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## Bibliometric Analysis of the Studies on Web-Based Language Teaching

**Mesut Bulut**   
Atatürk University, Turkiye

**Ayhan Bulut**   
Aydın Adnan Menderes University, Turkiye

**Abdullatif Kaban**   
Atatürk University, Turkiye

### To cite this article:

Bulut, M., Bulut, A., & Kaban, A. (2023). Bibliometric analysis of the studies on web-based language teaching. *International Journal of Technology in Education (IJTE)*, 6(3), 455-474. <https://doi.org/10.46328/ijte.543>

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Mesut Bulut, Ayhan Bulut, Abdullatif Kaban

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### Article Info

#### Article History

Received:

08 February 2023

Accepted:

10 June 2023

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#### Keywords

Language teaching

Web-based education

Bibliometric analysis

### Abstract

This study aims to build a bibliometric mapping of research on web-based language instruction. By identifying the elements of author, publication, keyword, journal, country, and citation, the bibliometric mapping approach was utilized to examine trends in web-based language instruction research from an international viewpoint. The Turkish Online Journal of Distance Education has published most of the research on the topic. According to the findings, Xie H. and Zou, D. are the most pertinent writers. The most significant university is Anadolu University. The USA leads the world in terms of total publications, co-authored publications, national publications, and cited articles. Frequently used keywords include "language," "students," "education," and "technology." The authors' cluster analysis revealed that the papers are mainly divided into 5 classes. The names of the web-based teaching methods are assigned to each group. It is anticipated that this study will significantly advance future research in web-based language instruction.

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### Introduction

In parallel with the rapid development of information and communication technologies, this situation also affects human life. Of course, it is unthinkable that the education-training system is not affected by this situation. Therefore, it has paved the way for the emergence and development of e-learning environments by transmitting information to stakeholders and different places quickly through communication technologies. Web-based distance education (WBDE) is part of e-learning environments. Web-based distance education is an educational approach that is accepted and widespread in the world. Public and private institutions, especially universities, provide educational programs through the web-based distance education (WBDE) system (Kurt & Özkan, 2014). The web-based distance education system, which eliminates the necessity of being in the same place in educational activities, dates back to the 1840s. Parallel to the developments in information and communication technologies, its importance from past to present is increasing daily.

Content quality directly affects the web-based distance education system. In addition, the methods and tools used are also crucial. This understanding of education does not rival the traditional formal education system; on the contrary, it has features that increase the quality of this education system. Suppose appropriate methods and techniques are used, healthy communication between the student and the teacher, and the instructors can have computer literacy. In that case, the web-based distance education system can be at least as effective as the formal education system (Düzakın & Yalçınkaya, 2008). With the organizations that started with the concept of

"employee training," new searches in training strategies have become inevitable with the effect of saving time and space. Therefore, "distance education" emerges as a fundamental and comprehensive approach from the past to the present. The distance education strategy is used increasingly today as an essential method with functions such as the economy and eliminating distance.

Web-based education programs are also regarded as the final stage of technology-based distance learning strategies; they are also described as a cutting-edge "distance learning" strategy that makes computer-assisted learning accessible through interactive web and web intranet methodologies and technologies (Doğan-Cebeci, 2000). Although this understanding of education is met with the concept of Web-Based Education (WTE), it can be used with many similar terms. These; are "Internet-based education, Internet-based education, computer-assisted distance education, online education" (Işık, 2013). In addition, Web-based education is also used in the literature with names such as "learning through the internet and e-learning" (Turğut & Yenilmez, 2013). Web 2.0 technologies and applications are essential in realizing web-based educational activities (Işık, 2013). It is also possible to define web-based distance education as an understanding of education that can offer interaction that other distance education types cannot offer. Students who are passive in the formal education system are actively involved in the web-based education approach as a part of educational activities (Düzakın & Yalçınkaya, 2008). Within the framework of new educational approaches, distance education students can have almost the same communication and interaction as face-to-face students. This situation results from the widespread use of information and communication technologies and the diversity of opportunities to reach this technology (Rasheed, 2007).

The functionality of the web-based distance education approach is critical for universities to be interested in this educational approach. Some misconceptions, such as seeing web-based distance education as "uploading lecture notes to the Internet," undoubtedly affect the quality of education negatively. In the web-based distance education system, evaluating and perceiving the instructor's content as "preparer and instructor" is wrong. Because the instructor is mainly in the "consulting" role in this system, therefore, the instructor; should know the system well and guide students quickly and effectively (Düzakın & Yalçınkaya, 2008). More than any other teaching method, distance education brings with it a joint effort between students and teachers that is not limited by traditional time, space, and single teacher effort (Rasheed, 2007). The rapid developments in information and communication technologies in recent years have deeply affected societies and their understanding of education. Especially the internet has been a tool for getting to know and experiencing different cultures that have essential functions in terms of communication. The internet, which functions as a mediator in various political, social, and economic situations, has reached worldwide influence (Park & Son, 2009). Teachers' attitudes and concerns about technology can affect their adapting to technology (Liu et al., 2004). Therefore, the teacher needs to be self-confident. Because a lack of self-confidence can prevent teachers from using technology in the classroom (Lam, 2000), it is also essential for teachers to be comfortable with technology in the classroom and have positive thoughts (Rakes & Casey, 2000). In today's information age, technology is developing rapidly, and education is getting its share. Technology is an indispensable element of education systems. Therefore, developments in technological fields have also been felt in education in many ways. Especially the developments in communication technologies have made it necessary to re-question and define the learning process and purpose in education.

Technological tools and equipment used in both internet applications and classroom environments have become commonplace today. Especially in recent years, language education and teaching have been made much easier by developing web-based vocabulary teaching models using web-based teaching materials in language education (Baturay et al., 2007). In the last decade, the emergence of information technology and multimedia has revolutionized language learning (Pralong, 2001). The prerequisite for web-based education, which is used extensively, especially in foreign language teaching, is a good internet connection. This strategy may be used in both lessons in autonomous learning because of the network connection. From this point of view, it can also be called an online course. It can also be used in the context of distance education. This method, also known as an online course (online education), is the current form of distance education. Web-based education came to the fore in the 2000s, when the internet and computers became widespread and were used extensively in education. It has become its current state by being developed. In particular, web-based foreign language education means using web-based applications that can be transferred to the classroom environment as a course tool (Asutay, 2021). Language, the primary transmitter of culture, which is a set of material and spiritual values, also functions as the primary communication tool. Language, a fundamental element that distinguishes humans from other living things, is unifying and integrative in terms of being social. It is also possible to define it as a synthesis that blends language, culture and thought that prepares the infrastructure of the concept of nation. Emotions and thoughts become meaningful with language and can be transferred. For this reason, from past to present, all nations or states have approached language education and teaching sensitively and have tried to develop language policies for various language education and teaching.

In the context of language policies, computer and internet-supported language education materials are used intensively today. It is an undeniable fact that interaction is significant at this point. Multimedia-supported language teaching materials provide significant convenience to students regarding visual and auditory aspects. Internet technology especially offers contemporary language teaching approaches in repeating and reinforcing what is learned in the classroom, doing additional research, and realizing self-learning. The language learning approaches implied here are different from the classical learning approaches. The place and importance of contemporary language education approaches have been revealed in studies in the literature (Baturay et al., 2009). In today's globalizing world, where information and messages are produced quickly and transmitted to desired locations, communication with technological tools (computer, internet, and satellite) has advanced. However, people still cannot experience the same level of satisfaction from communication they have had one-on-one. Therefore, the language used to convey our feelings, thoughts, and wishes is a lived process. Since it takes its source from life, it continues for generations (Çiftçınar, 2014). The use of computer-aided foreign language learning/teaching methods has been facilitated by the latest developments in science and technology.

An example is the appropriate use of the web-based learning (WBL) learning approach. Web-based learning (WBL) as a sustainable technology corresponds to well-known and successful computer and internet-assisted methods (Ainoutdinova & Ainoutdinova, 2017). Web-based learning, which emerged within the scope of web-based distance education, can also be used to promote significantly increasing cultural awareness. Students communicate directly with people from all over the world and explore exciting topics about various countries, cultures, history, politics, philosophical and religious beliefs, lifestyles, customs, and traditions. They also have

the opportunity to research items. At this point, web-based distance learning can serve as a powerful tool (Zellhofer et al., 1998). Web-based learning is a general term used to refer to computer-assisted learning. It is used in many contexts where it is critical to be clear about what one means when one speaks of "e-learning." Web-based technologies and strong internet connections provide various new opportunities for the development of educational technology (Sarica & Çavuş, 2008).

Several indicators distinguish an academic discipline from one another, including journals, conferences, and graduate programs. One of them is the presence of academic publications in prestigious citation indexes such as the Web of Science (WoS) (Arik & Arik, 2017). WoS, a respected citation index, is considered the "quality document" of scientific fields, scientific research, and researchers in international citation indexes. Therefore, it is essential to investigate the studies in this database (Şeref & Karagöz, 2019). The publications indexed in international databases such as WoS and Scopus and the number of citations to these publications are considered one of the leading indicators of scientific production (Şeref & Karagöz, 2019). Therefore, scientific journals, which are one of the main tools of the world of science and scientific exchange, play an important role in publishing the information and findings obtained as a result of scientists' scientific research, such as experiments, observations, and trips (Karagöz & Koç-Ardıç, 2019). Bibliometric analysis, which is used in the research of many scientific sources, especially journals, analyzes the features of documents such as subject, author, and year.

In bibliometric research, certain features of documents or publications are analyzed, and various findings related to scientific communication are obtained (Al & Coştur, 2007). In this context, the bibliometric analysis of the studies on "language education" within the scope of "web-based education" in the WoS database is critical in determining the studies on language education. Language is indispensable for both the individual and society. The education and teaching of the language, which is vitally essential for nations, is also important. In terms of the literature, it is vital academically to investigate the questions about what studies have been carried out on web-based language education and teaching. It is crucial, especially in today's world, where a technology-supported language education approach is widely accepted due to the situations experienced during and after the covid-19 process. Answering the questions about what kind of studies have been done and how much is done about "web-based education and language education" in the WoS database, which contains scientific studies that are accepted as "important and high-quality" worldwide. It is imperative both for the studies to be done and for those who are considering researching this subject.

In this context, this research is vital in revealing the relevant authors, journals, countries, universities, trending topics, the most cited studies, and trends in web-based language education and teaching. In this research, a bibliometric analysis of "web-based language teaching" studies in the journals listed in the WoS was made. It is intended to draw some conclusions on the authors and keywords, the nations where the study was done, the subjects, the referenced authors, and their patterns in this context. For this purpose, answers to the following questions were sought:

1. Which are the most relevant journals on web-based language training?
2. Which are the most relevant authors on web-based language training?
3. Which are the most relevant universities and countries for web-based language training?

4. What is the citation status on web-based language training?
5. What are the keywords and trending topics on web-based language training?
6. How do clusters by authors coupling take shape in studies on web-based language training?

## Method

### Research Design

The bibliometric mapping method was employed in this study to analyze the papers on web-based language teaching in terms of several characteristics. Bibliometric mapping is a spatial representation of relationships between sciences, fields, specific publications, or authors (Small, 1999). Bibliometric studies enable the identification of trends in the field by measuring various aspects of study in a specific area and analyzing the results (Kasemodel et al., 2016). Bibliometric analysis ensures that the studies, researchers, institutions, and scientific flow associated with the chosen scientific subject are followed (Martí-Parreño et al., 2016). Quantitative analysis and statistics identify publishing trends within a particular literary discipline. Bibliometric evaluation methods are used by researchers to determine the impact of a single author or to establish the relationship between two or more authors or works (Thanuskodi, 2010). The approved analysis technique includes three significant steps: research mapping, quantitative analysis, and trend and pattern analysis.

### Obtaining the Meta-data Set

In July 2022, 5697 publications were discovered as a consequence of a search of the WoS database using the query term presented in Figure 1. The document types (document types = articles), WoS category (WOS Categories = education educational research), and language (languages = English) filters yielded 1074 articles. The descriptive data from the acquired studies are also provided in Table 1.

The screenshot displays a search query in a text box: `((TS=(language)) AND TS=(learning or education or training)) AND TS=("e-learning" or "distance education" or "open education" or "web based" or "internet based")`. Below the query, it shows the results: **1,074 results from Web of Science Core Collection for:**. There are three buttons: **Analyze Results**, **Citation Report**, and **Create Alert**. Below these, the 'Refined By' section shows three filters: **Document Types: Article**, **Web of Science Categories: Education Educational Research**, and **Languages: English**.

Figure 1. WoS Search and Filtering Query

Table 1 shows that 1074 publications acquired from 86 distinct sources began in 1988 and have continued till the present. While the number of publications grows by 12.19% each year, the average citation rate per document is 10.98. The number of single-author documents in this research, which included 2341 authors, is 321. There are 2.42 co-authors per document.

Table 1. Descriptive Data of Obtained Studies

Description	Results
Timespan	1988:2022
Sources (Journals)	286
Documents	1074
Annual Growth Rate %	12,19
Average citations per doc	10,98
Authors	2341
Single-authored docs	321
Co-Authors per Doc	2,42

Figure 2 depicts the distribution of the number of studies by year. The number of publications increased between 2002 and 2008, with a significant increase in 2021.

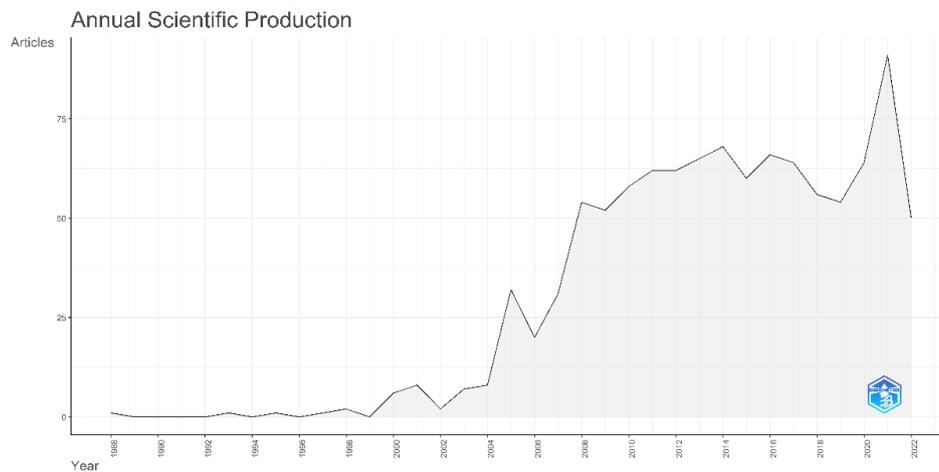


Figure 2. Yearly Distribution of the Number of Studies

### Data Analysis

The metadata data from articles about the subject published in WoS were retrieved in BibTeX file format and analyzed using the "Bibliometrix" software built for the R programming language. The Bibliometrix is a reliable, open-source tool for conducting a complete science mapping examination of the scientific literature (Aria & Cuccurullo, 2017).

### Results

#### Most Relevant Journals

According to the WoS database search and filtering, 1074 articles relevant to "web-based language teaching" were published in 286 journals (Table 1). Figure 4 depicts the "Bradford's Law" graph constructed based on the order to be acquired and the number of articles in the journals in which these articles are published. The graphic

organized the journals by the number of publications and visually represented the titles of the journals in the first group.

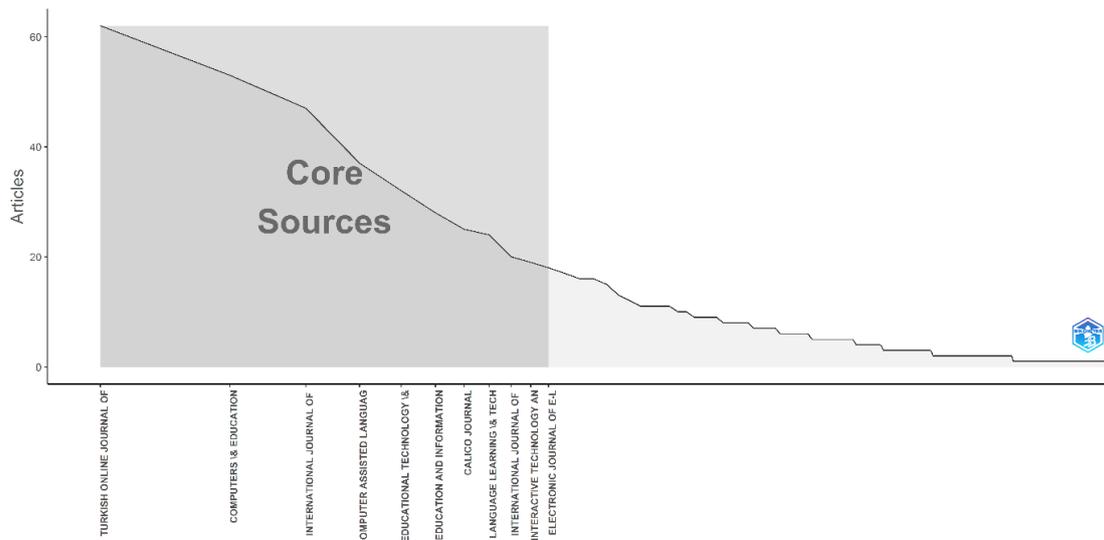


Figure 4. Bradford's Law Analysis Journal Ranking

Table 2 shows the numerical information for the 20 most popular journals in which the research subject articles are published, in the order of publication of the most articles. According to the table, the most published journal is the Turkish Online Journal of Distance Education (ArtN=62). In contrast, the most cited journal with the highest h\_index, g\_index, and TC values is Computers & Education (CiteN=830, h\_index=25, g\_index=42, TC=1895). The second highest published journal is Computers & Education (ArtN=53), Language Learning & Technology (CiteN=489, h\_index=17, TC=1105) is the journal with the highest number of citations and the highest h\_index and TC values, and the journal with the highest the journal with h\_index and g\_index values is Educational Technology & Society (h\_index=17, g\_index=30).

Table 2. Most Relevant Journals according to Number of Articles

Journal	ArtN	CiteN	h_index	g_index	TC
Turkish Online Journal of Distance Education	62	23	7	9	165
Computers & Education	53	830	25	42	1895
International Journal of Emerging Technologies in Learning	47	5	8	13	240
Computer Assisted Language Learning	37	375	15	23	619
Educational Technology & Society	32	194	17	30	923
Education and Information Technologies	28	79	8	10	146
Calico Journal	25	233	11	18	352
Language Learning & Technology	24	489	17	24	1105
International Journal of Distance Education Technologies	20	2	5	6	55
Interactive Technology and Smart Education	19	13	5	8	82
Electronic Journal Of E-Learning	18	32	5	9	83
Interactive Learning Environments	17	76	6	9	90

Journal	ArtN	CiteN	h_index	g_index	TC
Recall	16	346	9	14	217
Int. Review of Research in Open and Distributed Learning	16	219	7	12	147
Journal Of E-Learning and Knowledge Society	15	18	4	6	47
Int. J. of Cont. Engineering Education and Life-Long Learning	13	3	4	6	44
Int. J. of Computer-Assisted Language Learning and Teaching	12	26	4	6	46
British Journal of Educational Technology	11	266	8	10	290
Foreign Language Annals	11	166	7	11	177
Open Learning	11	66	6	9	87

ArtN= Article Number, CiteN=Citation Number, TC=Total Cite

### Most Relevant Authors

The search in the WoS database revealed that 2341 different authors are publishing on the subject of "web-based language teaching." While 321 of these authors worked alone on their studies, 2020 collaborated on them (Table 1). Table 3 provides numerical information on the top 20 authors on the subject.

Table 3. The Most Relevant Authors according to the Number of Articles

Authors	ArtN	Pub. Year	LC	h_index	g_index	TC	TCpY
Xie, H.	8	2017-2022	3	6	8	145	24,17
Zou, D.	8	2017-2022	3	6	8	145	24,17
Chang, M. M.	6	2007-2019	4	5	6	135	8,44
Kim, D.	5	2008-2014	4	5	5	150	10,00
Jia, J.	5	2009-2022	0	3	3	51	3,64
Liu, Y.	5	2010-2015	0	2	2	8	0,62
Chen, C. M.	4	2008-2021	9	4	4	350	23,33
Lin, Y. C.	4	2013-2016	1	4	4	116	11,60
Ryoo, K.	4	2008-2017	3	4	4	162	10,80
Hampel, R.	4	2004-2013	10	3	4	158	8,32
Cheng, G.	4	2017-2021	1	3	4	48	8,00
Wang, T. I.	4	2008-2017	1	3	4	101	6,73
Lee, M. C.	4	2008-2017	1	3	4	98	6,53
Lin, M. C.	4	2013-2019	3	2	4	39	3,90
Wang, M.	4	2009-2021	0	3	4	33	2,36
Rienties, B.	4	2013-2020	0	3	4	23	2,30
Son, J. B.	4	2008-2018	4	3	3	31	2,07
Hirata, Y.	4	2018-2022	1	1	1	5	1,00
Baturay, M. H.	3	2010-2011	0	3	3	70	5,38
Aikina, T. Y.	3	2015-2020	0	3	3	32	4,00

ArtN= Article Number, LC=Local Citation Number, TC=Total Cite, CpY= Citations per Year

When Table 3 is examined, it is seen that Xie H. and Zou D. (ArtN=8, h\_index=6, g\_index=8, TCpY=24.17) are the authors who publish the most on "web-based language training" in WoS, have the greatest h\_index and g\_index values, and have the highest citation rate every year. Hamper R. received the most local citations (LC=10), whereas Chen C. M. received the most (TC=350). Figure 5 depicts a graph showing the number of writers' publications over time.

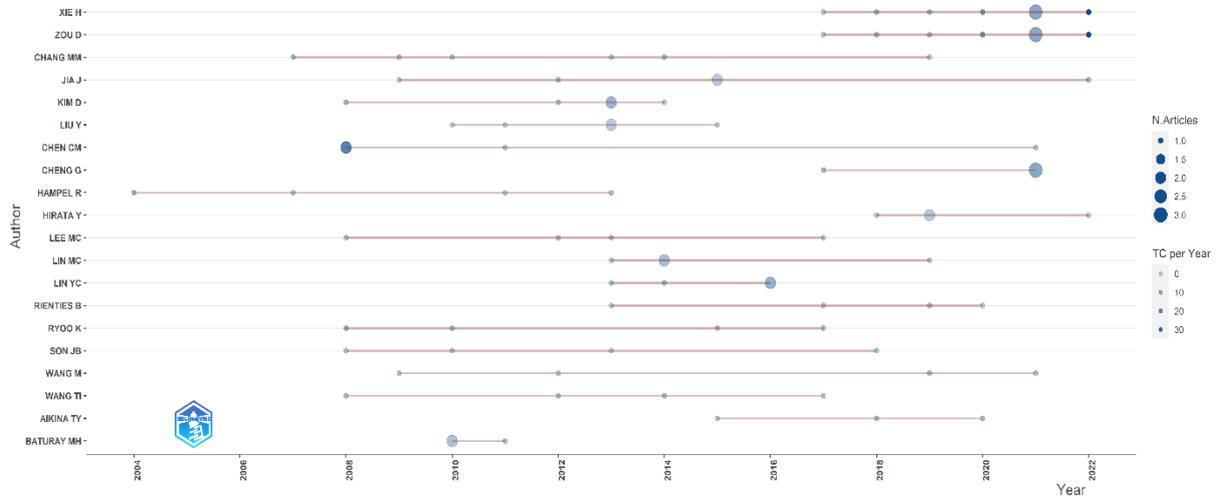


Figure 1. Top Authors' Production over Time

### Most Relevant Universities and Countries

When the research on "web-based language teaching" in the WoS database is investigated based on the universities where the authors work, publications from 1104 universities are found. Table 4 lists the 20 universities with the most publications. The first 20 universities to publish on the subject produced 399 publications. Anadolu University has the most publications (ArtN=52), followed by Open University (ArtN=49) and National Taiwan Normal University (ArtN=33).

Table 4. The Most Relevant Universities based on the Amount of Articles

Affiliations	ArtN
Anadolu Univ.	52
Open Univ.	49
Natl. Taiwan Normal Univ.	33
Islamic Azad Univ.	31
Iowa State Univ.	29
Educ. Univ. Hong Kong	21
Hong Kong Polytech. Univ.	18
Univ. S Florida	16
Natl. Cheng Kung Univ.	15
Gazi Univ.	14

<b>Affiliations</b>	<b>ArtN</b>
Natl. Chiao Tung Univ.	14
Univ. Melbourne	14
Natl. Pingtung Univ. Sci. and Technol.	13
Univ. Houston	13
Natl. Cent. Univ.	12
Natl. Res. Tomsk Polytech. Univ.	11
Natl. Tsing Hua Univ.	11
Ohio Univ.	11
Texas Aandm Univ.	11
Univ. Politecn. Valencia	11
Total	399

ArtN= Article Number

There are contributors from 87 different nations, according to an analysis of the publications on the topic based on the locations of the authors. The first 20 countries with the most articles on the subject are listed in Table 5. The USA, which has the most articles, has the most co-authored, single-authored, multinational total citations, and the average number of publication-based citations (ArtN=504, CAAN=172, SCP=153, MCP=19, TCN=3024, AAC=17.58).

Table 5. The Most Relevant Countries according to the Number of Articles

<b>Country</b>	<b>ArtN</b>	<b>CAAN</b>	<b>SCP</b>	<b>MCP</b>	<b>TCN</b>	<b>AAC</b>
USA	<b>504</b>	<b>172</b>	<b>153</b>	<b>19</b>	<b>3024</b>	<b>17,58</b>
China	<b>448</b>	<b>154</b>	<b>143</b>	11	<b>2562</b>	16,64
Turkey	229	82	78	4	499	6,09
UK	150	56	40	<b>16</b>	967	<b>17,27</b>
Spain	133	49	40	9	664	13,55
Australia	118	44	39	5	585	13,30
Iran	107	40	37	3	144	3,60
Russia	82	27	25	2	63	2,33
Japan	77	24	18	6	169	7,04
Ukraine	73	24	24	0	46	1,92
Germany	67	20	16	4	264	13,20
Italy	63	25	22	3	249	9,96
Canada	61	21	17	4	162	7,71
France	51	13	12	1	66	5,08
Greece	45	18	17	1	214	11,89
South Africa	45	18	15	3	137	7,61
Saudi Arabia	45	16	8	8	132	8,25
Poland	41	15	14	1	31	2,07

Country	ArtN	CAAN	SCP	MCP	TCN	AAC
Sweden	40	11	10	1	138	12,55
Malaysia	35	11	11	0	47	4,27

ArtN= Article Number, CAAN= Corresponding Author Article, SCP=Single Country Publication, MCP=Multiple Country Publication, TCN= Total Citations Number, AAC= Average Article Citation

### Citation Status

The 20 most cited articles on web-based language teaching published in WoS are listed in Table 6. The most global cited paper is "Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms" (GC=380) by Pianta et al. (2008), followed by "The technological dimension of a massive open online course: The case of the CCK08 course tools " (GC=218) by Fini (2009). Tudini's (2003) work titled "Using native speakers in chat" (LC=8) and the work of Kessler et al. (2012) titled "Collaborative writing among second language learners in academic web-based projects" (LC=8) had the most local citations.

Table 6. The Most Cited Papers

Paper	DOI	GC	LC
Pianta R C, 2008, Early Childhood Res Q	10.1016/j.ecresq.2008.02.001	<b>380</b>	0
Fini A, 2009, Int Rev Res Open Distance Learn	10.19173/irrodl.v10i5.643	<b>218</b>	0
Chen C M, 2008, Comput Educ	10.1016/j.compedu.2007.06.011	211	6
Law K M Y, 2010, Comput Educ	10.1016/j.compedu.2010.01.007	194	1
Ibanez M B, 2014, Ieee Trans Learn Technol	10.1109/TLT.2014.2329293	190	0
Dewaele J M, 2008, Lang Learn	10.1111/j.1467-9922.2008.00482.x	175	1
Ware P D, 2005, Mod Lang J	10.1111/j.1540-4781.2005.00274.x	157	6
Tudini V, 2003, Lang Learn Technol	-	119	<b>8</b>
Kessler G, 2012, Lang Learn Technol	-	118	<b>8</b>
Brown B A, 2008, J Res Sci Teach	10.1002/tea.20255	117	1
Henze N, 2004, Educ Technol Soc	-	115	3
Bayne S, 2015, Learn Media Technol	10.1080/17439884.2014.915851	113	1
Hampel R, 2004, Lang Learn Technol	-	111	6
Tsou Wl, 2006, Comput Educ	10.1016/j.compedu.2004.08.013	109	2
Chen C M, 2008, Educ Technol Soc	-	104	3
Caspi A, 2008, Comput Educ	10.1016/j.compedu.2006.08.003	97	1
Verdugo D R, 2007, Lang Learn Technol	-	90	3
Liaw M, 2006, Lang Learn Technol	-	90	0
Avgeriou P, 2003, Educ Technol Soc	-	89	1
Wang Yp, 2004, Lang Learn Technol	-	82	5

GC: Global Cite, LC: Local Cite

Table 7 shows the 20 most cited references in the bibliography of works linked to web-based language teaching

published in WoS. When Table 7 is studied, it is clear that books are the most often cited sources. Among these, Vygotsky's (1978) book "Mind in Society: Development of Higher Psychological Processes" (f=37) was the most frequently referenced.

Table 7. The Most Cited References

Corr. Author	Year	Type	Source	f
Vygotsky L. S.	1978	Book	Mind in Society: Development of Higher Psychological Proc...	37
Davis F. D.	1989	Journal	MIS Quarterly	21
Oxford R.	1990	Book	Language learning strategies	21
Council of Europe	2001	Book	Common European framework of reference for language...	21
White C.	2003	Book	Language learning in distance education	20
Kern R. G.	1995	Journal	The Modern Language Journal	19
Warschauer M.	1997	Journal	The Modern Language Journal	18
Chapelle C. A.	2001	Book	Computer applications in second language acquisition	18
Lave J.	1991	Book	Situated learning: Legitimate peripheral participation	17
Cohen J.	2013	Book	Statistical power analysis for the behavioral sciences	17
Vygotsky L.	1978	Book	Mind in society: Development of higher psychological processes	16
Warschauer M.	1996	Journal	CALICO Journal	16
Bax S.	2003	Journal	System	16
Krashen S.	1985	Book	The input hypothesis: Issues and implications	15
Krashen S. D.	1982	Book	Principles and practice in second language acquisition	14
Mayer R. E.	2001	Book	Multimedia learning	14
Stepp-Greany J.	2002	Journal	Language Learning & Technology	14
Ellis R.	2003	Book	Task-based language learning and teaching	14
Kessler G.	2010	Journal	Computer Assisted Language Learning	14
Krashen S.	1981	Book	Second language acquisition	13

### Keywords and Trend Topics

Articles scanned in WoS contain both Keyword Plus data and their keywords. Although these statistics are not mentioned in the article's title, they are calculated automatically from frequently repeated words in the names of references in the bibliography list. KeyWords Plus, based on a proprietary Clarivate algorithm, expands the power of citation-reference search by searching across disciplines for all publications having standard references (Clarivate, 2022). Figure 6 depicts the 50 most frequently occurring words in KeyWord Plus generated from publications linked to the issue.

Language (f=87), students (f=67), English (f=55), education (f=53), technology (f=46), learners (f=39), online (f=35), perceptions (f=31), influence (f=30), and instruction (f=27) are the ten most repeated words among the KeyWords Plus items shown in Figure 2. Figure 3 is a word cloud constructed from the 50 most frequently used terms by the authors in their articles.

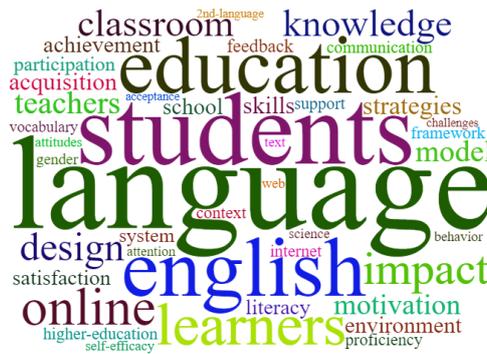


Figure 2. KeyWord Plus Wordcloud

When looking at Figure 3, the top ten most repeated words are e-learning (f=209), distance education (f=92), learning (f=57), language learning (f=52), education (f=48), blended learning (f=34), online learning (f=33), higher education (f=26), language (f=26), and technology (f=26). Figure 4 depicts the distribution of the frequency of use of the authors' keywords by year.



Figure 3. Wordcloud for Authors' Keywords

Figure 8 shows that studies on web-based teaching settings became popular after 2009, and the subject's popularity continues to this day.

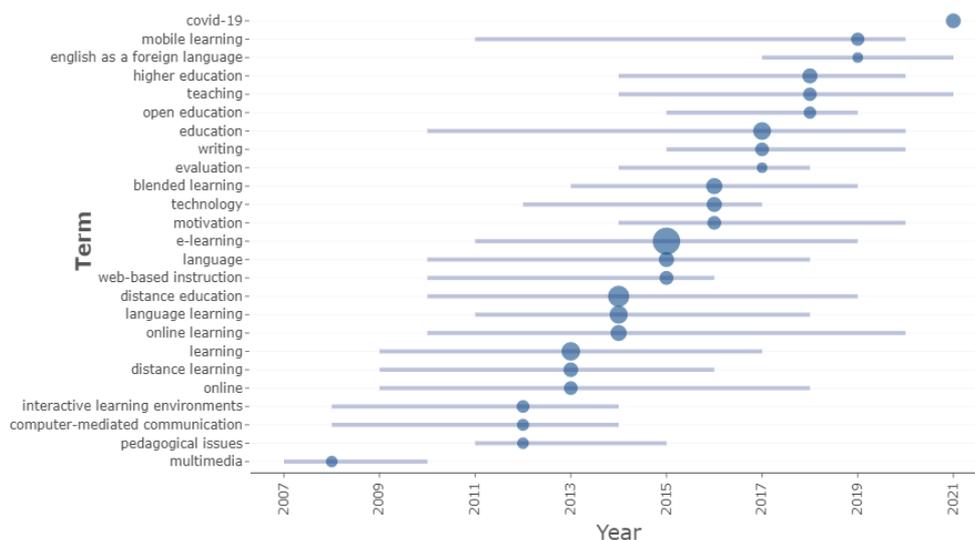


Figure 4. Trend Topics

### Clusters by Authors Coupling

Table 8 summarizes the results of a cluster analysis of publications published in WoS linked to web-based language teaching. The clustering technique used the bibliography to find matches, the number of global citations as the effect scale, and the author keywords as the clustering tag.

Table 8. Custer Analysis

Group	Cluster Label	Conf (%)	<i>f</i>	Centrality	Impact
1	intelligent tutoring systems	100	14	1,49	3,43
	personalized learning	90			
	e-learning	29,6			
	learner modeling	100			
	vocabulary acquisition	100			
2	pedagogical issues	100	11	1,06	2,13
	computer-mediated communication	66,7			
	improving classroom teaching	100			
	interactive learning environment	100			
	strategies	80			
3	distance education	81,8	42	0,87	1,73
	e-learning	22,2			
	language learning	31,2			
	learning	45,5			
	online	100			
4	e-learning	44,4	13	0,83	2,67
	language learning	43,8			
	multimedia	71,4			
	ebooks	100			
	interactive learning	75			
5	collaborative learning	66,7	13	0,94	3,58
	computer-assisted language learning	50			
	distance	66,7			
	education	50			
	efl	66,7			

When Table 8 is studied, it is clear that the articles are clustered in five groups as a result of the authors' clustering analysis. Each group has labels for web-based learning.

Figure 5 depicts the graph displaying the groups in which the authors' keywords are focused as a consequence of the clustering analysis.

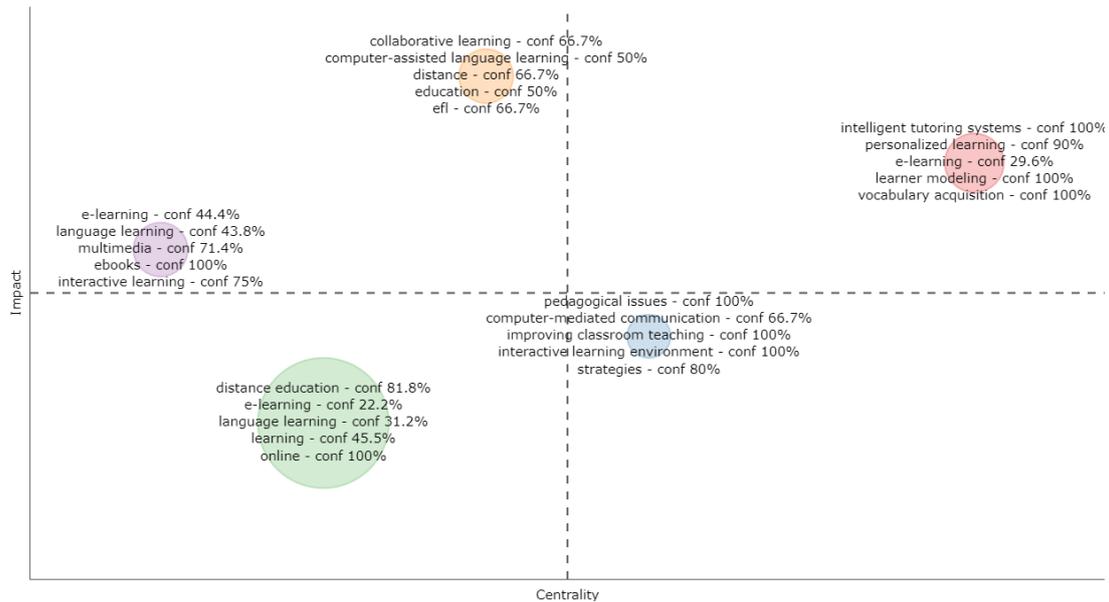


Figure 5. Clusters of Authors' Key Words

## Discussion

This study aims to investigate works on web-based language instruction from a bibliometric standpoint. It was attempted to determine the journals, authors, universities, and locations that published the most on the subject for this purpose. The publications' citation status has been thoroughly analyzed. Keywords and hot topics in web-based language teaching were investigated. Cluster analysis was carried out using the keywords from the authors' publications about their works.

The Turkish Online Journal of Distance Education has published the most articles on the subject. Computers & Education, the most published journal after this one that provides publications for online education, is also the most cited. The journals that make up the core list, according to the Bradford Law (Bradford, 1934) are Turkish Online Journal of Distance Education, Computers & Education, International Journal of Emerging Technologies in Learning, Computer Assisted Language Learning, Educational Technology & Society, Education and Information Technologies, Calico Journal, Language Learning & Technology, International Journal of Distance Education Technologies, Interactive Technology and Smart Education, Electronic Journal Of E-Learning. When the common characteristics of these publications are analyzed, it is clear that they all emphasize instructional technologies and language education.

When the writers of web-based language education publications are analyzed, it is discovered that Xie H. and Zou, D. have the most publications. Chen C. M. leads the pack in terms of total citations. Chang M. M. comes in second regarding the number of publications, whereas Ryoo K. comes in second regarding the total number of citations. When the writers' writings are studied in terms of period, it is discovered that there is a concentration between 2008 and 2020. After D. 2017, Xie H. and Zou began producing publications, and it has been seen that they publish publications yearly.

When the universities where the authors work are examined, it is discovered that Anadolu University has the most publications. Open University is the second most prolific publisher. When countries are compared, the USA has the most publications, co-authored publications, single and multiple national publications, and cited articles. This is followed by China, which has the most publications, co-authored publications, single national publications, and cited publications, and the UK, which has average citation numbers.

Since its publication in 2008, Pianta's paper entitled "Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms" has been the most quoted work. The most referenced work in the bibliography of the papers analyzed within the scope of the study was Vygotsky's 1978 book "Mind in society: Development of higher psychological processes." Tudini's (2003) work titled "Using native speakers in chat" and the article of Kessler et al. (2012) titled "Collaborative writing among second language learners in academic web-based projects" received the most local citations.

According to Arik and Arik's (2017) bibliometric examination of "Second Language Writing (SLW)" articles in the WoS Social Sciences Citation Index and Arts & Humanities Citation Index, the first publication occurred in 1992, with a steady increase in recent years. Between and 2013, WoS recognized 266 "Second Language Writing (SLW)" articles, the vast majority of which were about linguistics research (92%). It was established that the publications included articles, book reviews, and bibliographies by 1.64 writers per publication, with a low level of collaboration on "Second Language Writing (SLW)." An average of 31.44 publications and 5.90 publications were cited, and an average SLW title contained 2.49 different words and a total of 10.85 words. Also included are a synopsis of around five phrases and six keywords and the terms second language writing, academic writing, plagiarism, and error repair.

Both the Keywords Plus terms of the articles on the subject and the keywords of the authors were analyzed. While the terms "language," "students," "education," and "technology" came to the fore in Keyword Plus analysis, the terms "e-learning," "distance education," and "language learning" came to the fore in the analysis of author keywords. When looking at the article titles, it can be observed that between 2007 and 2015, the subjects of "multimedia," "pedagogical difficulties," and "interactive learning settings" were popular. As the years progressed, it was concluded that topics such as "online learning," "technology," and "blended learning" came to the fore. After 2011, "mobile learning" started to become famous and seems to continue. As an indicator of this popularity, a study was conducted by Sobral (2020) on "mobile learning," examining 450 articles on "mobile learning" from journals indexed in WoS by Clarivate Analytics and journals in Elsevier Scopus. According to the results of this research, the publications on "mobile learning" have been published in 244 international journals, and the most common WoS topics are Social Sciences and Computer Science. It was concluded that the most commonly used keywords in the study were "Mobile Learning, m-Learning, e-Learning," and the countries that published the most on the subject were Malaysia, USA, and South Korea.

In a study by Goksu (2021), according to the metadata of 5167 studies in total in the WoS database as of September 2019, as a result of the bibliometric analysis of Harzing's Publish and Perish for VOSviewer and sciMAT-index, Taiwan, USA, China, and England are the most influential countries in mobile learning. According to the keyword

co-occurrence analysis, the keywords of "mobile devices, higher education, mobile technologies, tablet, and smartphone" stand out in mobile learning. It is known that the trending topics in the 2015-2019 period are educational technologies in general and, more specifically, tablets, mobile phones, MOOCs, and learning strategies. G. J. Hwang was the most influential researcher, and the National Taiwan University of Science and Technology was the most influential university. It has been concluded that the most influential researches are "augmented reality, higher education and mobile learning research focused on smartphones." According to the analyzes made in the context of journals, *Computers & Education*, *British Journal of Educational Technology*, and *Educational Technology & Society* were determined as the journals that contributed the most.

In the clustering analysis performed on the keywords specified by the authors in their articles, it is seen that the top 100 authors are divided into 5 clusters. It is noteworthy that the labels "Distance," "online," and "e-learning" are included in all clusters. When looking at the other clusters, labels on teaching methods are seen. It is seen that the labels "personalized learning" in the first group, "interactive learning environment" in the second group, "language learning" in the third group, "interactive learning" in the fourth group, and "collaborative learning" and "computer-assisted language learning" in the last group.

In the study conducted by Chen et al. (2021), it was determined that this field had become an active research area, according to the results of the research on "Personalized language learning (PLL)," which is becoming increasingly crucial in effective language education. According to the findings of the bibliometric study performed on the WoS and Scopus databases, it is clear that from 2000 to 2019, "Personalized language learning (PLL)" has become one of the most popular research topics in this discipline. It has been determined that *Educational Technology & Society* and *Computers & Education* journals are the journals that contribute the most to this field. In addition, the research results concluded that Personalized language learning (PLL) is closely related to mobile learning, game-based learning, and online/web-based learning.

Karakus et al. (2019), according to the results of the "WoS augmented reality (AR)" research, The concepts of "virtual reality, mobile learning, interactive learning environments, and e-learning" have been the most studied concepts. The best magazines; *Computers & Education*, *EJMSTE*, *Educational Technology and Society*, and *Interactive Learning Environments*, while Spain and Taiwan were the most important countries, C.C. Tsai and G.J. Hwang have also been the top authors, and the National Taiwan University of Science and Technology has been the top institution in this research field. According to the results of the bibliometric research on the "Interactive Learning Environments (ILE) journal" by Mostafa (2022), 995 articles published in the journal by 2298 authors representing 65 countries from 1990 to 2020 were scanned through the Scopus database. The authors were determined as Gwo Jen Hwang, Timothy Teo, and Yeuh Min Huang. In the study by Goksu (2020), the articles published in the *Computer Assisted Language Learning (CALL)* journal between 2014-2019 were primarily examined for language skills, 'English as a foreign language,' 'communication,' 'motivation,' 'telecollaboration.' ', 'mobile learning,' 'writing,' and 'blended learning' keywords are frequently used. The countries making the most significant contribution are respectively; Taiwan, USA, and China. In addition, Taiwan-based universities contributed the most publications in *Computer Assisted Language Learning (CALL)*, and Wu-Yuin Hwang and Siew Ming Thang were the authors with the highest number of publications.

## Conclusion and Recommendations

This study, which aims to examine the studies on web-based language teaching from a bibliometric perspective, has been tried to determine the journals, authors, universities, and countries with the most publications on the subject. As a result of the examination, the most published journal is the Turkish Online Journal of Distance Education. The most published authors are Xie H. and Zou, D. When the authors are examined in terms of the institution they work in and the country they live in, it is seen that the most publications are from Anadolu University and the USA. While Pianta's 2008 article titled "Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms" is the most cited, the most cited reference is Vygotsky's 1978 "Mind in He has a book titled "Society: Development of higher psychological processes." In the keyword analysis, it was concluded that the most repeated terms are "language," "students," "education," and "technology." When the article titles are examined, it is seen that the topics of "online learning," "technology," and "blended learning" are still trending today. Another result of the study is that the author's keywords are collected in 5 clusters, and each cluster includes tags for web-based teaching techniques.

Given the findings stated above, it is recommended that researchers who plan to publish on web-based language instruction look into the journals mentioned above in terms of scanning the literature and publishing. Furthermore, because the highly referenced papers include thorough information on the issue, they can be utilized in the introduction and discussion portions of the articles. It is advised that these difficulties be addressed in web-based language teaching research by evaluating relevant trends.

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### Author Information

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#### Mesut Bulut

 <https://orcid.org/0000-0002-0733-0964>

Atatürk University

Erzurum, Türkiye

Contact e-mail: [mesutbulut\\_77@yahoo.com](mailto:mesutbulut_77@yahoo.com)

#### Ayhan Bulut

 <https://orcid.org/0000-0001-6482-8032>

Aydın Adnan Menderes University

Aydın, Türkiye

#### Abdullatif Kaban

 <https://orcid.org/0000-0003-4465-3145>

Atatürk University

Erzurum, Türkiye

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