



A 30-year Perspective of Bibliometric Analysis on Teacher Cognition: Toward Teacher Development

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Teacher cognition, the system of teachers' mental lives, has a great impact on teachers' instructional practices and professional development. However, a comprehensive exploration into the overall scholarship in the teacher cognition field through a bibliometric lens is lacking. By using VOSviewer1.6.16, this bibliometric analysis aims to profile the research landscape on teacher cognition by identifying the development trajectory, country contributions and collaborations, the most productive authors and journals, and the research foci based on 440 documents retrieved from the Scopus database (1993-2022). The findings indicate progressive growth in the publication trend on teacher cognition, especially in the last decade. The publications are mainly geographically distributed in the United States, China, and the United Kingdom. The United States leads others in terms of contribution and collaboration. Borg S., Feryok A., and Johnson K.E. emerged as the most productive authors, and *System, Language Teaching Research* and *Teaching and Teacher Education* the most prolific journals. The topical foci identified are (1) language teachers' cognition from a sociocultural perspective, (2) teacher professional development, (3) teacher education and English as a Foreign Language (EFL) teachers' cognition, (4) novice ESL teachers' cognition, (5) teacher beliefs and teaching practices. It is concluded that teacher cognition, especially language teacher cognition has grown into a well-established and cross-perspective field of study and it will conceivably remain a promising subject.

Keywords: teacher cognition, bibliometric analysis, research landscape, educational arena, teacher development

INTRODUCTION

Over the past decades, the exploration of the nature of teacher cognition and its impact on actual teaching has become a recurring research theme in the educational arena (Bruzana, 2018; Johnson, 2018). Seen as a powerful asset to govern teachers'

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pedagogical practices (Öztürk, 2021), teacher cognition research has received mounting academic attention from scholars with different disciplinary backgrounds and evolved into a sprawling and productive enterprise (Burns et al., 2015). With more boundaries being expanded, it is essential to present the complete picture of the development trajectory and research hotspots of this particular field.

Teachers' cognition, which is referred to as an all-encompassing word for the "situated, dynamic, mediated, and inherently complex" (Burns et al., 2015, p.597) system of teachers' mental lives, can exert a substantial impact on their instructional practices (Alzaanin, 2019; Borg, 2006). Additionally, since teacher cognition is related closely to teachers' professional development (Dhanavel, 2022; Dos Santos, 2019), a thorough investigation into it may help understand the intricacies of their professional lives in an increasingly globalized world (Johnson, 2018). On the other side, teacher education is acknowledged as a significant aspect that may strengthen and change teacher cognition (Krulatz et al., 2022).

Teacher cognition research started in the 1980s, covering aspects of pedagogical knowledge, pedagogical reasoning, and practical knowledge (Lee, 2018). Today, rather than simply looking into teachers' instructional approaches, more emphasis is being devoted to investigating the complexity of teachers' mental life (Kyriakides, 2020) due to the belief that teachers' instructional activities are accurate representations of their knowledge, beliefs, and thoughts (Öztürk & Gürbüz). Notably, studies on teacher cognition, particularly language teacher cognition, have been carried out on a relatively large scale, exposing the complicated nature of teachers' cognitive worlds (Li, 2020; Wei & Cao, 2020) and the intricate relationship between cognition and practices (Lin, 2022; Zhang et al., 2020).

Though there are a few reviews regarding cognition that have generated many valuable insights into the body of knowledge, such as a review on the teacher cognition and practice of educational equity in English as a Foreign Language Teaching (EFL) (Chen & Abdullah, 2022) and a systematic review on teacher cognition and expertise of second language writing teachers (Yao et al., 2022), these studies focus exclusively on a certain aspect of teacher cognition, it lacks a thorough investigation to comprehensively and quantitatively profile the general research landscape of the field. Only with an overall picture of the research hotspots and frontiers, can scholars be oriented on the right way to contribute more to the field of inquiry. Therefore, there is a pressing need to analyze the emergent body of literature pertaining to teacher cognition and provide valuable insights to the academia.

Since bibliometric analysis, with the same advantages as meta-analysis (Suseelan et al., 2022), is considered a rigorous approach to delivering a comprehensive yet scientific view of a progressive evolution from extant literature in a given field (Merigó et al., 2016), conducting bibliometric research can enable both established and emerging scholars to identify the research gaps and generate novel ideas (Donthu et al., 2021). Notably, the ever-increasing attention to teacher cognition necessitates a bibliometric review of the studies to profile the research landscape and outline future research priorities. Hence, given the importance of teacher cognition in enhancing teachers'

teaching quality and promoting educational development, this bibliometric analysis which aims at informing scholars of knowledge about teacher cognition and offering them effective recommendations for future research with a holistic and insider perspective, is of great significance.

LITERATURE REVIEW

Debates on the definition of teacher cognition

The term “teacher cognition” has been vigorously debated by the academic world. Back in 1996, Calderhead (1996) simply clarified the knowledge structure into three categories-teacher knowledge, beliefs, and thinking. Consistent with Calderhead’s view, Öztürk (2021) asserted that these three components serve as the foundation for the conceptual domains of teacher cognition. However, the term teacher cognition is a comprehensive concept with dynamic and intricate nature, except for the abovementioned parts, it also covers a range of invisible psychological constructs such as values, perspectives, expectations, judgments and emotions, etc. (Öztürk & Yıldırım, 2019).

Notably, in teacher cognition research, there are diverse terminologies under the umbrella of teacher cognition (Li, 2019; Zhao, 2019) among which terms such as “beliefs” and “knowledge” are used interchangeably with “cognition” (Borg, 2015; Zhao & Zhang, 2022). Therefore, to help clarify the concepts, Borg (2003; 2019) elaborated on different terminologies and finalized the definition of teacher cognition as the overarching term for all cognitive constructs in teachers’ mental worlds. The cognitive bases, encompassing teacher knowledge, beliefs, thinking, conceptions, attitudes, assumptions, principles, and decision-making, constitute the whole picture of teachers’ cognition for teachers to draw on when performing classroom practices (Fan & Li, 2019; Zhu, 2017). Having noticed the impact of experiential factors on mediating the relationship between teacher cognition and their practices, Borg further claimed that this construct is “defined and refined on the basis of educational and professional experiences throughout teachers’ lives” (Borg, 2015, p.35). In terms of the justification of the concept by Borg, the term “teacher cognition” is used in the current bibliometric study to refer to all cognitive constructs in teachers’ mindset.

Related research on teacher cognition

Teacher cognition is becoming a sprawling field of inquiry (Burns et al., 2015). The majority of the empirical investigations focus on deciphering the intricate relationship between teachers’ invisible mental activities and visible instructional practices (Clark & Yu, 2022; Wei & Cao, 2020). Substantial research has validated that teacher cognition plays an influential role in forging their practices and thus impacting their professional development (Chung & Fisher, 2022; Dhanavel, 2022; Johnson, 2018).

To synthesize the findings of past studies and identify the research trends and hotspots in the teacher cognition field, a few scholars have made attempts to review the previous studies on teacher cognition. For instance, Öztürk (2021), by employing a conceptual review approach, provided significant implications for teacher education by presenting

the historical basis, key elements, conceptual domains, and underlying dynamics of teacher cognition. Moreover, more attention has been paid to outlining the research landscape of language teacher cognition. To profile ontologically and methodologically the research trend and hotspots in language teacher cognition, Burns et al. (2015) addressed several key inquiries concerning the nature of teachers' cognitive minds by undertaking mapping research based on the foregoing literature. By centering on EFL teachers' cognition from an equity perspective, Chen & Abdullah (2022) examined the intricate interrelationship between EFL teachers' equity-oriented cognition and practice and identified the influential factors that may mediate such a relationship. With a focus on second language writing teachers, Yao et al., (2022) performed a systematic review on interpreting the three primary inquiries, namely, teacher cognition, practice, and expertise in the teaching field based on 67 empirical studies in the past four decades and accordingly, proposed a theoretical framework regarding the findings.

In conclusion, the prior studies have delivered a meticulous summary of the current literature and profiled the research trends and foci on teacher cognition in certain aspects, however, there is still a gap in knowing the overall scholarship and performance of the teacher cognition field from a general and historical perspective and up to now, no bibliometric research has been applied to uncover this gap. Therefore, this study, by using bibliometric data and scientific mapping, can reveal the research evolvement of the field over the last three decades and highlight the importance of certain vital themes to orient emerging scholars to identify the research priorities.

Purpose of the study

This exploratory study aims to outline the overall research landscape of teacher cognition by applying bibliometric procedures of science mapping analysis based on the Scopus Database from 1993 to 2022 by using VOSviewer1.6.16, Micro Excel, and Tableau. By illustrating the development trajectory, country contributions and collaboration, active authors and journals as well as the research foci, in addition to enriching the existing body of knowledge, it is expected to provide valuable insights for the new entrants into this specific field in the educational arena and orient them to engage in the future studies. Besides, the findings can draw on more valuable suggestions for promoting teacher development. Four main research questions are addressed as follows:

RQ1. What development trajectory can be identified in the teacher cognition field during the past three decades?

RQ2. What are the international contributions and collaboration in the teacher cognition field?

RQ 3. Who are the most productive authors and what are the most productive journals on teacher cognition?

RQ 4. What topical foci in this domain have been most frequently investigated?

METHOD

The following sections cover the criteria for data extraction, collection, and analysis in detail.

Data extraction and collection

The study followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al., 2009) (see Figure 1), which involves four steps, identification, screening, eligibility, and inclusion, to refine the research results.

In the first stage, the search terms were identified as “teacher cognition”, also, the wildcard character “*” was used in the search to allow for the spelling variation. The initial total number of 486 publications was identified using the search string ‘TITLE-ABS-KEY (“teacher* cognition*”) AND PUBYEAR> 1992’. All the data were extracted on 6 October 2022.

During the screening stage, since only articles, book chapters, and reviews written in English were the focus of the study, other documents such as books and conference papers in other languages were filtered. Altogether 44 items were excluded.

As for eligibility, the article titles and abstracts were scanned manually to confirm their relevance, and documents with missed information were also filtered. Finally, a total of 440 samples were included for conducting the bibliometric analysis.

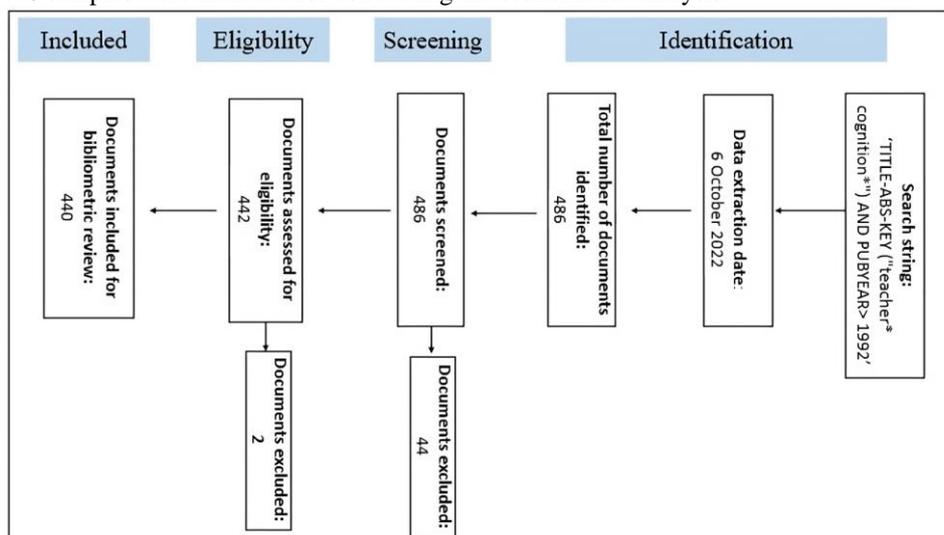


Figure 1
PRISMA flowchart of document identification on teacher cognition

Data analysis methods

For a start, the development trajectory of publications on teacher cognition was presented based on the bibliometric data harvested from the Scopus database. Microsoft Excel 2019 was used to make the graph that indicated the yearly number of publications.

In addition, a world map with the distribution of the publication was generated by using Tableau to capture the country contribution. Moreover, the VOSviewer1.6.16 was used to show the network visualization map of country collaborations.

Moreover, based on the bibliometric data retrieved from VOSviewer1.6.16, Microsoft Excel was employed to help list the most productive authors and journals. Other information such as total citations, SJR 2021, h-index, and journal quartiles were also included.

Lastly, VOSviewer1.6.16 was used to generate the network visualization map of the co-occurrence of keywords to identify the research foci. Before analyzing the data, the keywords were refined through the thesaurus file to avoid redundancy. For instance, “cognition”, “cognitions”, “teacher cognitions”, “teachers’ cognitions”, “teachers’ cognition” and “teacher cognition” were found duplicates, and “teacher cognition” was employed to replace all of them. Similarly, “teacher beliefs” was used to replace “beliefs”, “teacher belief”, “teachers’ beliefs”, “teachers” was for “teacher”, “English as a foreign language” was for “English as a foreign language (EFL)” and “EFL”. Of the 928 keywords, 79 met the threshold when setting the minimum number of occurrences of a keyword at three.

FINDINGS

The bibliometric analysis was conducted based on the 440 publications yielded from the Scopus database from 1993 to 2022. The majority of the publications were articles (87.05%), book chapters (8.41%), and reviews (4.54%).

The development trajectory of publications on teacher cognition

Figure 2 demonstrates the development trajectory of publications on teacher cognition annually from 1993 to 2022. Based on the bar graph, the development trend can be divided into three periods. From 1993 to 2012, there remained a small number of publications (less than four publications) on the teacher cognition field. During the next decade from 2003 to 2012, the number of publications began to rise steadily from 2 publications to 18 publications. Notably, starting from the last decade, there was a dramatic increase in the number of publications, reaching a peak of 45 publications in 2021.

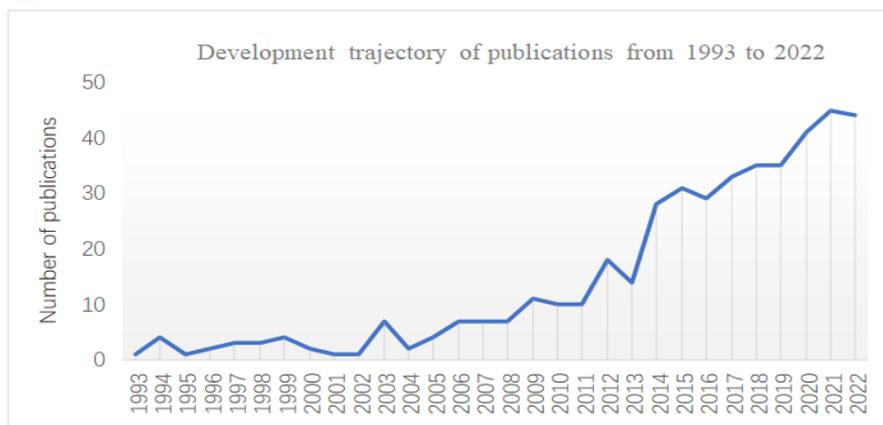


Figure 2
Development trajectory of publications on teacher cognition from 1993 to 2022

In general, despite a few fluctuations, it can be seen that during this period, the overall trajectory of publications on teacher cognition is on a progressive base especially from 2013 to 2022.

Country contributions and collaboration

The geographical distribution of publications by country was generated by Tableau. The darker the shade is, the higher the number of publications the country has. As seen in Figure 3, the top 10 countries out of 55 that have produced the largest publications on teacher cognition are the United States, China, United Kingdom, Australia, New Zealand, Iran, Canada, Netherlands, Germany, and Turkey. The United States has contributed the largest number of 109 publications to this domain, taking up 24.77% of the total amount. China, though ranks second, has published 53 documents (including publications from Hongkong, Macau, and Taiwan) which is half of the amount that the United States has, followed by the United Kingdom with 47 publications. Other countries with more than 20 publications are Australia (37), New Zealand (34), Iran (32), Canada (20), and the Netherlands (20).

Another obvious finding is, compared with North America, Europe, and Asia, which have yielded the majority of publications on teacher cognition, only a few researchers from South America and Africa have paid due attention to this field for the fact that there is a limited number of publications on this topic from the two continents.

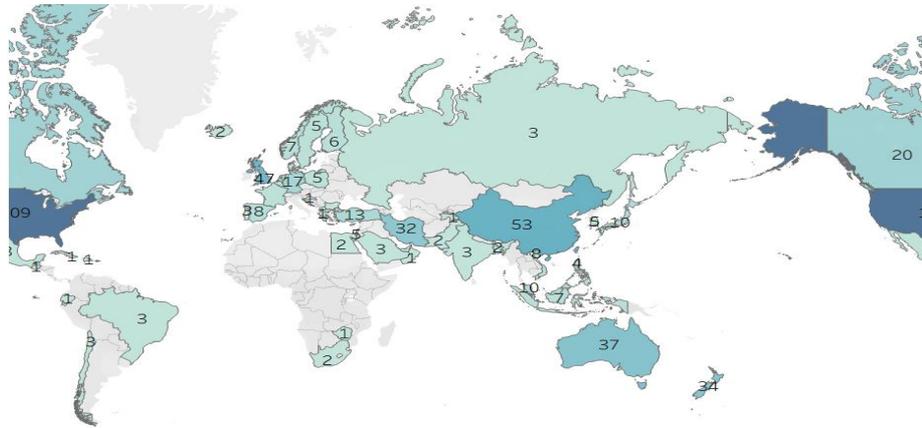


Figure 3
Geographical distribution of publications by country

To understand the country collaboration in this field, the co-authorship among 55 countries with at least one publication was illustrated (see Figure 4). Since 32 out of 55 countries are connected in terms of collaboration, the figure generated only focused on this largest set of items instead of those with no collaboration at all. As the map shows, the largest node United States has eleven edges connected to it which reveals its collaborations with eleven countries such as the United Kingdom, Mexico, and Turkey. Compared with the United States, the United Kingdom owns ten collaborations

including the United States and Turkey, followed by China which has collaborated with nine countries on the academic topic.

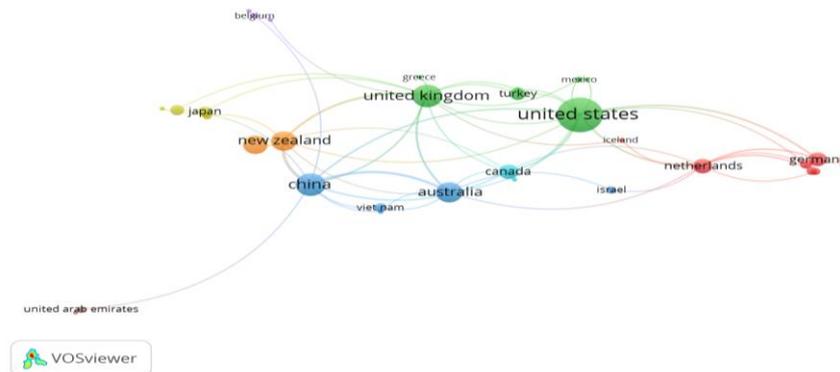


Figure 4
The network visualization map of country collaboration

As shown in Figure 4, there are eight clusters in different colors (i.e., green, blue, orange, and yellow) in the network visualization of country collaboration. Inter-continent collaboration can be detected from some clusters. For instance, the green cluster is composed of two North American countries, the United States and Mexico, one South American country Brazil as well as three European countries, the United Kingdom, Turkey, and Greece. Likely, the cluster in blue consists of four countries from Asia (i.e., China, Viet Nam, Singapore, and Israel) and one from Oceania (i.e., Australia). However, countries such as the United Arab Emirates and Belgium were not active in co-working with other countries.

Most productive authors and journals

Among 728 authors, 19 authors have been identified with more than four publications as listed in Table 1. Professor Borg, S is the most productive author with a total number of nine publications in this domain, followed by Feryok A. from the University of Otago in New Zealand and Johnson K.E. from Pennsylvania State University in the United States. Most of the prolific authors are from the United States, Australia, New Zealand, and the Netherlands and their publications account for 75.79 % of the 95 publications.

The total citations of the 19 productive authors demonstrate varying degrees. Borg S. received the maximum of 1425 citations and his average citations per article reached 158, followed by Sherin M.G. with total citations of 613. Specifically, the number of authors with more than 100 total citations is nine. However, authors like Nazari M. and Karimi M. N. were only cited less than 30 times in all of their publications.

Table 1
Top 19 productive authors in the teacher cognition domain

Rank	Author	Nation/Institution	NoP	TC	ACPC
1	Borg S.	Norway/WNUAS	9	1425	158
2	Feryok A.	New Zealand/University of Otago	7	289	41
3	Johnson K.E.	The United States/Pennsylvania State University	7	208	30
4	Zhang L.J.	New Zealand/University of Auckland	6	158	26
5	Baker A.	Australia/University of Wollongong	6	137	23
6	Hutner T.L.	The United States/University of Alabama	6	35	6
7	Wyatt M.	United Arab Emirates/Khalifa University	6	35	6
8	Burri M.	Australia/University of Wollongong	4	54	14
9	Coppen P.A.	Netherlands/Radboud University	4	45	11
10	Couper G.	Australia/Auckland University of Technology	4	47	12
11	Graus J.	Netherlands/HAN University of Applied Sciences	4	45	11
12	Jarodzka H.	Netherlands/Open University of the Netherlands	4	182	46
13	Karimi M.N.	Iran/Kharazmi University	4	28	7
14	Kubanyiova M.	The United States/University of Birmingham	4	234	59
15	Macalister J.	New Zealand/Victoria University of Wellington	4	60	15
16	Nazari M.	Iran/Kharazmi University	4	12	3
17	Sherin M.G.	The United States/Northwestern University	4	613	153
18	Wolff C.E.	Netherlands/Open University of the Netherlands	4	168	42
19	Worden D.	The United States/University of Alabama	4	71	18

Note. NoP=Number of Publications, TC=Total Citations (up to 6 October 2022), ACPC=Average Citations Per Article, WNUAS=Western Norway University of Applied Sciences

In terms of the top productive journals, 15 journals with more than five publications were identified (see Table 2). The journal *System* is the largest contributor with a total number of 28 publications, followed by the journals *Language Teaching Research* (22) and *Teaching and Teacher Education* (21). And the majority of the journals only published less than 10 related to teacher cognition. As for the total citations, *Teaching and Teacher Education*, the one with the highest H-index, ranks first with 1284 citations, followed by *Modern Language Journal* (961) and *System* (877). In terms of SJR, the journal *Modern Language Journal* enjoys the highest of 3.1.

As seen from the table, most of the top journals are from developed countries. In Europe, the United Kingdom is listed at the top with eight journals and its representative journal is *System*. Among three journals owned by the United States, *Modern Language Journal* is the most productive. *Australian Journal of Teacher Education* and the *Iranian Journal of Language Teaching Research* is the only journal in Australia and Iran respectively. Another finding is almost all of the prolific journals are ranked Q1 except for the *Asian EFL Journal* which has been discontinued and the *Australian Journal of Teacher Education* in Q2, indicating the journals that specialize in teacher cognition topics are normally of high quality and prestige.

Table 2
Top 15 productive journals in the teacher cognition domain

Rank	Journal	Country	NoP	TC	CPD	SJR 2021	H- index	JQ
1	System	United Kingdom	28	877	31	1.72	84	Q1
2	LTR	United Kingdom	22	256	12	1.64	65	Q1
3	TTE	United Kingdom	21	1284	61	1.95	135	Q1
4	MLJ	United States	19	961	51	3.1	94	Q1
5	RELC Journal	United Kingdom	12	294	25	0.81	37	Q1
6	JRST	United States	10	356	36	2.71	139	Q1
7	Language Awareness	United Kingdom	10	230	23	0.99	42	Q1
8	FiP	Switzerland	9	106	12	0.87	133	Q1
9	TESOL Quarterly	United States	8	164	21	1.78	101	Q1
10	Asian EFL Journal	United Kingdom	7	36	5	N/A	18	N/A
11	AJTE	Australia	7	48	7	0.63	37	Q2
12	TTTP	United Kingdom	7	263	38	1.24	62	Q1
13	ILLT	United Kingdom	5	33	7	0.83	22	Q1
14	IJLTR	Iran	5	33	7	0.56	12	Q1
15	RSE	Netherlands	5	46	9	1.7	56	Q1

Note. NoP=Number of Publications, TC=Total Citations, CPD=Citation Per Documents, JQ=Journal Quartiles, LTR=*Language Teaching Research*, TTE=*Teaching and Teacher Education*, MLJ=*Modern Language Journal*, JRST=*Journal of Research in Science Teaching*, FiP=*Frontiers in Psychology*, AJTE=*Australian Journal of Teacher Education*, TTTP=*Teachers and Teaching, Theory and Practice*, ILLT=*Innovation in Language Learning and Teaching*, IJLTR=*Iranian Journal of Language Teaching Research*, RSE=*Research in Science Education*

Topical foci

The topical foci of the research on teacher cognition were presented by the network visualization map of co-occurrence analysis of author keywords as shown in Figure 5. Of the 928 keywords, a total of 36 keywords with more than five occurrences were included to generate a clear clustering result. According to the map, the largest node is “teacher cognition” with 210 occurrences (the largest light blue node), followed by nodes “teacher beliefs” with 45 (the largest purple node) and “language teacher education” with 27 (the largest red node). The edges between keywords pairs indicate a high co-occurrence. For instance, the edges between keywords pairs such as “teacher cognition” and “teacher beliefs”, “teacher cognition” and “teacher education”, “teacher cognition” and “teacher practices”, as well as “teacher cognition” and “English as a foreign language” (EFL) are relatively thicker, therefore, the co-occurrence between them is higher than others.

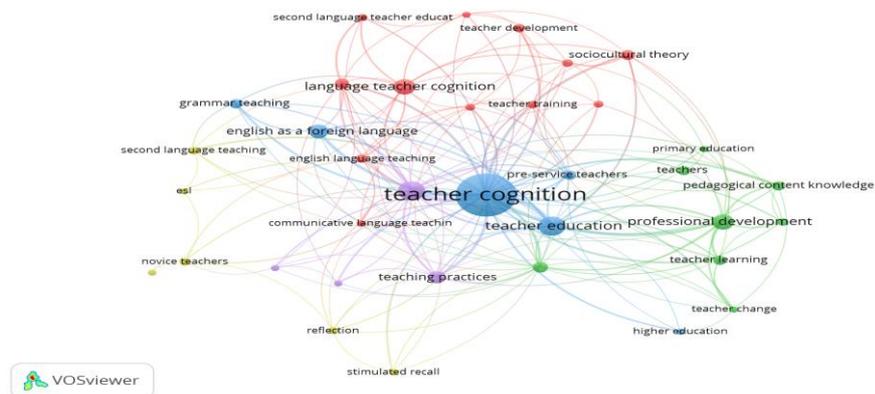


Figure 5

The network visualization map of the co-occurrence of keywords (Occurrence Threshold ≥ 5)

The 36 keywords were classified into 5 clusters in different colors and each color represents a research topic. The red cluster is the largest one with 12 keywords, among which the node size of “language teacher cognition”, “sociocultural theory” and “language teacher education” is much larger than other nodes. Therefore, this cluster mainly focuses on language teachers’ cognition from a sociocultural perspective. As for the cluster in green, nodes such as “professional development”, “teacher learning” and “teacher knowledge” are much larger compared with the other five nodes in the cluster, reflecting the research topic as teachers’ professional development. In the cluster in blue, the largest node “teacher cognition” is in the center, connecting to the themes of “teacher education” and “English as a foreign language”. Following this, the cluster implied the research focus named the teacher education and EFL teachers’ cognition. The yellow cluster consisted of six keywords, in which “novice teachers”, “ESL” and “second language teaching” are the main focus, indicating that the topic of this cluster is novice ESL teachers’ cognition. Notably, in the smallest cluster in purple which only consists of four keywords, “teacher beliefs”, and “teaching practices” are the largest nodes, implying the focus is on teacher beliefs and teaching practices.

In addition, the themes which have been discussed with a burgeoning interest in the academic world were displayed in Figure 6. The color in light indicates recent attention to the given topic. Compared with the nodes in dark such as “teacher education”, “grammar teaching” and “second language teaching”, nodes in yellow such as “multilingualism”, “language teacher education”, and “pedagogical knowledge base” were identified as the hotter research focus in teacher cognition field over the years.

topic in the education arena since the second millennium. To uncover the complexity of what teachers know, believe, and think, Borg (2003) conceptualized and developed a teacher cognition framework that later inspired surging research interest in language teacher cognition. Another reason that can account for the development trend of this field is the urgent call for centering on the cognitive knowledge base of second language teachers made by scholars such as Borg (2015) and Karimi (2011).

What are the international contributions and collaboration in the teacher cognition field?

The top five countries that produced the largest publications related to teacher cognition are the United States, China and the United Kingdom. The United States, as the largest contributor and cooperator in this domain, covers almost one-quarter of the total amount over the past 30 years. The surging development of teacher cognition research in the United States was partly due to an important report issued in 1975 calling for researchers to investigate the psychological dimensions of teachers' teaching to know how they make sense of their work. Since then, the funding for teacher cognition has been raised greatly and as a result, the number of research investigating diverse cognitive aspects of teaching and learning has grown significantly (Cichocka, 2020). Apart from this factor, it may also be attributed to the current educational reforms in the United States which focus on teacher cognition research on children education (Capps & Crawford, 2018).

Moreover, China, ranking after the United States in terms of the number of publications, has made a significant contribution to this research field, and since the past decade, the research on teacher cognition in China "has been prosperous" (Han & Song, 2011; p.176). The reason behind this is many Chinese researchers (e.g., Zhao & Zhang, 2022; Zheng, 2015) highlighted the research trajectory of teacher cognition in the Western world and are dedicated to investigating the diverse dimensions of teacher cognition research in the distinctive Chinese context.

By contrast, only a small number of researchers from South America and African countries have given this topic much consideration, nor did they collaborate with other countries. It implies that there is a dearth of literature regarding teacher cognition in African countries like Kenya (Okoth, 2016) which might result from the sporadic nationally supporting program in the education systems for teachers to systematically study cognitive constructs in these developing countries (Mavhunga & Rollnick, 2016). In response to such research deficiency, Cong-Lem (2021) highlighted the need of conducting further research on teachers' mental activities in developing countries especially in Africa, and Latin America.

Who are the most productive authors and what are the most productive journals on teacher cognition?

As the most productive author, Borg S. is undoubtedly the one who made the largest contribution to the teacher cognition field. As the founder of the teacher cognition model, Borg S. reviewed numerous studies on teachers' mental lives and redefined the thinking process as teacher cognition (Ardavani, 2020). As Borg S. mentioned,

investigating teachers' beliefs, knowledge, and other unobservable cognitive constructs beneath teachers' behavior is of great importance for fully understanding teachers' practices and promoting development (Birello, 2012). With all his contributions to directing this area of research, teacher cognition research "has become a well-established domain of inquiry in language teaching research" (Öztürk, 2021, p.181) and researchers can go "toward better understanding the fullness of the work of teaching" (Burns et al., 2015, p.586).

Regarding the most prolific journals, the journal *System*, *Language Teaching Research and Teaching* and *Teacher Education* are the ones that have produced more articles on the teacher cognition field. *The journal System* is focused on the applications of applied linguistics and educational technology to address issues with teaching and learning foreign languages. As Guo et al. (2019) commented, *System* has given much attention to the core issues such as teacher cognition within the language teacher education arena. With the same research scope in foreign language teaching, *Language Teaching Research*, as a prestigious journal with a high impact factor over the years, indicates that teacher cognition research is a hot topic in the area of foreign language teaching (Chen & Abdullah, 2022; Johnson, 2018).

What topical foci in this domain have been most frequently investigated?

The topical foci in the teacher cognition domain identified are (1) language teachers' cognition from a sociocultural perspective, (2) teacher professional development, (3) teacher education and EFL teachers' cognition, (4) novice ESL teachers' cognition, (5) teacher beliefs and teaching practices.

The most prominent focus is language teachers' cognition from a sociocultural perspective. The finding is in line with the statement made by Öztürk (2021), claiming that the relationship between teacher cognition and sociocultural interactions in teachers' daily lives has been highlighted. The cognitive orientation broadened its research scope by gradually recognizing how social context affects teachers' cognition (Bruzano, 2018). Guided by Vygotsky's theory and the "social turn" in applied linguistics (Borg, 2003), an increasing number of scholars (eg., Chung & Fisher; 2022, Li, 2020; Ngo, 2018; Wei & Cao, 2020) have diverted their attention to the influence of sociocultural context on language teachers' complex mental activities. For instance, Li (2017) made a call on looking into language teacher cognition through sociocultural dimensions and reiterated the significance of incorporating a sociocultural perspective into language teacher cognition research (Li, 2020). As Bruzano (2018) stated, cognitive functions cannot be separate from social interactions since "teachers and their knowledge as socially situated and mediated in contexts" (p.67), suggesting the study of language teacher cognition from a sociocultural perspective is a promising theme in exploring teachers' cognitive worlds.

The second focus is teacher professional development. This finding is consistent with the statement made by Pinar et al. (2021) that much effort has been made with a focus on examining teacher professional development and teacher learning. Notably, the ongoing focus of research on teachers' professional development is congruent with

widely accepted notions of the nature of learning and cognition (Borko et al., 2010). More effective learning opportunities which should be based on the idea that teaching is a lifelong endeavor with a continuum must be given to teachers, supporting that teacher learning can be achieved through teachers' construction of knowledge in their professional lives. A quite number of empirical studies (eg., Jamil & Hamre, 2018; Suyatno et al., 2022; Tóth & Szivák, 2022) have looked into the crucial aspects of professional development and teacher learning in different contexts. However, one deficiency is all of the measures used to assess the quality of teacher learning focus only on a specific element, such as cognition and emotion (Pinar et al., 2021). This urges more efforts to identify the factors that affect teachers' professional development and learning.

The third topical focus is teacher education and EFL teachers' cognition. This is consistent with the claim that substantial studies have examined the effect of teacher education on cognition (Krulatz et al., 2022; Miri et al., 2017). According to Goldenberg (2020) and Öztürk and Gürbüz (2017), it is teacher education that shapes their initial cognitive minds. As Gilje (2014) found in the qualitative study on Norwegian EFL reading teachers' cognition, the influence of formal teacher education differed from teacher to teacher. However, the model of pre-service EFL teacher cognitive development has not been much covered (Misrohawati, 2016). Therefore, it requires an in-depth perspective to examine this certain aspect.

The fourth topical domain is novice ESL teachers' cognition. This is reflected in Kang and Cheng's (2014) statement that both general education research and second language research provide a wealth of information about the developmental traits of novice teachers and the complicated challenges they encounter. Furthermore, according to Jerome and Samuel (2017), a great deal of research has been done on the complicated link between ESL teachers' beliefs and practices as well as the disparities between novice and expert teachers in terms of their pedagogical cognition and practices, such as studies conducted by Golombek and Doran (2014), and Worden-Chambers (2020). However, the role of other elements or communities in language teacher cognition models that may result in cognitive and behavioral changes in novice teachers has not been given due attention (Macalister, 2022). Therefore, it is worth stating explicitly the impact of these influential factors.

The last topical focus is teacher beliefs and teaching practices. The finding is supported by the statements that teacher belief has always been the predominant focus of interest in teacher cognition research (Borg, 2006; 2019) and teacher belief has become a well-established field due to a plethora of studies (Chen, 2020). Numerous studies (eg. Chen, 2020; Gao & Cui, 2022; Hailuan, 2020) have been conducted on examining the degree of consistency between teacher beliefs and their actual practices. As a crucial dimension in the overarching term cognition, teacher belief is found to exert an influence on teachers' classroom practices (Ro & Jung, 2016; Safa & Tofighi, 2022). However, limited attention has been given to teacher beliefs in terms of listening teaching and the dynamic changes in teacher belief (Su & Yang, 2020), therefore, there is a need for further investigation into these themes.

Additionally, the theme “multilingualism” has received the most research attention in the teacher cognition field over the years. The finding is in alignment with the statement of Alisaari et al. (2019) reporting that the recent decade has seen a surge in interest in multilingualism and ensuring all language instructors are multilingual specialists is one of the most challenging goals of future work on language teacher education. To answer the call that multiculturalism is crucial to educational access and societal power (Paris & Alim; 2014), an increasing number of studies (eg., Burner & Carlsen, 2022; Gorter & Arocena, 2020; Krulatz et al., 2022) began to investigate teacher cognition about multilingualism concerning language teaching. However, literature has found that teacher education programs have not been entirely successful in preparing language teachers for the multilingual reality of their classrooms (Alisaari et al., 2019; Cantone, 2020; Rodríguez-Izquierdo et al., 2020) which necessitates a further inquiry.

CONCLUSION

To conclude, the progressive growth in the publications’ trend on teacher cognition indicates that there will be a continual increase in the future. The publications are mainly geographically distributed in the United States, China and the United Kingdom. The United States is identified as the country which leads others in terms of contributions and collaboration. Borg S., Feryok A., and Johnson K.E. are the most productive authors, and *System, Language Teaching Research* and *Teaching and Teacher Education* emerged as the most prolific journals. The topical foci in the teacher cognition domain identified are (1) language teachers’ cognition from a sociocultural perspective, (2) teacher professional development, (3) teacher education and EFL teachers’ cognition, (4) novice ESL teachers’ cognition, (5) teacher beliefs and teaching practices. Since research gaps are presented in the research foci, future studies on these five research domains are warranted. As Dhanavel (2022) asserts, teacher cognition, especially language teacher cognition has grown into a well-established and cross-perspective field of study and conceivably it will remain a promising subject. As the first attempt to shed light on the development trajectory and research hotspots of the teacher cognition field by using bibliometric analysis, this study can derive new ideas for practitioners in the educational arena to expand the research themes and draw on more valuable suggestions for facilitating teacher development.

LIMITATIONS AND SUGGESTIONS

Though the study provides a thorough quantitative analysis of the teacher cognition knowledge base, several limitations should be addressed. To begin with, because the data was acquired from a single database, some relevant publications may not be included. Additionally, the data were extracted on 6 October 2022, and publications after that date 2022 were not covered and investigated. Furthermore, the interpretations of the findings might be influenced by subjectivity though the authors attempted to remain objective. Therefore, future studies on the teacher cognition field have suggested the use of multiple databases to guarantee the full coverage of data. Despite its limitations, this study has offered valuable insights into the research of teacher cognition.

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