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Bibliometric Analysis of the Deep Learning Approach in Teaching the English Language

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ABSTRACT

This bibliometric analysis examines the evolving and swiftly growing domain of research on the implementation of deep learning methodologies in English language instruction. The ongoing transformation of the educational landscape by artificial intelligence (AI) has sparked significant interest in incorporating deep learning techniques among researchers and educators seeking to enhance language learning outcomes. This study utilises a selected dataset of 196 peer-reviewed articles published from 2019 to 2023, showcasing the most recent advancements in this interdisciplinary field. This

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global viewpoint highlights the increasing acknowledgement of deep learning's capacity to customise education, automate evaluation, and enhance communicative proficiency among English language learners. Unlike conventional machine learning techniques, deep learning provides superior skills in natural language processing, speech pattern recognition, and adaptive feedback generation, which are widely utilised in language teaching settings. This review situates itself at the intersection of applied linguistics, computer science, and educational technology, aiming to provide an in-depth understanding of how deep learning is transforming English teaching approaches. The study enhances understanding of the field's evolution by identifying research patterns, prominent authors, significant publication locations, and funding trends. Moreover, it highlights domains that are yet inadequately examined, encouraging further investigation and creativity in the integration of intelligent systems into English language instruction.

Keywords: English Language Teaching; Deep Learning; Bibliometric Analysis; Web of Science; Citation Analysis

1. Introduction

Deep learning is a subset of machine learning that utilises artificial neural networks with numerous layers to represent intricate patterns in extensive datasets, allowing systems to learn and improve autonomously without explicit programming[1]. This technology has emerged as a fundamental element of advancement in various fields. Deep learning algorithms in healthcare have exhibited significant accuracy in medical image interpretation, disease prognosis, and patient outcome prediction[2,3]. In social and cultural domains, it facilitates real-time translation, speech recognition, and tailored content distribution, thereby transforming user experiences in applications such as YouTube, Spotify, and Google Translate[4]. In the industrial sector, deep learning improves efficiency via intelligent automation, predictive maintenance, and quality assurance systems[5].

Deep learning is becoming increasingly important in education by facilitating intelligent tutoring systems, adaptive learning platforms, and automated essay grading, all of which enhance and personalise the learning experience[6]. In the realm of English language education, deep learning enables tools like real-time speech-to-text converters, grammar-checking engines, and AI-assisted feedback systems that enhance communication skills and promote self-regulated learning[7]. Therefore, instead of confining its educational significance, it is crucial to contextualise deep learning within a wider digital transition affecting many knowledge systems. The use of ICT in English instruction exemplifies the intersection of linguistic proficiency and technical adeptness—an indispensable dualism in contemporary education.

In the field of education, the term "deep learning technology" refers not only to the computational models but also to their application in the development of intelligent tutoring systems, adaptive learning environments, automated assessment tools, and personalised educational experiences. A student's progress may be monitored, learning behaviours can be analysed, performance can be predicted, and quick feedback can be provided via these systems. Deep learning enables teachers to make informed judgments based on data and provides students with individualised assistance tailored to their specific needs and capabilities.

In addition, from a pedagogical point of view, the phrase "deep learning" (which should not be confused with the technical term) also refers to the level of cognitive engagement that is achieved by pushing pupils to analyse, synthesise, and evaluate knowledge rather than simply memorising it. The combination of deep learning as an artificial intelligence technology and deep learning as an educational objective creates prospects that have the potential to change how individuals learn and teach in the modern era.

The phrase "deep learning" (DL) was first introduced by American academics F. Marton and R. Saljo in their 1976 study, "On Qualitative Difference in Learning: Outcome and Process"[8]. In an experiment designed to help schoolchildren improve their reading skills, the researchers first proposed surface and deep learning concepts. Deep learning aims to understand the article's concept and scholarly meaning. Other academics, such as Ramsden[9], Evans and Honour[10], and Biggs and Collis[11], subsequently refined their theories in their studies. Furthermore, scientists from the American Research Institute and Huberman stated that DL refers to a thorough understanding of precision; this method has helped solve appropriate problems in humanitarianism

and other sciences[12]. Asian researchers have recently conducted research in the field of deep learning (DL). He Ling and Li Jiahou (2005) discovered for the first time that Chinese specialists required DL in order to apply their learned material to situations outside of the classroom[13]. According to Cui Yunhuo (2017), deep learning is a process in which pupils demonstrate high input, high cognitive ability, and meaningful engagement in the intricate learning environment that teachers have constructed[14].

In recent years, there has been an increase in academic interest in utilising deep learning approaches in English Language Teaching (ELT), indicative of a broader trend towards the integration of artificial intelligence in educational environments[15]. This bibliometric study seeks to thoroughly investigate and assess the research landscape of deep learning methodologies in English Language Teaching (ELT) by scrutinising a collection of 196 articles sourced from the Web of Science database. The chosen articles, published between 2019 and 2023, encompass a diverse array of international studies, providing an extensive overview of contemporary research trends, significant contributions, and emerging issues[16].

As educational approaches evolve in response to technological advancements, understanding the historical and current research trends in this field is crucial for educators, researchers, and policymakers. This bibliometric analysis provides a comprehensive overview of the impact of deep learning on English language training, identifying potential avenues for future research and practical applications.

2. Methodology

2.1. Research Methodology and Data Origin

An approach known as bibliometrics was employed in this work to analyse global research trends regarding the application of deep learning technology in English language training (**Figure 1**). The Core Collection of the Web of Science (WoS) was chosen as the data source due to its high-quality, peer-reviewed content and the universal recognition it has received within the academic community. Through the utilisation of various keyword combinations, including "deep learning," "teaching English," and other relevant terms, a total of 196 articles that were published between the years 2019 and 2023 were discovered. To limit the dataset to the specified disciplines of Education, Linguistics, Psychology, Information Science, Computer Science, and Engineering, filters were implemented.

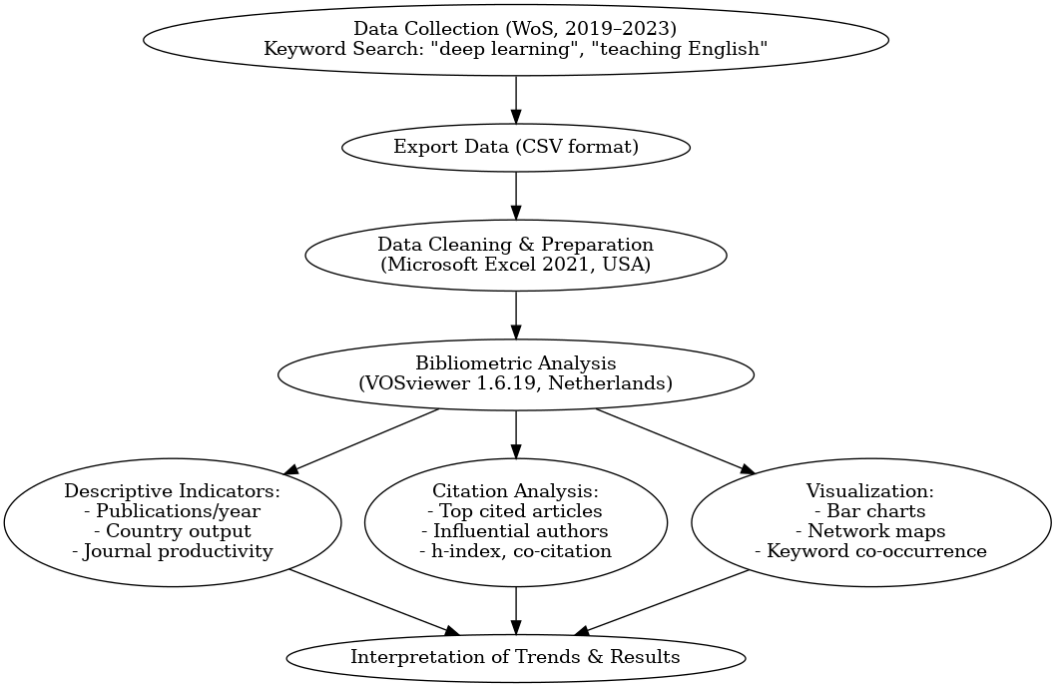

Figure 1. Flowchart of the Methodology.

2.2. Country Selection Rationale

The nations included in this research are China, Ukraine, Spain, Russia, Australia, Japan, France, the Czech Republic, and Saudi Arabia. These countries were chosen because they have a significant number of publications that are related to the dataset included in them. In addition, these countries were at the forefront of adopting educational technology connected to artificial intelligence and consistently displayed a high research output over the defined period.

2.3. Data Extraction and Instruments

The bibliographic data were exported from WoS in CSV format and then processed using Microsoft Excel 2021 (USA) for initial cleaning and organisation. VOSviewer version 1.6.19, developed by Leiden University in the Netherlands, was used for advanced network analysis and visualisation. With the use of these tools, it was possible to recognise patterns, trends, and connections between authors, institutions, keywords, and countries.

2.4. Employed Bibliometric Indicators

To ensure methodological rigour, this study employed both descriptive and citation-based bibliometric indicators, following the best practices outlined in Donthu et al.[17], Aria and Cuccurullo[18], and Zupic and Čater[19].

We used two primary groups of indicators, which are as follows:

A. Indicators of Descriptive Bibliometric Performance
- The number of publications that are produced each year
- The geographical distribution of research outputs
- The most productive journals and document kinds
- Institutional and national connections
- The most often used keywords and research topics

B. Indicators Based on Citations
- The total number of citations for each publication
- The most frequently referenced papers and authors
- Author output, as measured by the number of publications
- Co-authorship and institutional collaboration with other organisations
- Analysis of co-occurrences of several keywords and co-citations

Values of the h-index (where they are available)

Not only are these indicators in line with well-established bibliometric standards, but they were also used to determine which contributions have had the most significant impact on the area.

Inclusion and Exclusion Criteria

The following are the criteria that were used to exclude candidates:

1. Articles that have abstracts written in English but complete contents written in other languages
2. Research that is entirely unrelated to the field of study
3. less clear Keywords (for example, “resistance” and “stability”)
4. Publications that did not have a DOI, which impaired the ability to trace

3. Results

3.1. Published Papers and Publication Types on the Deep Learning Approach in Teaching the English Language

An analysis of annual publication and citation trends led to the development of a deep learning approach to teaching the English language in education. With 196 articles published between 2019 and 2023, the research based on a deep learning approach in teaching English has been published in 64 nations worldwide (**Figure 2**). The three developmental phases of scientific articles are as follows: the introduction phase, which shows a minor decreasing trend from 2019 to 2020; the period of sharp decline from 2021 to 2022; and the period of significant increase from 2022 to 2023.

Introduction: This first period comprises 89 publications, accounting for 45%. In 2020, there were 41 publications, down from 48 at the beginning. After this, there was a 7-document decline.

A period of dramatic drop: Three-quarters of the total, or 68 documents, come from this period. Although the number of publications decreased by 28 in 2022, 40 papers were published on deep learning in English language instruction. The period of noteworthy rise: There are 39 documents in this final period, accounting for 19.89% of the total. Throughout the previous four years, 2023 saw the most significant number of publications, marking a steady increase in the discipline. It has been noted that the deep learning approach

to teaching English beyond 2022 has not made significant advancements. Although there is an increasing focus on language competency, there has not been much progress in this area.

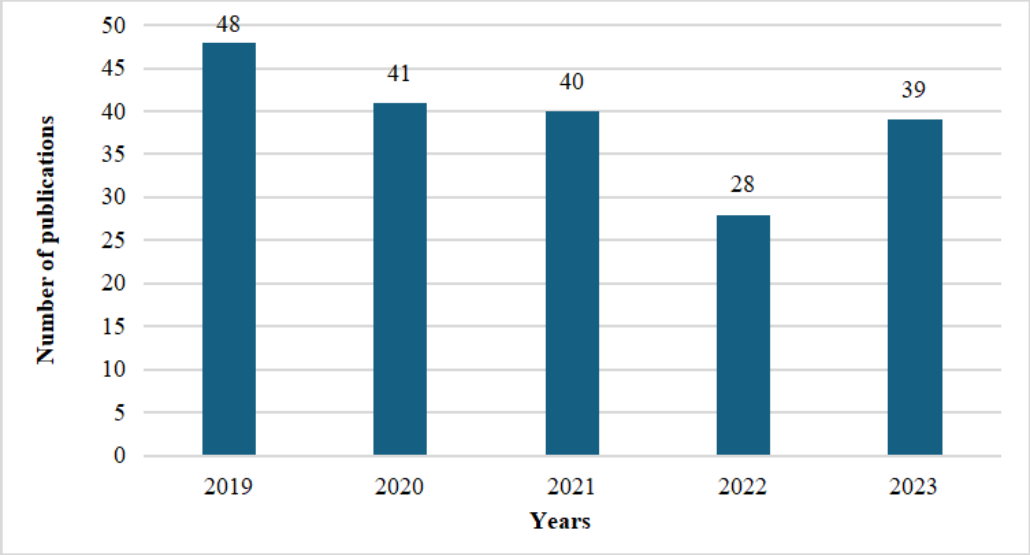

Figure 2. Number of Papers on the Deep Learning Approach in Teaching the English Language by the Year of Publication Worldwide.

Furthermore, our analysis reveals that among the 196 papers, 69% were research articles, 41% were conference proceedings, and 10% were other types of articles. Additionally, 16% of the documents were review articles, and just 2% and 1% of the papers were Book Chapters and Early Access, respectively. The residual collection comprised additional documents, including editorials, errata, notes, brief surveys, and retracted works (**Figure 3**).

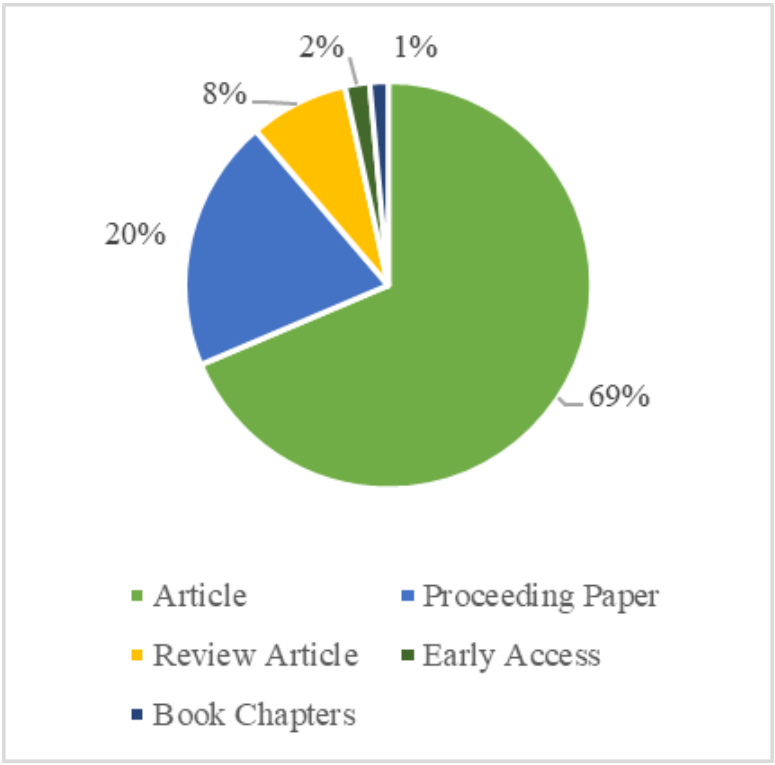

Figure 3. Publication Type on the Deep Learning Approach in Teaching English in Countries.

3.2. Top-Cited Journals on the Deep Learning Approach in Teaching the English Language Worldwide

The productivity and influence of journals have been evaluated based on the volume of papers they publish. **Figure 4** displays the premier publications that have published research on the deep learning methodology for English instruction. To examine the most-cited journals in this domain, we initially organised the source names alphabetically in the 196-document Excel file. Subsequently, we ascertained the aggregate number of citations for each journal. This approach generated a revised list of potential journal titles. **Figure 4** displays the initial ten selected journals. The Studies in Higher Education led with 121 citations, followed by the International Journal of Bilingualism and Bilingual Education with 58 citations, the Journal of Hospitality, Leisure, Sport, and Tourism Education with 18 citations, Iberica with 13 citations, and the Asia Pacific Journal of Education also with 13 citations. Furthermore, the Journal of English for Academic Purposes, the Journal of Computing in Higher Education, the Romanian Journal for Multidimensional Systems, "System," and the Journal of English for Academic Purposes each have 11 citations.

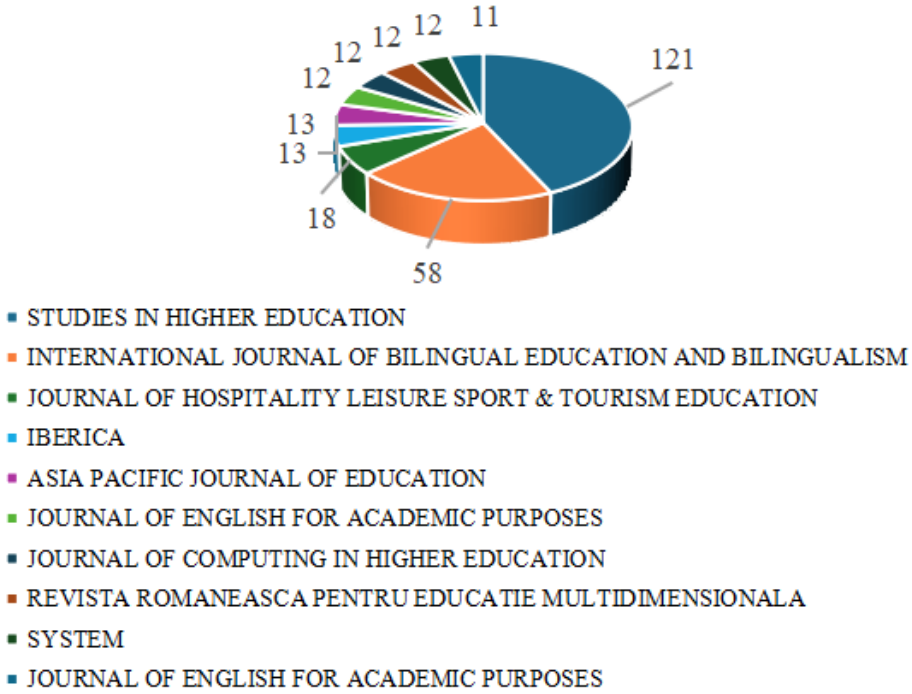

Figure 4. List of the Top-Cited Journals on the Deep Learning Approach in Teaching English Worldwide.

3.3. The world's Most Productive Writers in Research on the Topic of Deep Learning Methods for Teaching English

Our analysis indicates that from 2019 to 2023, 358 authors from 54 nations examined deep learning methodologies in English language education. **Figure 5** displays the 14 authors who have published more than three publications. Among these, Simonova I. has authored nine publications[20]. Rudneva, M. and Valeeva, N. each had eight publications[21], followed by Guslyakova, A. with 7[22], Nigmatzyanova, Y. with 5[23], and Pavlova, E. with four research papers, respectively. Moreover, the quantity of articles authored by Didenko, I. and Faizi, R.[?]. Contemporary university students are incessantly immersed in multimedia content, particularly during their leisure hours, which impacts their attention span, communication, and learning processes. As educators and scholars, it is both arduous and gratifying to design activities that sustain student motivation and concentration. Therefore, we must modify our curricula to achieve the desired outcomes, leveraging student interests while enhancing their skills and abilities.

Audiovisual translation can be advantageous in this context when incorporated into the learning process as a pedagogical tool, serving as a means to an end. The objective pursued by a consortium of academics from UCM, UNED, and UAM in creating this project was to leverage the interest of a cohort of university students in multimedia content and information and communication technology (ICT). All exercises were conducted with a clear objective: to enhance their English writing proficiency and employ specialised language pertinent to their tourism degree. The students engaged in reverse subtitling tasks before submitting written pieces at various stages of the project. The researchers collected data on the impact of reverse subtitling activities on students' writing ability enhancement and compared it to the performance of a control group. Avila-Cabrera and Rodríguez-Arancón[27], Faltynkova L. and Kostolyanova K.[28], Lezhneva E.[29], Synekop O.[30], Ulanova K. and Zhukova N. are equivalent[31]. This compilation of eminent authors includes six from Russia, one from Morocco, two from the Czech Republic, and one from Ukraine.

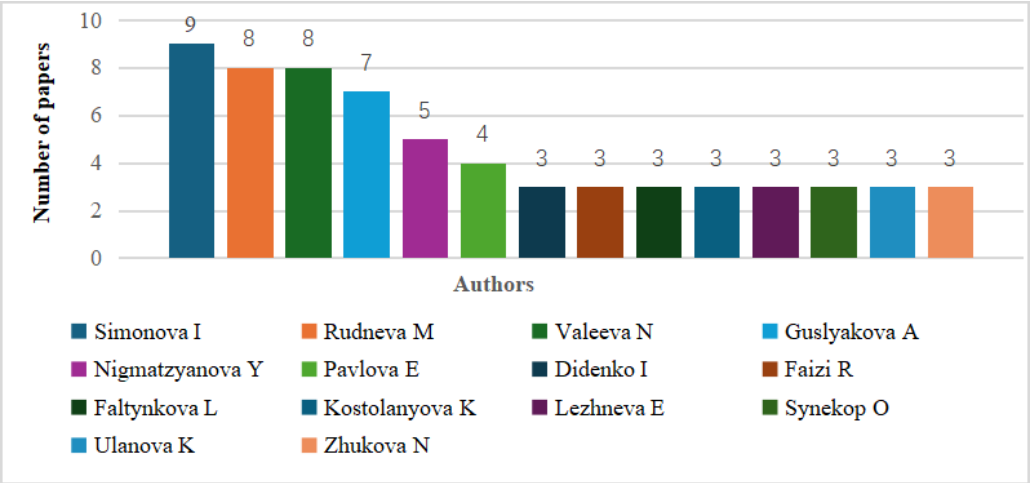

Figure 5. List of the Most Productive Writers and the Number of Papers They Published on the Topic of the Deep Learning Approach in Teaching English.

3.4. Top Productive Institutions in the World for Research on the Topic of Deep Learning Approaches in English Language Instruction Worldwide

Over five years, 214 distinct institutions collaborated to produce 303 publications on the topic. Our analysis of the publications from the leading 10 institutions in this domain determined the most productive and influential entities. Of these 10, four were in Ukraine, two in Russia, one in the Czech Republic, one in Spain, and one in Saudi Arabia. These thriving establishments accounted for approximately 26% of the overall production. The Ministry of Education and Science of Ukraine holds the top spot with 26 records, followed by Russia (16 records), Igor Sikorsky Kyiv Polytechnic Institute (12 records), the Czech Republic (10 records), and next in line is Taras Shevchenko National University of Kyiv (4 records) (**Figure 6**). Additionally, based on their ranking records, Saudi Arabian and Spanish institutions are ranked the same. Each record has four entries. At the same time, Zaporizhzhia Polytechnic National University ranked last with three publications.

3.5. Top Funding Agencies on the Deep Learning Approach to Teaching English Language Worldwide

Forty-three funding sponsors collaborated to publish 196 papers on the deep learning methodology in English language instruction between 2019 and 2023. Our examination of the publications from the top 10 financial sponsors enabled us to identify the most prolific and influential organisations in this domain. **Figure 7** illustrates that among the 15 publications we selected, two originated from the SGS Project, two from the Rudn University Program 5100, two from the Ministry of Science and Technology of Taiwan, two from the Ministry of Education and Science of the Russian Federation under the program aimed at enhancing competi-

tiveness among nations, two from the Australian Research Council, and two from the Chinese Language and Technology Centre. Additionally, the China Scholarship Council and other organisations each contributed one publication during the selected period. The remaining publications are made up of the three other financing organisations.

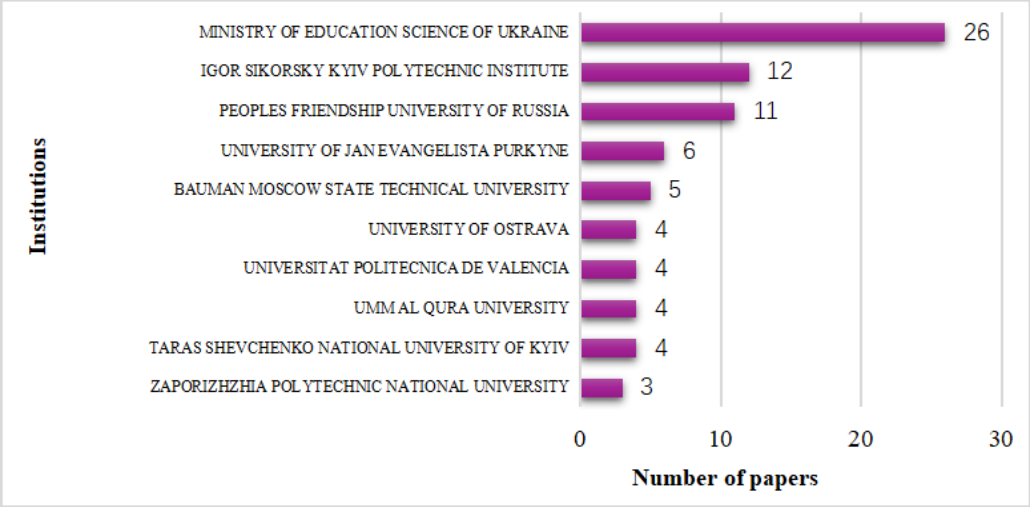

Figure 6. List of Top Institutions on the Deep Learning Approach in Teaching English Worldwide.

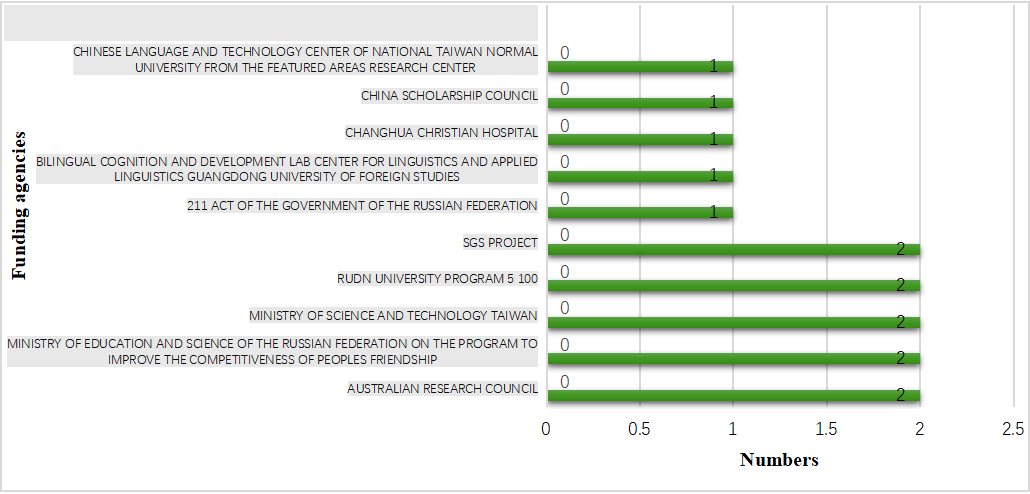

Figure 7. List the Top Funding Agencies for the Deep Learning Approach in Teaching English Worldwide.

3.6. Top Publication Journals on Deep Learning Approach in Teaching the English Language

We systematically organised 230 source names in Excel in alphabetical order to analyse the leading journals in this domain. The aggregate quantity of publications for each journal was subsequently enumerated: 230 papers published in 105 journals. **Figure 8** displays the top 10 active journals rated by productivity. The Journal of Teaching English for Specific and Academic Purposes, with 26 publications, obtained the top rating in this category. The Arab World English Journal ranked second with 17 publications, while "INTED Proceedings," "13th International Technology Education and Development Conference," and "Revista Romaneasca Pentru Educatie Multidimensionale" had 13, 9, and 7 publications, respectively. Three journals, "Information Technologies and Learning Tools" and "Iceri Proceedings," each contain six concurrent publications. Additionally, the subsequent three journals exhibit an identical number of publications: "14th International Technology Education and Development Con-

ference INTED 2020," "12th International Conference of Education Research and Innovation Icery 2019," and "12th International Conference on Innovation in Language Learning," each with four publications.

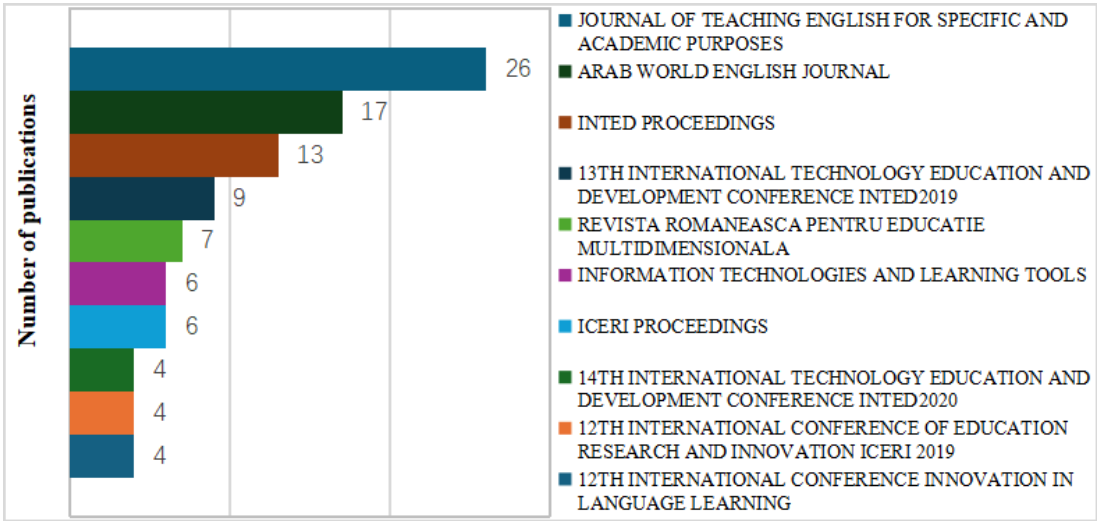

Figure 8. List of Top Publication Journals on the Deep Learning Approach in Teaching the English Language.

3.7. Leading Research Publications Globally in Deep Learning Approaches to English Language Instruction

Between 2019 and 2023, more than 196 publications have been released concerning the deep learning approach in English language instruction. The fifteen most well-known publishers using deep learning to teach English were identified through analysis. The University of Nis and the International Association of Technology Education and Development (IATED) hold the first and second positions with 26 and 22 documents, respectively, according to theresults in **Figure 9**. The Arab World English Journal, with 17 papers, comes in third place, followed by publishers Elsevier and Taylor & Francis, each with 12 articles. Springer Nature is fifth with 10 documents. Filodiritto Publisher, Walter De Gryuter, Aelfe, Centre, Higher Education Studies, Emerald Group Publishing, MDPI, National Academy of Educational Sciences, and Natl Izdatelstvo Az Buki are in last place with four papers each.

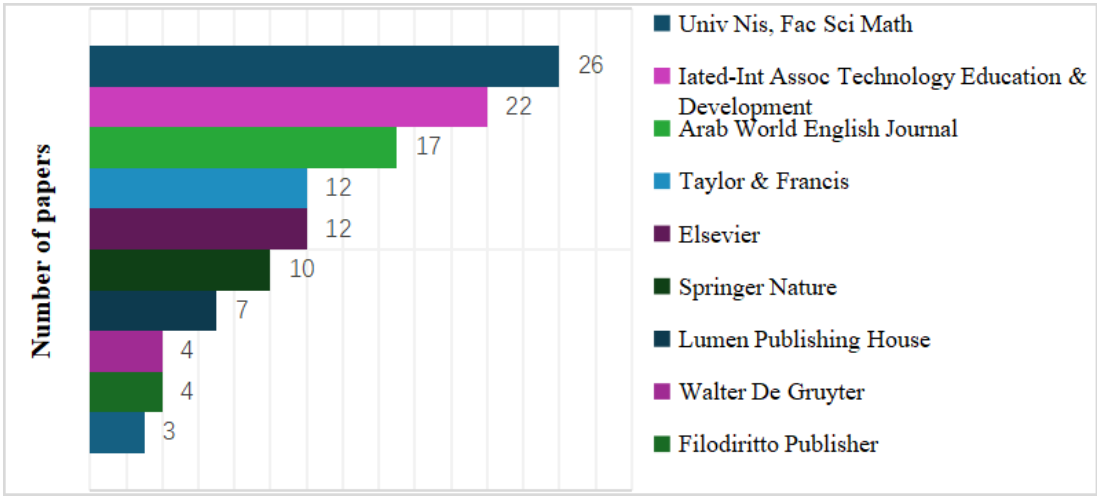

Figure 9. List of Top Publishers for a Deep Learning Approach in Teaching the English Language.

3.8. Top-Cited Papers on Deep Learning in Teaching the English Language Worldwide

Table 1 provides information on the ten most cited publications about the deep learning methodologies used worldwide in English language instruction. The ten most-cited works collectively account for 282 citations across all databases. Citation counts range from 11 (Cheng A.) to 121 (Rose H.). The mean citation count is 28.2, while the median lies at approximately 12.5, reflecting a heavily right-skewed distribution driven by the two highest-cited studies (Rose H. and Curle S.). Rose H.[32], Curle S.[33], Ho Y.[34], Avila-Cabrera J.[27], Tai TE.[35], Gaffas ZM.[36], Simonova I.[37], Karpushyna M.[38], Chan CSC.[39], and Cheng A. wrote these papers[40].

Table 1. List of Top-Cited Publications on the Deep Learning Approach in Teaching English in the World.

Article Title	Source Title	Reprint Addresses	Publisher City	PY[1]	TC[2]	TC, All Databases
What drives success in English medium-taught courses? The interplay between language proficiency, academic skills, and motivation	Studies In Higher Education	Rose, H.	Abingdon	2020	117	121
Success in English Medium Instruction in China: significant indicators and implications	International Journal of Bilingual Education and Bilingualism	Curle, S	Abingdon	2022	56	58
Communicative language teaching and English as a foreign language undergraduates' communicative competence in Tourism English	Journal of Hospitality, Leisure, Sport & Tourism Education	Ho, YYC	Oxford	2020	16	18
The use of active subtitling activities for students of Tourism to improve their English writing production	Iberica	Avila-Cabrera, JJ	Castello	2021	12	13
The role of graduate students' learning strategies in reducing their English medium instruction avoidance: the mediation effect of language anxiety	Asia Pacific Journal of Education	Tai, TE	Abingdon	2021	13	13
Students' perceptions of the impact of EGP and ESP courses on their English language development: Voices from Saudi Arabia	Journal of English for Academic Purposes	Gaffas, ZM	Amsterdam	2019	11	12
Blended approach to learning and practising English grammar with technical and foreign language university students: comparative study	Journal of Computing in Higher Education	Simonova, I,	New York	2019	11	12
Warm-Up as a Means of Fostering Target-Language Performance in a Particular English Class	Revista Romaneasca Pentru Educatie Multidimensionala	Karpushyna, M	Iasi	2019	12	12
University graduates' transition into the workplace: How they learn to use English for work and cope with language-related challenges	System	Chan, CSC	Oxford	2021	12	12
Examining the applied aspirations in the ESP genre analysis of published journal articles	Journal of English for Academic Purposes	Cheng, A	Amsterdam	2019	11	11

[1] PY – Publication year, [2] TC – Total citations

These 10 works have received 282 citations. This group includes nine research papers and one progress paper.

High-Impact Outliers. Rose H.: With 121 citations in all databases, this study on success factors in English-medium instruction more than doubles the average of the top ten.

Curle S., At 58 citations, it is the only 2022 publication in the list and the second-highest cited (**Table 2**).

Research vs. Progress Papers. Of the ten items, nine are research articles and one is a progress paper[32]. The sole progress paper is also the most cited, indicating that broad-scope, status-report style publications may have higher visibility in this area (**Table 3**).

Table 2. Yearly Trends.

Publication Year	Top-Cited Papers	Total Citations	Avg. Citations per Paper
2019	4	47	11.8
2020	2	139	69.5
2021	3	38	12.7
2022	1	58	58.0

Table 3. Publisher Locations & Journal Reach.

Publisher City	Papers	Total Citations	Avg. Citations
Abingdon	3	197	65.7
Amsterdam	2	23	11.5
Oxford	2	30	15.0
Castello	1	13	13.0
Iasi	1	12	12.0
New York	1	12	12.0

Rate of Citation Accrual. Comparing 'TC (this database)' vs. 'TC, All Databases' reveals consistent discrepancies in low-level indexing (e.g., Rose H.: 117 vs. 121; Curle S.: 56 vs. 58). The difference ranges from +2 to +4 citations, suggesting that most citations are captured across multiple indexing services.

Key Takeaways and Comparative Insights

1. Skewed Impact: A small subset of articles (Rose H., Curle S.) is driving the bulk of citations.
2. Temporal Dynamics: 2020 was a watershed year for the field. Recent work (2022) is trending upward.
3. Geographic Concentration: Abingdon-based journals are dominant.
4. Publication Type Matters: Progress-style overviews may achieve broader reach.
5. Indexing Consistency: Cross-database citation counts are closely aligned.

3.9. Top Subject Areas for the Deep Learning Approach in Teaching the English Language

Papers are categorised into several scientific topics by the Web of Science database. As illustrated in **Figure 10**, most studies on the deep learning approach to teaching English fall into eight subject areas. With 63% (154) of the total articles, the Education and Educational Research research area has the highest percentage. Meanwhile, 27% (66) are accounted for by linguistics, 4% (10) by psychology, 3% (8) by computer science, and 1% (2) by social sciences and other subjects. Two and one per cent of the total publications are in the remaining topic categories.

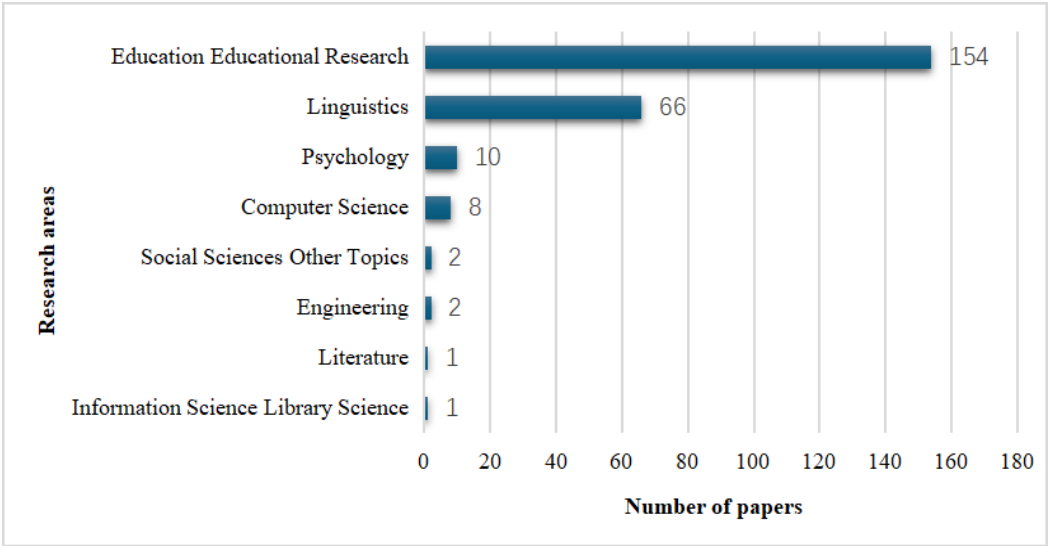

Figure 10. List of Research Areas of the Deep Learning Approach in Teaching the English Language.

3.10. Top Countries for the Deep Learning Approach in Teaching the English Language

Between 2019 and 2023, ten nations investigated the deep learning methodology in English language education and disseminated their findings. Ukraine recorded the most publications, at 31, followed by Russia with 24 and Spain with 19. The Czech Republic and Saudi Arabia produced 13 and 12 publications, respectively, whereas China had 10. Australia published nine papers, whilst Taiwan and France published seven and six papers, respectively. Japan is included in the list with five publications, positioning itself among the top 10 countries (**Figure 11**).

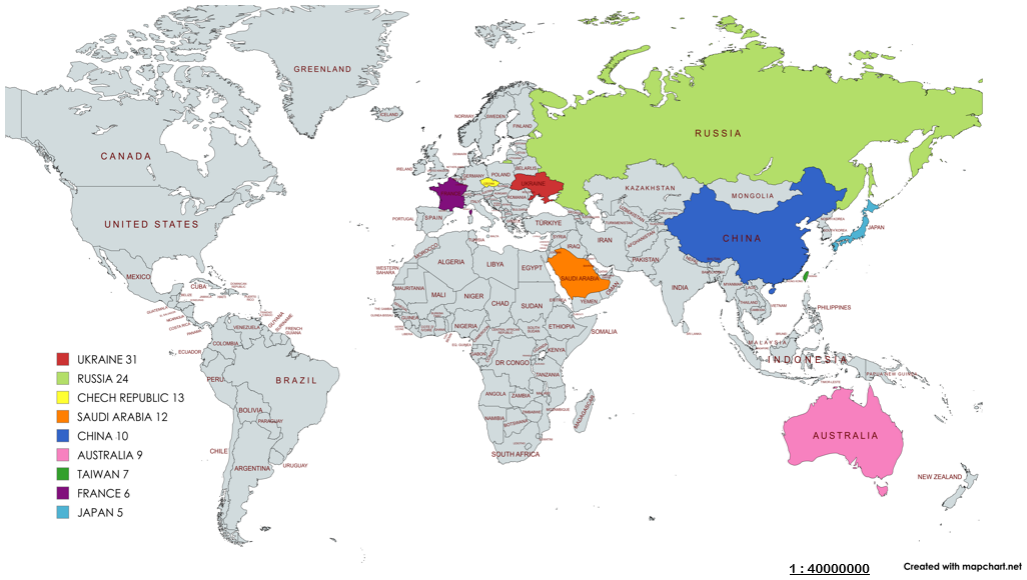

Figure 11. List of Top Countries for Deep Learning in the English Language.

3.11. Top Co-Authorships on the Deep Learning Approach in Teaching English

This high-resolution network map illustrates the co-authorship links between countries actively engaged in developing deep learning applications for English educational purposes. Each node represents a country, and the size of the node is proportional to the number of publications from that country. The degree of cooperation between nations can be assessed by examining the thickness of the connecting lines between them. Clusters are colour-coded to highlight research affiliations that are either regional or thematic. The VOSviewer software was employed to visualise bibliometric networks, with a particular focus on co-authorship in the field of deep learning applications in English language teaching (**Figure 12**). The analysis revealed:

- **Total co-authorship items**: 9
- **Total number of clusters**: 3
- **Total links**: 31
- **Total link strength**: 94

Each cluster represents a group of authors with stronger internal collaboration than external, suggesting thematic or regional research communities.

Total: 9 co-authorships across 3 clusters.

3.12. Keywords for Teaching English Using a Deep Learning Technique

A thorough examination of 296 keywords was performed to discern prevailing topic patterns in the literature regarding deep learning applications in English language education. Following the elimination of broad and low-relevance terms, 46 highly pertinent keywords were identified. The terms were illustrated through a keyword co-occurrence network created with VOSviewer. The visualisation was improved by adjusting text sizes and enhancing the arrangement to maximise clarity and interpretability.

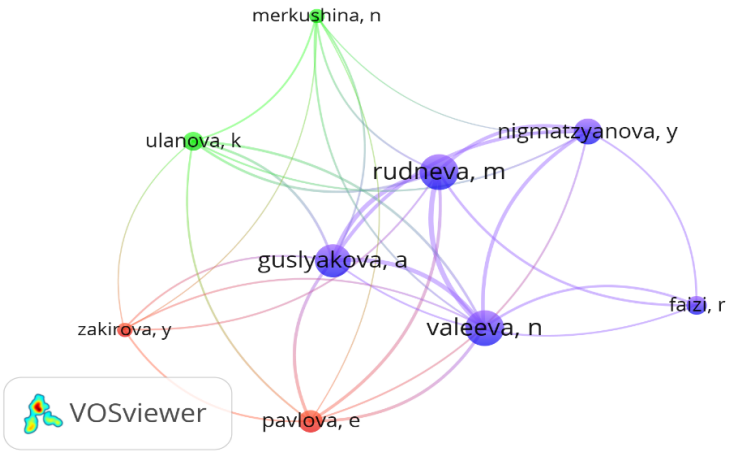

Figure 12. Structure Map of Countries' Co-Authorships in Deep Learning for Teaching English.

In the resultant network, each node signifies a keyword, with the node's size indicating its frequency of occurrence in the dataset. Connections between nodes signify co-occurrences in the same publication, implying intellectual or thematic relationships. Keywords that commonly co-occur are organised into clusters, each signifying a unified topic area within the discipline. The co-occurrence network has eight unique clusters, including the following terms:

- Cluster 1: learning English, English speaking abilities, learners, motivation, views, locations, students, university, vocabulary
- Cluster 2: critical thinking abilities, distance learning, English as a foreign language, English language learning, English language teaching, speaking skill, teachers
- Cluster 3: education, English, English teaching, English-speaking skills, language, oral English, proficiency
- Cluster 4: EFL learners, English as a foreign language, English first additional language, listening and speaking skills, pronunciation, reading, speaking
- Cluster 5: classroom, English language, learning, speaking skills, teaching, technology
- Cluster 6: analytic scoring, assessing speaking skills, holistic scoring, teaching English as a foreign language
- Cluster 7: critical thinking skill, English speaking skill
- Cluster 8: needs analysis, teaching English

The resultant network displayed 167 linkages among the keywords, with a total link strength of 218, indicating strong correlations between recurring study subjects (**Figure 13**). This network visualisation offers significant insights into the primary conceptual domains, pedagogical techniques, and learner-related characteristics that prevail in academic discussions regarding deep learning in English language instruction.

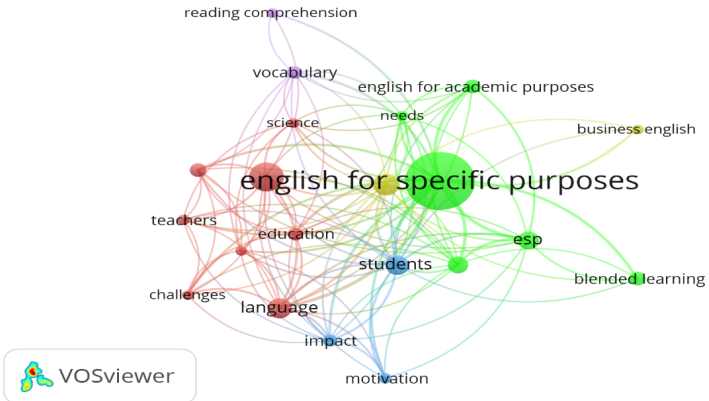

Figure 13. Keyword Co-Occurrences Analysis with at Least Three Occurrences Based on Web of Science Data Using VOS Viewer.

4. Discussion

This study utilised bibliometric data obtained from the Web of Science to investigate the current state of the art in the application of deep learning to the teaching of English as a second language. The findings offer a complete overview of the publications, authors, and institutions that have the most significant impact in this multidisciplinary field. There have been very few studies that have conducted a bibliometric analysis expressly targeting the linguistics domain, despite the growing interest in the interface of artificial intelligence and language education. In its capacity as an analytical tool, bibliometrics not only assists in identifying current research trends but also identifies productive research groups and areas of research that have not yet been thoroughly investigated [17].

The fact that research articles make up 69 per cent of the overall number of publications is evidence of the academic rigour that exists in this field. It is still the case that articles are an essential medium for scholarly communication because they provide standardised frameworks for the presentation of techniques, findings, and critical discussion. There has been a significant movement towards integrating deep learning models in English instruction, as evidenced by the increasing number of papers published over the past three years (2021–2023). These publications account for more than half (54%) of the documents that have been evaluated. According to Zawacki-Richter et al., this aligns with current global educational trends that prioritise digital transformation. This shift was particularly prompted by the Coronavirus Disease 2019 pandemic and the subsequent transition from traditional to hybrid learning settings [6].

It is interesting to note that the majority of research production is concentrated in a small number of countries that are on the cutting edge of technology and invest much in education. These countries include Saudi Arabia, China, Australia, Taiwan, France, Japan, the Czech Republic, Russia, Spain, and Ukraine. These nations were responsible for producing 69 of the 196 papers that were examined. It is possible that disparities in national investment in artificial intelligence infrastructure, university funding structures, and policy frameworks that prioritise instructional technology are to blame for this uneven distribution. For example, Saudi Arabia and China have both adopted strategic plans (such as Vision 2030 and the AI Development Plan) that support the incorporation of artificial intelligence (AI) across a variety of fields, including education [41]. During this time, countries such as Ukraine and Russia have managed to retain significant academic publishing traditions and international collaborations despite the budgetary constraints they face.

Throughout the post-Soviet reforms, the Ukrainian Ministry of Education and Science emerged as a significant contributor, which may have been the result of institutional instructions that encouraged the teaching of digital languages during this period. In a similar vein, the high output that can be attributed to RUDN University and Igor Sikorsky Kyiv Polytechnic Institute might be connected to their participation in international research initiatives and Erasmus+ programs. Indicative of the presence of strong research leadership and access to foreign funding sources is the dominance of these institutions, which account for sixty per cent of the top-affiliated articles.

Organisations such as the SGS Project, RUDN University, the Ministry of Science and Technology in Taiwan, and the Australian Research Council topped the list in terms of financial sponsorship. Each of these organisations supported many high-impact projects. The educational technology sector is a crucial innovation area that these agencies prioritise, and they frequently award funds for applications that involve high technology and interdisciplinary collaboration. Considering the relatively low number of total financial sponsors, it is clear that a financing gap exists that could potentially impede continued development in underrepresented regions [32]. It is crucial to make targeted investments in capacity building and collaborative international grants to achieve a balance between these two forms of imbalance.

Regarding the number of papers published, the Journal of Teaching English for Specific and Academic Purposes and the Arab World English Journal were the ones that published the most significantly. Studies in Higher Education, on the other hand, received the most significant number of citations, which suggests that the correlation between citation impact and publication frequency is not always the case. An example of this is Rose [32], who produced a single publication that garnered a substantial number of citations. This demonstrates that individual contributions can significantly alter scholarly discourse. Simonova, I., Rudneva, M., and Valeeva, N. [42], who are considered the most prolific authors, contributed

approximately 39% of the top articles. On the other hand, authors such as Rose H. and Curle S. were found to have the highest citation counts, suggesting a distinction between production and scholarly influence. A small number of writers tend to earn a disproportionate amount of citations. This analysis reveals that the advent of deep learning in English education is not merely a technological transition but rather a systemic transformation promoted by policy, institutional culture, and international collaboration. To further understand how cultural, linguistic, and pedagogical variables influence innovative technologies and approaches in various educational settings, further research is needed. There are a few areas that require additional examination. Although the incorporation of deep learning into English Language Teaching (ELT) shows promise, there are still obstacles associated with its accessibility, scalability, and pedagogical effectiveness. Exploring longitudinal studies, cross-cultural applications, and combining deep learning with other emerging technologies are some ways future research can address these challenges.

In general, this bibliometric study provides a solid foundation for understanding the current state of deep learning in English language instruction, as well as its future directions. Education professionals, academics, and policymakers can gain insights into the revolutionary potential of tools driven by artificial intelligence. These findings highlight the importance of ongoing research and innovation to fully capitalise on the advantages that deep learning can offer in the field of language instruction.

5. Conclusions

This bibliometric analysis aimed to provide a comprehensive overview of the research landscape on the implementation of deep learning methodologies in English Language Teaching (ELT) from 2019 to 2023. The study analysed 196 peer-reviewed publications from the Web of Science Core Collection, revealing significant research trends, important authors, and developing topic areas within this interdisciplinary domain. The findings indicate a significant rise in academic engagement, demonstrating the increasing worldwide interest in utilising deep learning technologies to improve multiple aspects of English language instruction. This increase in papers indicates a developing field, encompassing personalised learning, adaptive assessment, intelligent tutoring systems, and automated feedback mechanisms. These innovations are transforming educational practices and promoting more learner-centred and data-driven instructional settings. The study identified prominent authors, institutions, and nations that have made significant contributions to the progress of this field, highlighting the transnational and collaborative nature of research in ELT and educational artificial intelligence. Moreover, the data revealed a distinct progression in research emphasis—from theoretical investigations to the practical implementation and assessment of deep learning techniques in genuine educational environments. This bibliometric analysis not only maps the current state of research but also underscores the transformative potential of deep learning in language instruction. As interest expands, forthcoming research should prioritise longitudinal studies, ethical considerations, and application scalability to guarantee that deep learning technologies significantly enhance inclusive, practical, and contextually relevant English language instruction.

Author Contributions

Conceptualization, J.A.; methodology, J.A.; investigation, M.R. and S.J.; formal analysis, D.A. and M.G.; data curation, D.A.; writing—original draft preparation, J.A., S.J. and D.A.; writing—review & editing, M.G., S.A. and N.J.; visualization, M.R., S.A. and N.J.; supervision, J.A.; project administration, J.A. All authors have read and agreed to the published version of the manuscript.

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Not Applicable.

Data Availability Statement

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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