acceptable
Keywords	DE	24.58	73	Poor
Corresponding Author	RP	34.68	103	Poor
Keywords Plus	ID	41.08	122	Poor
Cited References	CR	100	297	Completely missing
Science Categories	WC	100	297	Completely missing

Table 1 provides a complete depiction of the quality of information, emphasizing the occurrence of data gaps in different categories including Affiliation, DOI, Keywords, Corresponding Author, Keywords Plus, Cited References, and Science Categories. The table functions as a point of reference for comprehending the constraints and difficulties linked to the dataset employed in this research.

3. RESULTS
A. Main Information

The bibliometric study encompasses a substantial temporal range spanning from 1982 to 2023, so offering a thorough depiction of the progression of research in (TAELT) across the preceding four decades. The analysis incorporates a comprehensive dataset of 210 journals, books, and other scholarly publications, so assuring a broad and varied range of sources for examination.

i   Document Analysis

A comprehensive analysis was conducted on a total of 297 documents, revealing an observed yearly growth rate of 8.06%. This finding suggests a significant augmentation in research output within this particular field throughout the course of time. The mean age of the papers is 9.23 years, indicating that the literature examined encompasses a blend of contemporary and established scholarship within the discipline. The average number of citations received per document was 9.202, indicating the significant impact and importance of the research across the academic community.

ii   Document Contents

The assessed texts contained a significant quantity of content, as indicated by the presence of 1434 Keywords Plus and 854 Author's Keywords. The inclusion of many keywords serves to underscore the extensive array of themes and subjects that are investigated within the realm of research pertaining to (TAELT).

iii   Author Analysis

The examined corpus of literature comprised contributions from a total of 611 authors, with 96 items attributed to a single author. The research exhibits a conspicuous demonstration of collaboration, shown in the mean number of 2.28 co-authors per document. It is noteworthy to mention that a considerable fraction of the collaborations, precisely 10.44%, involved co-authorships with authors from foreign countries. This discovery implies that research efforts in this specific field exhibit a worldwide and cooperative focus.

iv   Document Types

The collection of documents has a diverse range of formats, consisting of 143 articles, 2 conference papers in article format, 3 books, 10 book chapters, 114 conference papers, 11 conference reviews, 1 editorial, 1 note, 2 retracted documents, and 10 reviews. The wide range of document types included here exemplifies the complex and varied nature of research output in the field of (TAELT). The thorough examination of these primary data points yields significant observations regarding the extent, expansion, and cooperative environment of research in (TAELT). This analysis provides a nuanced comprehension of the principal patterns and dynamics within this domain.

B. Country Scientific Production

The analysis of scholarly publications on research related to technology-supported English language teaching across several countries reveals a diverse and global landscape. The analysis of the table reveals that China holds a significant position as the leading contributor, with a total of 122 articles. This indicates a significant and extensive body of study conducted in this specific area. The United States (USA) demonstrates a significant presence through the publication of 49 articles, while the United Kingdom (UK) equally showcases this pattern with 25 articles. Japan, Turkey, and Malaysia demonstrate substantial engagement in this specific domain, as indicated by their respective publication counts of 19, 13, and 12. Both Canada and South Korea exhibit a high level of involvement, as evidenced by their equal contribution of 11 publications apiece. Both Australia and Indonesia have made noteworthy contributions to the realm of research in (TAELT), as evidenced by the production of 10 papers from each country. This displays a continual and vigorous involvement in this field of research.

Furthermore, it is worth mentioning that certain countries, specifically Iran, Saudi Arabia, Spain, and Thailand, have each generated 10 papers, indicating a significant level of interest and involvement in this specific sector. Both the Netherlands and New Zealand have made noteworthy contributions, as evidenced by their respective outputs of seven publications apiece. The distribution of scientific production exhibits variation across different locations, although the collective contributions from numerous countries emphasize the worldwide significance and widespread interest in research

pertaining to English language instruction aided by technology. The presence of international collaboration and participation in this subject demonstrates its interdisciplinary and cross-cultural character, underscoring the significance of varied viewpoints and approaches in influencing the progress of research and practice in this domain. Please consult Figure 1 for additional details.
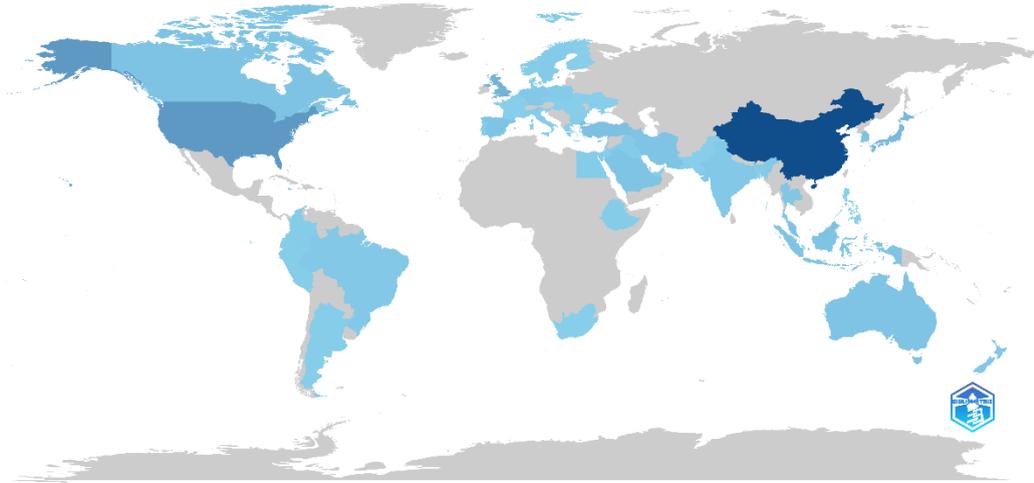

Fig. 1. Country scientific production map

C. Country Production over Time

The figure presented demonstrates the notable growth trajectory of China's scientific production in the field of research on (TAELT). The quantity of published works has experienced a major increase from 2008, with a notable upward trajectory that culminated in the greatest publishing rate observed in 2023, amounting to a total of 122 pieces.
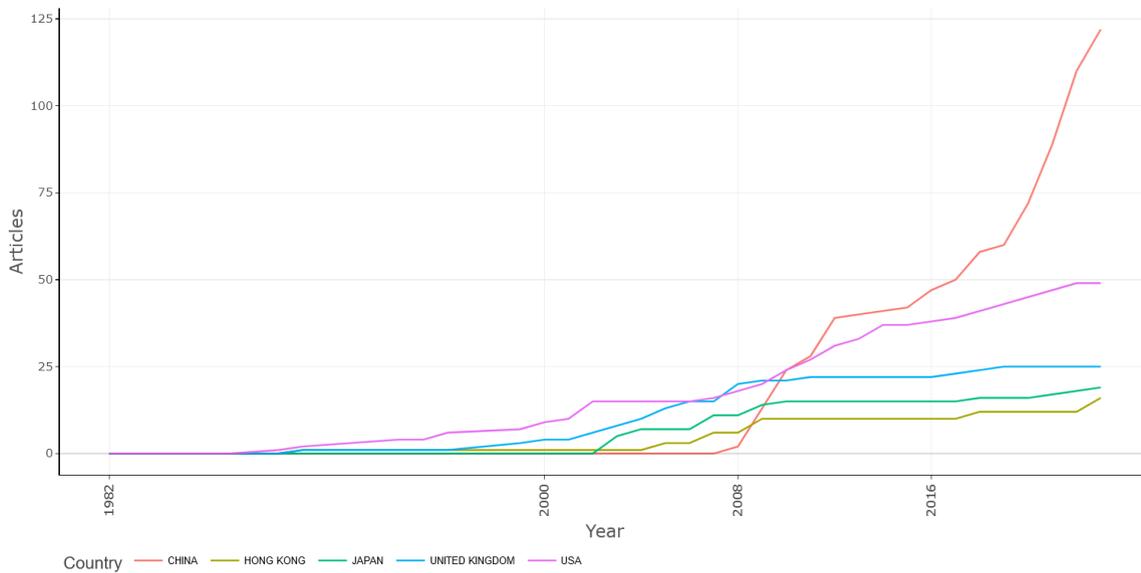

Fig. 2. Country production over time

The United States of America has always upheld a prominent position in terms of research production, exhibiting a stable upward trend in the annual publication of papers. By the year 2023, the number of articles published is projected to reach 49. Hong Kong demonstrates a consistent growth trajectory, characterized by a discernible upswing in scholarly publications from 2007 to 2018, subsequent to which there is a marginal variation before culminating in a pinnacle of 16 articles in 2023. The United Kingdom has a persistent rising trajectory, characterized by a steady growth in research productivity starting from 1999 and culminating with the publication of 25 papers in 2023. Japan exhibits a rather consistent pattern of publishing until the year 2003, subsequent to which there is a discernible surge in research productivity, culminating in the production of 19 papers by the year 2023. The provided graphical representation presents a complete depiction of publishing trends, effectively illustrating the substantial development and diverse patterns observed in scientific production across various nations throughout the years.

D. Most Cited Countries

The table presented displays data on the overall amount of citations (TC) and the average number of article citations for different countries engaged in research on (TAELT). Out of the countries under consideration, the United States of America exhibits the greatest cumulative citation count, amounting to 771 citations. This figure is accompanied by a noteworthy average of 55.1 citations per piece. The United Kingdom has a similar pattern, with a total of 460 citations and an average of 27.1 citations per article, indicating a significant and influential presence within the discipline[4].

The United States (USA) and the United Kingdom (UK) demonstrate notably larger citation counts in comparison to China. Despite China's lower total citation count of 251, it maintains an average of 3.9 citations per article. This indicates a comparatively lower average impact per publication when compared to the USA and the UK. This observation implies that although China has a significant volume of research publications, the influence of each individual paper, as measured by citations, is rather modest. It is worth mentioning that several nations, such Cyprus and Belgium, exhibit noteworthy average article citations, specifically 40, 49, and 30 respectively. This suggests that despite these countries potentially having a lower overall citation count, the influence of their individual papers is comparatively significant within the particular area.

Moreover, it is noteworthy that nations such as Japan, Saudi Arabia, and Korea have lower overall citation counts, which aligns with their comparatively small average article citations. This suggests a moderate level of effect within the respective academic domains. It is noteworthy to mention that specific nations, like Denmark, Germany, and Italy, have not yet amassed any citations. This observation implies the possibility of an emerging or relatively less active research involvement in the domain of (TAELT). In general, the data emphasizes the different levels of influence and impact observed among countries involved in this domain. This highlights the inequality in research productivity and its subsequent effect on the broader academic conversation and progress within the field of (TAELT) research. Refer to Figure 3 for additional details.
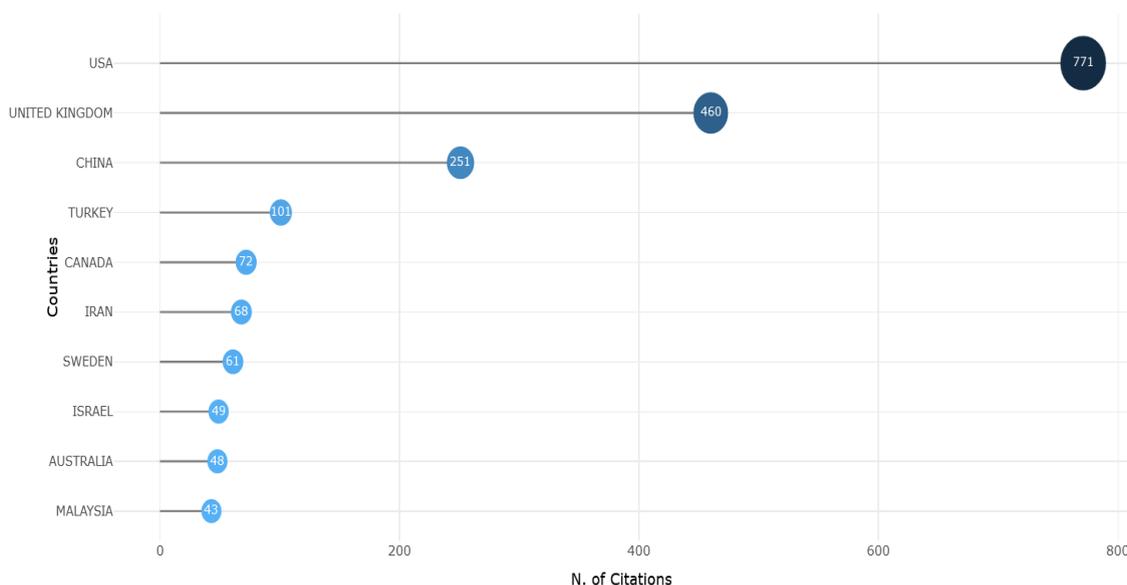

Fig. 3. Most cited countries

E. Corresponding Author's Countries

Figure 4 displays data pertaining to the countries of the corresponding authors (CAC) in the domain of research on (TAELT). The data includes various metrics such as the total count of articles, publications with a single corresponding author (SCP), publications with multiple corresponding authors (MCP), the frequency of occurrences of multiple corresponding authorship (Freq), and the ratio of MCP.

The analysis demonstrates that there are 109 articles within the dataset where the nationality of the associated author is not mentioned. This constitutes a significant proportion of the total number of articles. China has the biggest number of papers among the nations represented by the corresponding authors, with a total of 64 publications. The United Kingdom closely follows with 17 publications, while the United States of America has 14 publications. Upon analyzing the ratio of single corresponding author publications in comparison to the total number of articles, it becomes evident that nations such as Saudi Arabia, Australia, and Hong Kong exhibit significantly higher proportions. This observation suggests that there is a predominant trend of single corresponding authorship within the specified geographical regions. On the other hand, it is important to acknowledge that several countries, including Colombia, Italy, Norway, and the United Arab Emirates, exhibit a significant occurrence of multiple corresponding authorship. This observation implies a tendency towards collaborative research undertakings within these nations.

It is noteworthy to notice that several countries, like Germany, Greece, and Jordan, each possess the single publication associated with a corresponding author. This observation may suggest either an increasing research presence or a very limited contribution to the subject. The data elucidates the varied patterns of corresponding authorship observed in different countries, providing insight into the prevalence of both singular and multiple corresponding authorships. This exemplifies the cooperative nature of research in the domain of (TAELT).
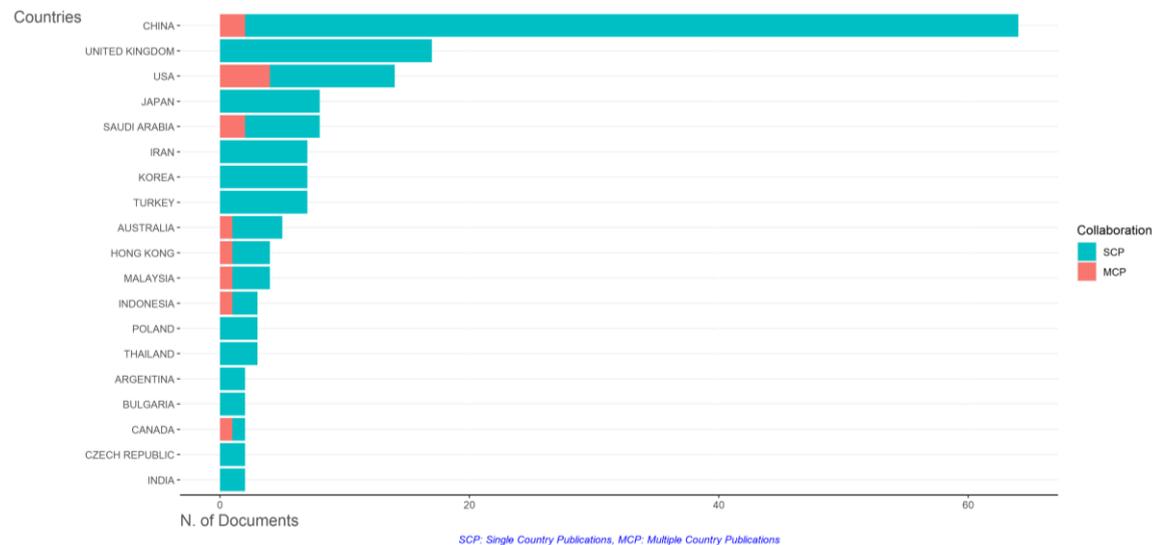

Fig. 5. Corresponding Author's Countries

F. Most Relevant Affiliations

The table presents data pertaining to the notable affiliations within the field of research on (TAELT). The data is arranged based on the frequency of articles linked to each affiliation. The analysis provides essential insights into the significant institutions that contribute significantly to the research landscape in this specific topic. Hong Kong Baptist University is recognized as a notable contributor, as seen by its affiliation with six articles. This indicates a strong and long-lasting research presence in the field. The University of Cambridge, Hebei University of Engineering, Prince Sattam Bin Abdulaziz University, and the University of Amsterdam have demonstrated noteworthy academic contributions, as indicated by the publication of 5, 4, 4, and 4 articles, respectively.

Furthermore, it is worth noting that some esteemed academic institutions, including Guangdong University of Foreign Studies, Kansai University, Near East University, the University of Canterbury, and the University of Oslo, have exhibited notable involvement and made substantial contributions in the field. Each of these institutions has been associated with three scholarly works, further highlighting their active participation in academic discourse. The data underscores the wide

range of participating institutions, so drawing attention to the international scope of research engagement in (TAELT). Furthermore, this highlights the collective endeavors and contributions made by diverse universities and educational establishments, so emphasizing the interdisciplinary methodology and the mutual dedication to promoting research and the diffusion of information in this particular domain.

TABLE II. MOST RELEVANT AFFILIATIONS

Affiliation	Articles
HONG KONG BAPTIST UNIVERSITY	6
UNIVERSITY OF CAMBRIDGE	5
HEBEI UNIVERSITY OF ENGINEERING	4
PRINCE SATTAM BIN ABDULAZIZ UNIVERSITY	4
UNIVERSITY OF AMSTERDAM	4
GUANGDONG UNIVERSITY OF FOREIGN STUDIES	3
KANSAI UNIVERSITY	3
NEAR EAST UNIVERSITY	3
UNIVERSITY OF CANTERBURY	3
UNIVERSITY OF OSLO	3

G. Authors' Production over Time

Table 3 offers valuable insights into the creation of different authors within the domain of (TAELT) throughout different historical periods. Numerous authors have made significant contributions, exhibiting variations in their research output throughout different years. The data presented in this study provides valuable insights into the publishing patterns and scholarly contributions of individual writers, thereby illuminating their significant engagement in this particular field of research. The research demonstrates that authors such as [5] have consistently engaged with the subject matter, as evidenced by their extensive publication records across several years. This indicates their long-standing dedication to the topic. The authors' contributions have had a significant impact on the field of study, as they have effectively addressed important issues related to the integration of information and communication technologies in education.

Furthermore, prominent academics including [6],[7] and [8] have significantly contributed to the scholarly conversation, as seen by their extensive publications in recent times. This statement highlights their active involvement in ongoing scientific discussions. The study conducted by the authors involves a diverse array of topics, which includes the examination of the integration of online English learning platforms and the development of intelligent teaching models that leverage artificial intelligence. Furthermore, notable contributions have been made by authors such as [9] , [10] and [11]. Their research output demonstrates a complete awareness of the obstacles and improvements in (TAELT). In general, the data highlights the commitment and involvement of multiple authors in the domain of (TAELT). This demonstrates the changing research landscape and the ongoing endeavors to enhance understanding and implementation in this area.

TABLE III. AUTHORS' PRODUCTION OVER TIME

Author	Year	Total citations	Frequency	Total citations per year
NA NA	2007	0	4	0
NA NA	2013	0	1	0
NA NA	2020	0	2	0
NA NA	2022	0	1	0
NA NA	2023	0	3	0
HENNESSY S	2002	75	1	3.409
HENNESSY S	2003	31	1	1.476
HENNESSY S	2004	56	1	2.8
HENNESSY S	2005	32	1	1.684
HENNESSY S	2006	18	1	1
RUTHVEN K	2002	75	1	3.409
RUTHVEN K	2003	31	1	1.476
RUTHVEN K	2004	56	1	2.8
RUTHVEN K	2005	32	1	1.684
RUTHVEN K	2006	18	1	1
LIU J	2005	5	1	0.263
LIU J	2007	7	1	0.412
LIU J	2009	0	1	0
LIU J	2023	1	1	1
WANG X	2020	2	1	0.5
WANG X	2021	25	3	8.333
CHEUNG WK	2005	5	1	0.263
CHEUNG WK	2007	7	1	0.412
CHEUNG WK	2009	0	1	0

DEANEY R	2003	31	1	1.476
DEANEY R	2005	32	1	1.684
DEANEY R	2006	18	1	1
LAM MH	2005	5	1	0.263
LAM MH	2007	7	1	0.412
LAM MH	2009	0	1	0
LEE C	2005	5	1	0.263
LEE C	2007	7	1	0.412
LEE C	2009	0	1	0
LI X	2017	45	2	6.429
LI X	2021	1	1	0.333

H. Most Relevant Sources

Upon examination of table 4, it becomes evident that specific pertinent sources are extensively referenced within the realm of (TAELT). Significantly, the subsequent sources exhibit prominence in terms of their impact and frequency of citation.

1. The Lecture Notes in Computer Science, which encompasses subseries such as Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics, has been cited in a cumulative of seven scholarly articles. This highlights the substantial impact it has made in the field of (TAELT). It is assumed that this source provides significant insights and research discoveries that contribute significantly to the existing body of literature in this specific topic.

2. The ACM International Conference Proceeding Series is an often cited resource in the realm of English language education and the integration of technology, as indicated by its presence in eight scholarly references. The ACM series is widely acknowledged as a major platform for scholars to efficiently disseminate their findings and participate in dialogues concerning advancements within their respective disciplines.

3. The International Journal of Emerging Technologies in Learning is widely recognized as a prestigious magazine that functions as a significant forum for scholars and practitioners in the field of educational technology. The significance of this work within the academic world is underscored by its citation in a total of seven papers. The substantial number of citations found within this journal serves as evidence of its prominence as a main resource for current research and scholarly discourse on emerging technologies in the realm of learning, specifically within the context of English language teaching.

4. The aforementioned article exhibits a notable influence in the field of technology-assisted language teaching, as indicated by its inclusion in nine scholarly works. The presence of a significant number of citations suggests that it plays a crucial role in understanding the relationship between computer-assisted instruction and academic success in the field of language acquisition.

5. The Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering (LNICST) is a widely referenced source that contributes significantly to the dissemination of research in computer sciences and related fields. Its prominence in the field of technology-assisted language teaching underscores its relevance in this context[12].

A comprehensive comprehension of the impact of these sources is of utmost importance for academics, educators, and researchers who aim to investigate the interconnections between technology and language education, specifically within the realm of English language instruction.

TABLE IV. MOST RELEVANT SOURCES

Sources	Articles
COMPUTERS AND EDUCATION	9
ACM INTERNATIONAL CONFERENCE PROCEEDING SERIES	8
INTERNATIONAL JOURNAL OF EMERGING TECHNOLOGIES IN LEARNING	7
LECTURE NOTES IN COMPUTER SCIENCE (INCLUDING SUBSERIES LECTURE NOTES IN ARTIFICIAL INTELLIGENCE AND LECTURE NOTES IN BIOINFORMATICS)	7
COMPUTER ASSISTED LANGUAGE LEARNING	5
ASIAN EFL JOURNAL	4
JOURNAL OF COMPUTER ASSISTED LEARNING	4
LECTURE NOTES OF THE INSTITUTE FOR COMPUTER SCIENCES, SOCIAL-INFORMATICS AND TELECOMMUNICATIONS ENGINEERING, LNICST	4
PROCEEDINGS - FRONTIERS IN EDUCATION CONFERENCE, FIE	4
2020 INTERNATIONAL WIRELESS COMMUNICATIONS AND MOBILE COMPUTING, IWCMC 2020	3

5.1 Annual scientific production

Figure 6 depicts the yearly scientific output in the domain of (TAELT) during a substantial timeframe. Upon conducting a thorough examination of the data, intriguing trends and patterns in the annual article output have been identified. During the period spanning from the early 1980s to the late 1990s, there was a consistent but relatively modest quantity of articles, occasionally experiencing variations. However, there was a noticeable rise in output between the late 1990s and early 2000s, indicating a growing interest in the integration of technology and language education during this period.

Between 2000 and 2010, there was a consistent increase in output, with a particularly significant upswing observed in the years 2009 and 2010. The increase in question can be ascribed to the swift progressions in digital technology and its incorporation into educational methodologies, which has prompted scholars to investigate their potential effects on language acquisition. The ensuing years, spanning from 2011 to 2016, exhibit a comparatively consistent output rate, characterized by negligible variations. Nevertheless, it is worth noting that there was a significant rise in productivity in the years 2017 and 2018. This indicates a surge in research endeavors and a greater emphasis on technology advancements in the field of language instruction during that specific timeframe.

The period from 2019 to 2023 saw a stable and moderate level of article production, reaching its highest point in 2020. This increase may have been affected by the COVID-19 epidemic and the subsequent transition to remote learning and digital education. In general, the data indicates an increasing interest and emphasis on (TAELT) over time, highlighting the significance of this area in current educational research and implementation.
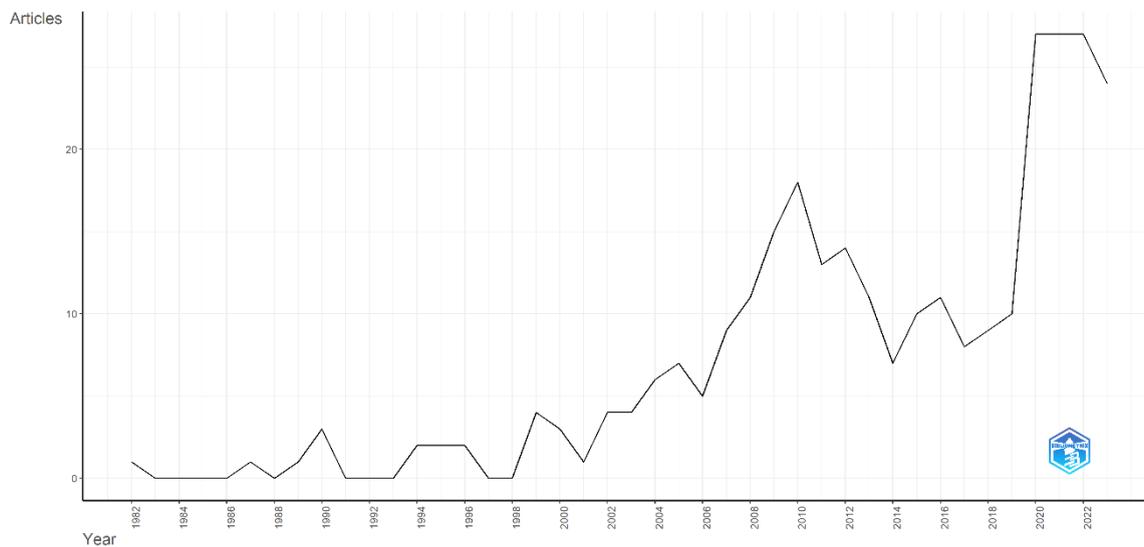

Fig. 6. Annual scientific production

5.2 Average Citations per Year

The table provided displays the mean number of citations per annum for scholarly works in the domain of (TAELT), spanning various years. The examination of this dataset enables us to identify and comprehend the trends and patterns pertaining to the influence of these articles as time progresses. In the early 1980s, the average annual citation count remained comparatively low, suggesting a restricted influence of the published publications during that particular timeframe. Nevertheless, during the latter part of the 1980s and the early years of the 1990s, there is a discernible upward trend in the average annual citation count, indicating an increasing acknowledgment and influence of the research during this period.

During the latter part of the 1990s and the early years of the 2000s, there was a substantial rise observed in the mean annual citation count, which serves as an indicator of the considerable impact and influence exerted by the scholarly output disseminated during this particular timeframe. The observed increase in impact is found to be associated with the concurrent growth in article output, indicating the escalating significance and pertinence of (TAELT) in the present era. The years after 2005 to 2018 exhibit varying patterns in the average annual citation count, wherein certain years have greater influence compared to others. The observed heterogeneity can be attributed to the wide range of issues investigated and the various levels of importance assigned to the research contributions during this time period.

In the period from 2019 to 2023, there is a varied trend observed in the average annual citation count, with certain years demonstrating a comparatively higher level of influence, while others displaying a decrease. The observed variability could perhaps serve as an indication of the progressive characteristics of the discipline and the shifting dynamics within the research environment. In general, the data suggests a rising mean impact of articles in the domain of (TAELT), underscoring the escalating significance and sway of this study topic within the scholarly community.
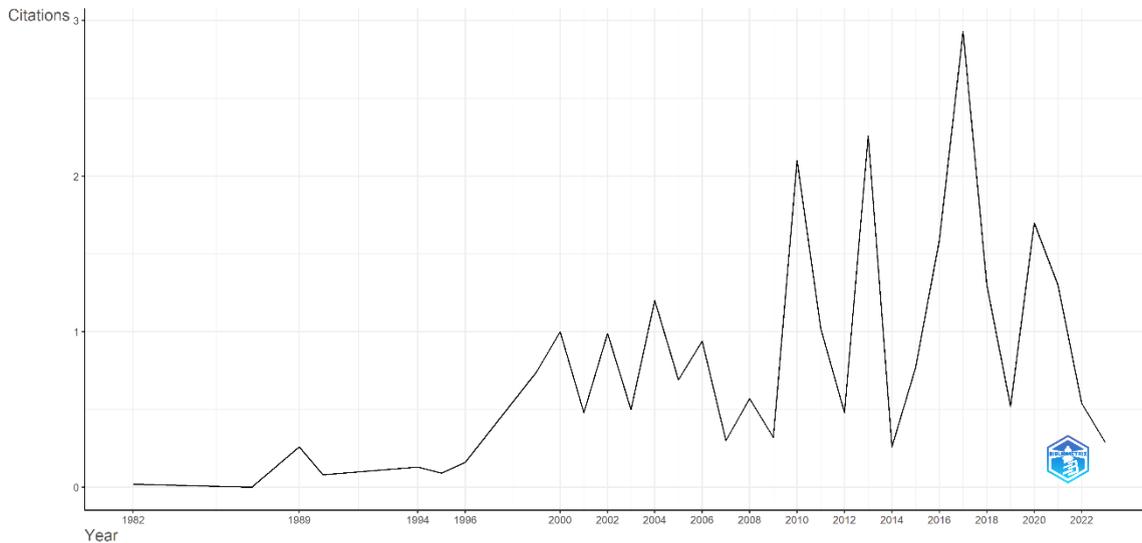

Fig. 7. Average Citations per Year

5.3 Most frequent word

Examining the prevalent words and phrases in the realm of (TAELT) yields significant observations regarding the central areas of emphasis and the fundamental research topics within this subject.

The visual representation known as Figure 8 depicts a word cloud, which serves to graphically portray the relative importance of different terms. In this representation, the size of each term inside the word cloud corresponds to its frequency. Significantly, the word cloud prominently features phrases such as "teaching," "students," "computer software," and "e-learning," suggesting their significant presence and importance in the discourse and scholarly papers. Furthermore, Figure 9 presents an overview of the most commonly occurring words and their corresponding frequencies. In the realm of (TAELT), the term "teaching" emerges as the prevailing and frequently employed concept, underscoring its fundamental significance. The term "students" is widely utilized, indicating a notable emphasis on the impact of technology interventions on the scholastic accomplishments of students.

Furthermore, the utilization of terms such as "computer software," "e-learning," and "computer-aided instruction" highlights the profound influence of technology on the advancement and execution of modern educational approaches. The utilization of terms such as "education," "engineering education," and "English teaching" serves to emphasize the interdisciplinary nature of this field, as it incorporates elements from the realms of education, engineering, and linguistics. Furthermore, the increasing usage of terminology such as "information technology," "artificial intelligence," and "computer science" highlights the expanding impact of technical breakthroughs and innovations in transforming the field of language teaching. The aforementioned phrases denote the progressive amalgamation of technology and digital tools within the framework and execution of educational curricula and learning systems. In brief, the examination of the most prevalent words and terms reveals the multifaceted character of (TAELT), underscoring its convergence with various fields of study and its dependence on sophisticated technological interventions to augment instructional and educational methodologies[13].

Fig. 8. Word cloud

Fig. 9. Most frequent words

5.4 Most Global Cited Documents

The analysis of the most often referenced publications in the field of (TAELT) provides insight into the influential works that have had a substantial impact on research and practices in this area. These seminal articles have received significant recognition and citations, indicating their significant influence on the academic conversation within the discipline. Figure 10 presents the data regarding the total citations, citations per year, and normalized citations for each of the most highly cited papers globally. The scholarly article written by [14] has garnered significant attention, as evidenced by its considerable citation count of 400, leading to an average of 28.57 citations each year. The aforementioned publication was published in the year 2010. The study cited above has significantly influenced the discussion on the integration of technology into educational approaches, providing substantial proof of its widespread recognition and influence. The study undertaken by [15] has garnered much acclaim, highlighting its importance and impact on the discourse surrounding (TAELT) and the welfare of human resources.

Furthermore, the academic contributions provided by [5], [16] , and [17] , as indicated by their respective citation counts of 75, 71, and 65, highlight the substantial influence of their research in the discipline. The scholarly publications produced by [5]in 2002 and 2004 have exhibited substantial effect, as evidenced by their enduring impact and consistent citation rates. The academic works authored by [18], [19], and [20]have made a significant influence on the current corpus of scholarly literature. The study findings and insightful contributions of the researchers have significantly impacted the trajectory of future research efforts in the field. Typically, scholarly articles that have the highest rates of global citations

focus on the importance of technology interventions in the fields of education and language acquisition, and their impact on various parts of the educational sphere. The aforementioned academic publications have provided crucial insights and recommendations for continued exploration and progress in the realm of (TAELT).
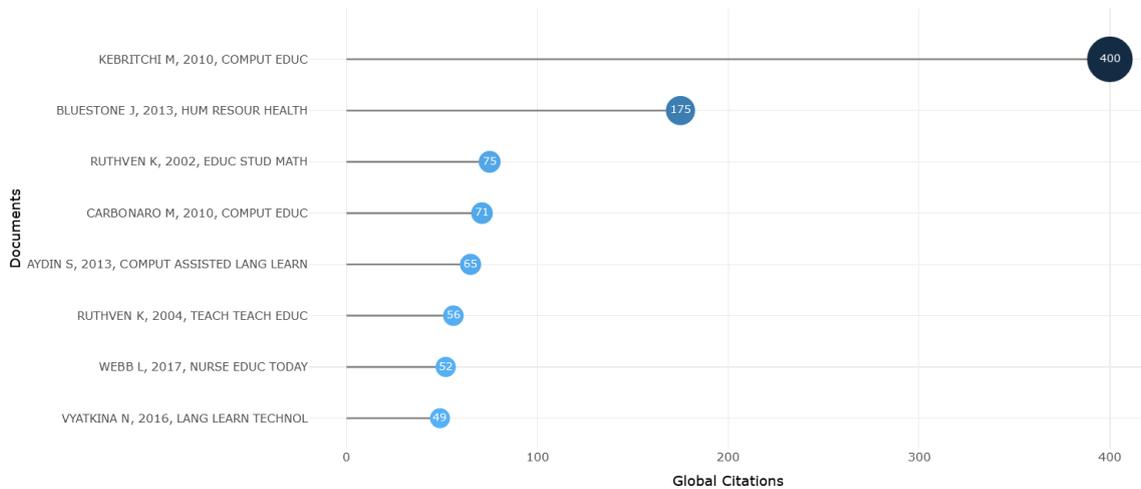

Fig. 10. Most Global Cited Documents

6. DISCUSSION

The present study has undertaken a thorough bibliometric analysis, yielding several significant findings that provide insights into the current status and trends of (TAELT). The examination of the writers' body of work over a period of time reveals a noteworthy surge in research productivity, particularly in more recent times. The observed expansion is in line with the significant increase in the quantity of published publications, as indicated in the part pertaining to yearly scientific output. Furthermore, the sustained and consistent average citation rates each year, as illustrated in the section pertaining to average citations per year, emphasize the ongoing influence and significance of the research conducted within this particular field.

Via an examination of the most pertinent sources, the prevailing platforms and publications via which research findings are being disseminated are identified. Significantly, the focus on well-established journals such as Computers and Education, ACM International Conference Proceeding Series, and the International Journal of Emerging Technologies in Learning underscores the main channels via which scholars make contributions and participate in the academic dialogue. Moreover, the examination of the most often referenced papers on a global scale underscores the pivotal contributions and prominent publications that have profoundly influenced the direction of scholarly inquiry in this particular domain. The persistent effect and continuous relevance of specific articles, such as those authored by [14] and [15], are highlighted by their high citation rates, which are noteworthy in the research community.

Moreover, the examination of the thematic map yields significant observations regarding the predominant themes and subjects that govern the present-day dialogue surrounding (TAELT). The interrelationships among several theme clusters, such as e-learning, English language, corpus-based research, and artificial intelligence, underscore the multifaceted character of research in this domain and the wide range of specific topics of interest that together contribute to its progress. The results of this bibliometric analysis highlight the fluid and progressive characteristics of research in (TAELT). The aforementioned statement underscores the growing importance of digital technology and data-driven methodologies in improving language learning results. It also emphasizes the crucial role of interdisciplinary collaboration in influencing the future direction of this particular domain.

The consequences of the bibliometric analysis conducted in this study have significant significance for both research and practice in the field of (TAELT). The significant increase in research output, as emphasized in the section on annual scientific production, demonstrates the growing significance of (TAELT) in the field of education. This implies the necessity for ongoing investment in research and development to tackle growing difficulties and fully exploit the potential of technology in the field of English language education. The process of identifying significant sources and extensively cited documents, as illustrated in the sections on the most pertinent sources and the most globally cited documents, can assist researchers in determining suitable platforms for disseminating their work and identifying influential works to draw

upon or reference in their research endeavors. This has the potential to enhance the coherence of the current knowledge base and promote the sharing of influential research findings throughout the (TAELT) community.

The wide range of interconnected subjects that are prominent within the (TAELT) study domain, such as e-learning, the English language, and artificial intelligence, highlight the interdisciplinary character of (TAELT). The aforementioned statement underscores the need of embracing a comprehensive methodology that incorporates diverse technical resources and pedagogical techniques in order to augment the outcomes of English language acquisition. The thematic clusters that have been found can serve as a valuable resource for educators and curriculum creators, providing guidance in the development of new and impactful teaching approaches that effectively incorporate technology into language learning. Furthermore, this can provide valuable insights for designing customized professional development initiatives aimed at equipping educators with the essential competencies and expertise required to proficiently utilize technology within the context of language acquisition.

The aforementioned consequences underscore the necessity of adopting a collaborative and multidisciplinary approach in both the research and practice of (TAELT). The utilization of the findings from this bibliometric analysis has the potential to facilitate a more thorough and cohesive strategy towards (TAELT). This, in turn, can lead to the progression and improvement of instructional methodologies and the achievement of desired learning outcomes among students in this field. The present bibliometric analysis offers useful insights into the field of (TAELT). However, it is crucial to realize certain limitations that could potentially affect the breadth and applicability of the results. The main constraint resides in the dependence on quantitative data, which may not comprehensively encompass the qualitative intricacies of the research terrain. Moreover, the utilization of precise databases and search parameters may have resulted in the omission of pertinent papers, thereby constraining the comprehensiveness of the research.

It is conceivable that the analysis's prioritization of specific keywords and concepts may have overlooked emerging or specialized topics that hold relevance within the (TAELT) domain. This underscores the importance of conducting thorough searches that encompass a broader range of terms and topics in order to have a more comprehensive grasp of the field. Moreover, the investigation primarily concentrated on the field of English language education, perhaps neglecting the importance of other languages and their interaction with technology within the context of education. Moreover, the lack of a comprehensive examination of the substance of the recognized publications restricts the extent to which we can comprehend the specific methods, educational approaches, and technological resources utilized in research on (TAELT). Future research endeavors may be enhanced by the inclusion of qualitative assessments in conjunction with quantitative analysis. This approach would offer a more comprehensive comprehension of the practical consequences of technology integration in the field of English language instruction.

Further investigation is warranted to examine the dynamic patterns and progressions in educational technology, taking into account the swift transformations in the technological domain. This entails the analysis of the effects of emerging technologies, such as virtual reality, artificial intelligence, and machine learning, on the process of English language acquisition and pedagogy. Furthermore, conducting comparative research in various educational contexts and settings can provide useful insights into the distinct requirements and difficulties associated with (TAELT) across different populations and areas. Longitudinal studies that monitor the progression of research on (TAELT) and its long-term effects can offer a more comprehensive comprehension of the trajectory and prospective advancements in this domain, considering the dynamic nature of technology and education. The utilization of systematic reviews and meta-analyses to amalgamate the outcomes of diverse studies might additionally expedite the formulation of evidence-based optimal approaches and recommendations for the integration of technology in the field of English language instruction.

7. CONCLUSION

This study of bibliometric analysis offers a complete overview of the trends and dynamics observed in the domain of (TAELT). By employing a range of statistical indicators, such as tracking author productivity over time, calculating average citations per year, and identifying the most frequently used keywords, this analysis provides valuable insights into the changing landscape of research in the field of (TAELT) and the prevailing themes within this area. The results highlight the growing academic attention towards utilizing technology for language education, namely in the realm of e-learning and computer-assisted instruction. The outcomes of this study underscore the importance of incorporating technology into language teaching and emphasize the necessity for ongoing research and innovation in this domain. Furthermore, it is important to acknowledge the constraints of the study and propose recommendations for future research, which underscore the possibility of conducting more comprehensive inquiries into the practical implementations of (TAELT) within various educational settings.

Data Source

The bibliographic information included in this scholarly article was acquired from a publicly accessible BibTeX (.bib) file. The dataset was obtained from the GitHub repository. The dataset encompasses bibliographic data pertaining to scholarly articles and conference papers in the domain of (TAELT). The data's open accessibility facilitates transparency, replicability, and verification of the study reported in this research article.

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Conflicts Of Interest

The authors affirm the absence of any conflicts of interest in relation to this research.

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