A Bibliometric Analysis of Research on Teacher Emotions

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ARTICLE INFO	ABSTRACT
	This study mainly aims to reveal the bibliometric profile of research on teacher emotions. To this end, the study sought answers to seven research questions, including the most frequently used keywords and their relation networks, the frequency distribution of articles by country and the collaboration network between countries, the frequency distribution by years and the number of citations, the most prolific scholars, the most cited articles, the frequency distribution of articles by WoS categories, and the most prolific universities. The study employed the bibliometric method. The data were limited to the Web of Science and retrieved only from this database. The first search yielded a total of 598 publications. However, those who did not satisfy the criteria were excluded, and the analysis was conducted on the remaining 521 publications. The findings of the study can be summarized as follows. 255 keywords were used at least twice in the articles (excluding search terms). The top five keywords were "emotion regulation, teacher education, teaching, teacher identity, and emotional labour." The researchers who published on teacher emotions were from 54 different countries, and the five countries with the most publications were the United States, China, Germany, Australia, and England. The most publications were in 2019. The top ten most prolific scholars published 70 articles, and the most cited articles were published in 2011. As for categories, two-thirds of the articles were in "education educational research". The most prolific institution was the University of Munich. The study also provided bibliometric maps, figures, tables, and graphs to illustrate the findings. It can be concluded that teacher emotions are associated with various disciplines. Although there is increasing research on teacher emotions, which has been ignored for a long time, teacher emotions as a research field is in its infancy. As the interest in teacher emotions increases, knowledge will accumulate, and the research capacity will be strengthened.
	Keywords:[^1] Teacher emotions, bibliometric analyses, web of science.

[^1]:

1. Introduction

Emotions are discussed in different disciplines, such as psychology, sociology, neurology, behavioural sciences, education, and economics (Küpers & Weibler, 2008). As expected, the authors emphasized various aspects of emotions handled from different perspectives in these disciplines. For this reason, emotions are one of the concepts whose definition is still controversial in the literature (Schuman & Scherer, 2014). In other words, it has been challenging to reach a consensus on the conceptualization of emotions (Chen, 2019a; Ellsworth & Scherer, 2003). However, in literature, some definitions come to the fore. Emotions are relatively short-term, perceptual, experiential, operational, and communicative patterns that emerge in response to physical and social challenges or opportunities (Keltner & Gross, 1999). Mulligan and Scherer (2012) defined emotions as episodic processes that begin and end at a particular time.

Emotions are essential for individuals' daily lives and are also integral to organizational life (Oplatka & Arar, 2018). The literature reveals that emotions are intertwined with organizational life (Brotheridge & Lee, 2008).

Schools are emotionally intensive organizations (Hargreaves, 1998; Pekrun, 2009), and teachers' emotions are at the forefront in schools (Farouk, 2012). As stated, emotions, which are at the centre of organizational life, have been ignored for a long time despite their emphasized importance (Atmaca et al., 2020; Frenzel et al., 2016). Because research on the professional development of teachers was primarily dominated by approaches that treated teachers from a rational perspective, they considered the emotional aspect of the teaching profession unimportant (Chen & Cheng, 2021). However, although teachers are thought to display their behaviours and reactions by filtering them through reason and logic, they are influenced by emotions (Goleman, 1995). The number of studies on teacher emotions, which have been ignored for decades, has increased recently (Burić, 2019; Chen, 2019b; Chen & Cheng, 2021). Recognition of various aspects of education in the light of developments in the literature has played a significant role in this growing interest (Chen et al., 2020). Emotions are essential in teachers' instructional behavior and students' academic success (Chen, 2019a; Burić & Frenzel, 2021). The findings that teacher emotions were influential on student emotions contributed to increasing interest in this research field (Brown et al., 2018; Frenzel et al., 2021; Linnenbrink & Pintrich, 2002; Yoon, 2002). Additionally, it can be said that teacher emotions play a critical role in pedagogical practices, change processes, power relations in schools, and understanding of social structures (Zembylas, 2011). Teacher emotions are considered an indispensable part of teaching (Hargreaves, 1998) and significantly improve the teaching and learning process (Gross & John, 2003).

There are various conceptualizations of teacher emotions in literature, as in emotions generally. One of the most commonly referred definitions of teacher emotions in literature was put forward by Farouk (2002). The researcher defined teacher emotions as "*internalized sensations that remain inert within the confines of their bodies but are integral to how they relate to and interact with their students, colleagues, and parents.*" In literature, teacher emotions were categorized as positive and negative (Sutton & Wheatley 2003). However, the literature addressed them as multidimensional within these two main categories (Chen, 2021). For example, "*enjoyment, anger, anxiety* (Frenzel et al., 2010)"; "*joy, love, sadness, anger,* and *fear* (Chen, 2016)"; "*enjoyment, anger, anxiety, pride* (Hong et al., 2016)"; "*joy, satisfaction, love, fatigue, anger, hopelessness* (Burić et al., 2018)"; "*enjoyment, anger, anxiety, pride, hope, disappointment* (Dilekçi, 2018)"; "*anxiety, happiness, anger, pride, hope* and *despair, exhaustion, shame,* and *guilt* (Gramipour et al., 2019)" are among them. Since positive teacher emotions have a great potential to affect students' motivational, affective, and behavioural aspects and academic outcomes (Burić, 2019), teachers' experiencing positive emotions is essential for the efficiency and effectiveness of educational processes in schools (Dilekçi & Limon, 2022; Pekrun, 2009). Additionally, emotions are closely associated with teachers' well-being (Gross & John, 2003) and significantly contribute to teachers' professional development (Chen, 2021; Osman, 2017). On the other hand, negative emotions restrict teachers' thinking skills (Leithwood & Beatty, 2008), cause them to experience professional burnout (Kenworthy et al., 2014), and significantly reduce students' chances of benefiting from learning approaches offered by teachers (Linnenbrink-Garcia & Pekrun 2011). Shortly, teacher emotions significantly affect students, teaching, learning, and teachers themselves (Chen, 2019b; 2021).

The study by Sutton & Wheatley (2003) has become a milestone in emotion literature, and the number of studies has increased since then (Chen & Cheng, 2021). This increase has created an accumulation of knowledge regarding teacher emotions globally. It is emphasized that this accumulation is sufficient to be dealt with through a bibliometric analysis (Chen 2019b; Chen, 2021; Chen & Cheng, 2021; Fried et al., 2015). In this sense, this study aims to manifest bibliometric profiles of the articles on teacher emotions. When the literature is examined, it is seen that the number of bibliometric studies aimed at teachers has increased, apart from teacher feelings (Çiftçi et al., 2016; Gülmez et al. 2021; Sönmez, 2020; Sönmez & Bozdoğan, 2020). The study identifies the most prevalent keywords and their network of relationships, the countries where the majority of studies were conducted and their networks, the number of publications and citations by year, the most prolific scholars, the most cited articles, and the classification of articles according to WoS Core Collection categories and universities. To this end, the study sought answers to the following questions:

Q1. *What are the most frequently used keywords in articles about teachers' emotions, and which keywords are included with which other keywords on the web?*

Q2. *Which countries are the articles on teacher emotions most frequently published, and with which other countries are these most frequently linked?*

Q3. *What is the frequency distribution of articles on teacher emotions by years and the number of citations?*

Q4. *Who are the most prolific scholars in teacher emotions?*

Q5. *What are the most cited/most influential articles on teacher emotions?*

Q6. *What is the articles' classification on teacher emotions based on WoS Core Collection categories?*

Q7. *Which universities publish the most articles on teacher emotions?*

2. Methodology

2.1. Research Model

The primary purpose of this study is to reveal the bibliometric profiles of the articles on teacher emotions. To this end, data mining was conducted on primary data sources, and descriptive analyses were employed. A bibliometric analysis was used (López López, 1996; Salini, 2016), which is a quantitative method to analyze bibliographic data associated with limited literature (Hallinger & Kovačević, 2019). Bibliometric analysis is integral to the research evaluation methodology (Ellegaard & Wallin, 2015).

2.2. Research Sample, Data Collection Tools and Procedure

The study included the research on teacher emotions indexed in ISI Web of Science (WoS Core Collection), and scanning was conducted on February 8, 2022.
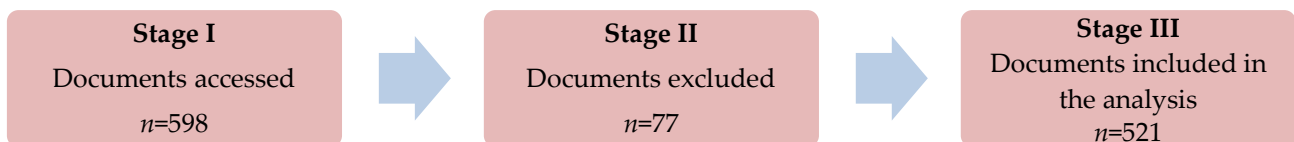
Stage I Documents accessed *n*=598	→	**Stage II** Documents excluded *n*=77	→	**Stage III** Documents included in the analysis *n*=521

Figure 1. *Stages of Data Collection*

The following terms were used for the search: "*Teacher emotion*," "*Teachers emotion*," "*Teacher's emotion*," "*Teacher emotions*," "*Teachers emotions*," "*Teacher's emotions*," "*Teacher feeling*," "*Teachers feeling*," "*Teachers feeling*," "*Teacher feelings*," "*Teachers feelings*," "*Teachers feelings*," "*Teachers mood*," "*Teachers mood*," "*Teacher's mood*," "*Teachers moods*," "*Teachers moods*," "*Teacher's moods*," "*Teacher affect*," "*Teachers affect*," "*Teacher's affect*," "*Teacher affects*," "*Teachers affects*," "*Teacher's affects*." The terms were searched together and using the "OR" link. The results were added to the WoS marked list (*n*=598). In the second stage, we excluded the documents which were "*Early access* (*n*=42)", "*Book chapters* (*n*=34)", "*Proceedings paper* (*n*=1)". During this stage, all articles' title, abstract, and keywords were checked. A total of 521 articles were reached as of 1986. Since the number of publications and citations in 2022 was unclear, 2022 was excluded from the analysis.

2.3. Validity and Reliability

The study included only the WoS to reach high-quality articles as an database. The search results were also added to WoS marked list. On the other hand, WoS database indicates that the findings were objective and could be presented descriptively easily.

2.4. Data Analysis

The articles included in the study were selected considering the criteria of "*dealing with teacher emotions and being indexed in WoS*." The *VOSviewer* was employed to answer the first and second research questions (Arts, 2020); *Microsoft Office Excel 2020* for descriptive statistics regarding the fourth and fifth research questions; the "*Analyze Results*" menu of WoS for the third, sixth, and seventh research questions. Bibliometric analysis was conducted within the first research question (the frequency of keywords and their network), excluding the 24 keywords in the first search and the concepts such as teacher, emotion, feeling, affect, and mood. They were excluded to make the bibliometric map in Figure 2 more understandable, and articles on teacher emotions stand out more clearly.

2.5. Ethical

The data were obtained from WoS. The data analysis was conducted through *VOSviewer*, *Microsoft Office Excel 2020*, and the *Analyze Results* menu on the WoS website, not requiring an ethics committee's permission.

3. Findings

Q1. *What are the most frequently used keywords in the articles on teacher emotions, and which are most frequently included in the network of relations with other keywords?*

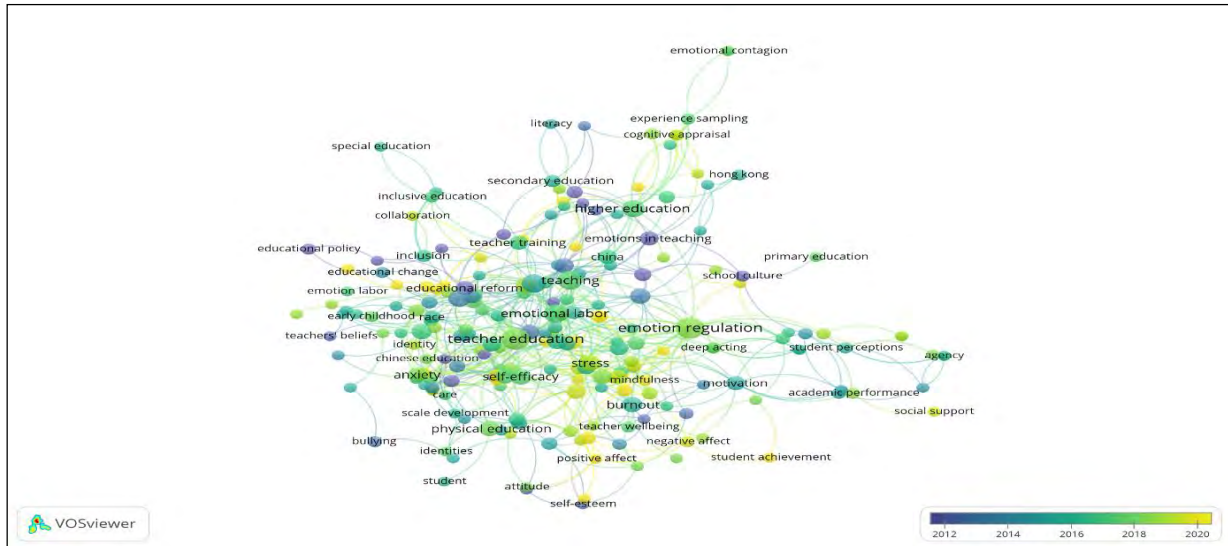Figure 2 below shows the keywords and their relationship network.

Figure 2. *Analysis of Keywords*

As Figure 2 shows, there were 255 keywords used at least twice in 521 articles (excluding search terms). The most frequent 5 keywords were *"emotion regulation (f=27)"*, *"teacher education (f=27)"*, *"teaching (f=17)"*, *"teacher identity (f=16)"*, and *"emotional labor (f=15)"*. Considering Total Link Strength, the first five keywords are the same. However, the order changed among themselves. It was as follows *"emotion regulation (f=35)"*, *"teacher education (f=27)"*, *"teaching (f=27)"*, *"emotional labor (f=25)"* and *"teacher identity (f=24)"*. The term *"teacher identity"* was used more frequently than *"emotional labor"*; however, *"emotional labor"* has more links with other keywords. Two keywords were used together at most four times in the articles. These are *"anger"* and *"enjoyment."* The keywords used together three times in the articles are *"teacher education and student-teacher,"* *"anxiety and enjoyment,"* *"emotion regulation and teacher wellbeing"*, *"emotional labor and emotion regulation"*, *"emotion labor and emotional rules"*, and *"emotional labor and China."* These findings indicate that the articles mostly focus on teacher education, teacher identity, learning, emotion regulation, and emotional labor. As for types of emotions, the studies mostly focus on *"anger," "anxiety,"* and *"stress."*

Q2. *In which countries are the articles on teacher emotions most frequently published, and which countries are these most frequently linked?*

Figure 3 below presents the countries where most articles were published on teacher emotions and their relation network.
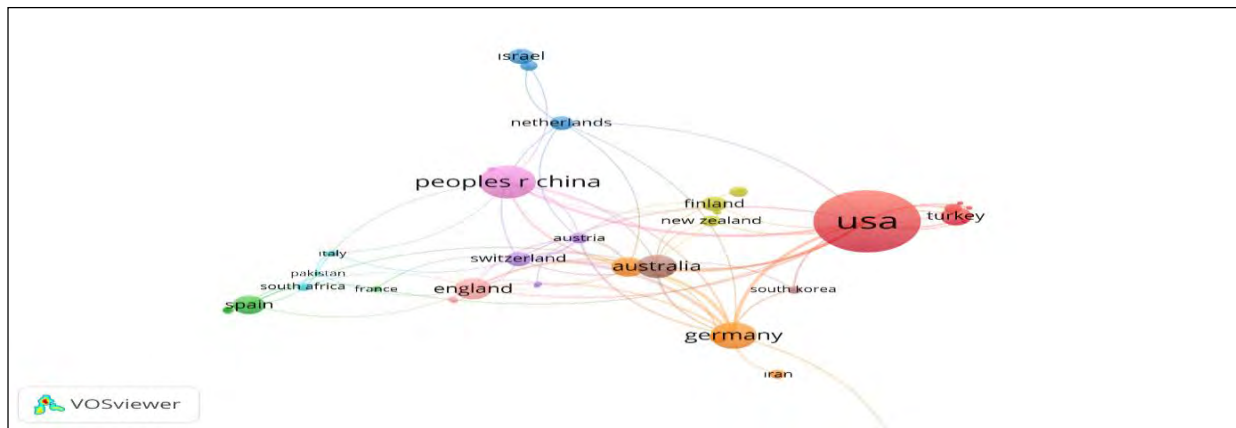
Figure 3. *Most Frequently Publishing Countries and Analysis of Countries*

As Figure 3 shows, there are researchers from 54 different countries, and the most publishing five countries are the U.S.A. (f=164), China (f=60), Germany (f=43), Australia (f=35), and England (f=31). Eight countries have less than five articles. Some of the articles are authored by researchers from more than one country. Researchers from the U.S.A. co-authored with researchers from 17 countries; researchers from England coauthored with researchers from 13 countries; researchers from Germany coauthored with researchers from 12 countries; researchers from China and Australia coauthored with researchers from 11 countries and lastly, researchers from Canada coauthored with researchers from 10 other countries. *"Germany and Switzerland"* had the most collaborations (Link Strength=9). On the other hand, there were seven collaborations between the counties of *"the U.S.A. and China," "the U.S.A. and Germany," "the U.S.A. and Canada," "Canada and Germany.".* By total link strength (not considering whether they are different countries or not), the top five countries are as follows: Germany (f=42), the U.S.A. (f=39), Canada (f=31), Switzerland (f=22), and Australia (f=19).

Q3. *What is the frequency distribution of articles on teacher emotions by years and the number of citations?*

Graph 1 below shows the number of articles by year.
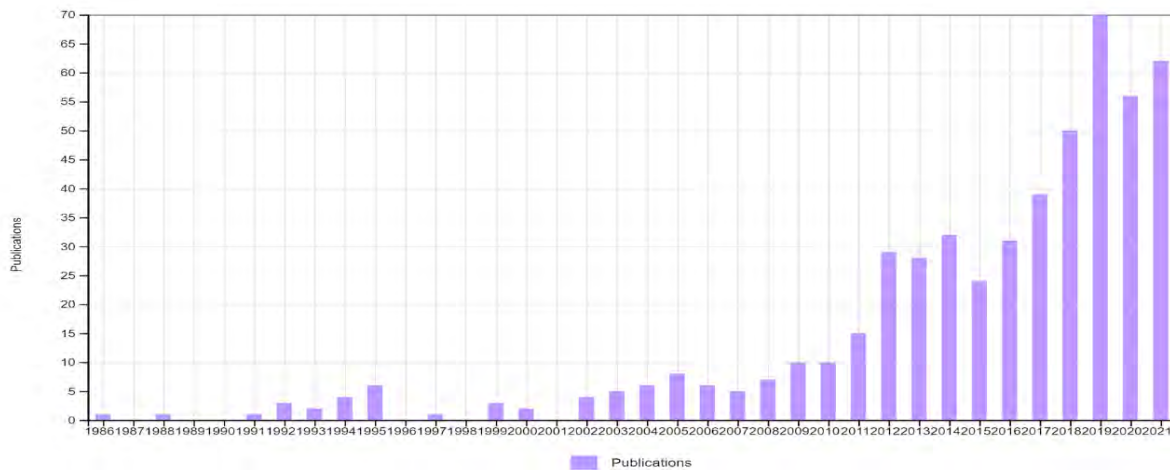
Graph 1. *The Number of Articles by Year*

Graph 1 shows that the first article on teacher emotions was published in 1986. There was a slight increase in the number of articles between 1991-1995. From 1995 to the beginning of the 2000s, few articles were published in WoS. A relative decrease in 2015 was observed compared to the previous three years (2012, 2013, 2014). As of 2017, there was a dramatic increase, and at least 50% of the total articles were published in and after this year. It was also striking that the highest number of publications was in 2019 (f=70; 13.4%). However, there was a relative decrease in the number of articles in the following two years (2020, 2021). The number of articles as of 2001 was 499 (95.8%), and it was only 22 (4.2%) in and before 2000. Graph 2 presents the number of citations by year.
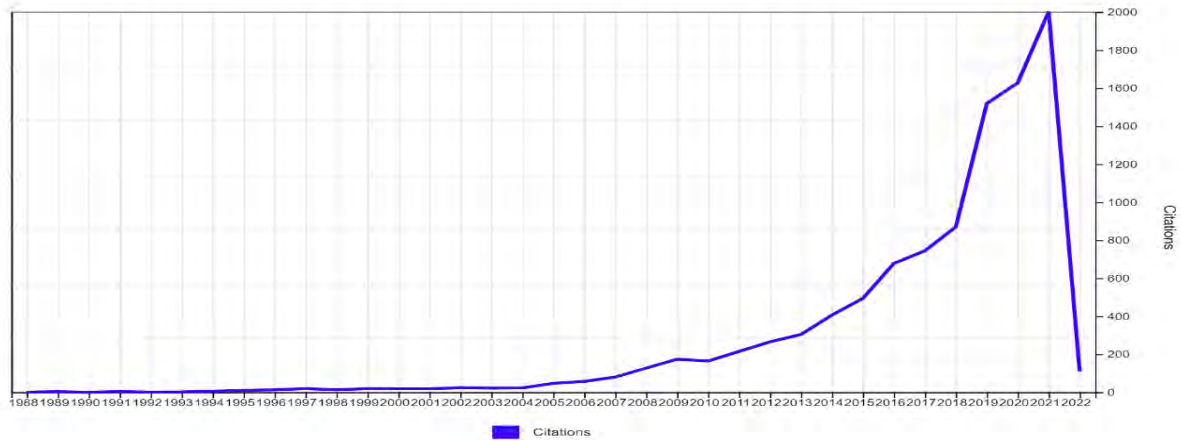
Graph 2. *Citations by Year*

Graph 2 shows that the number of citations by year was consistent with the number of publications by year as in Graph 1. As can be seen in the graph, there is a sharp increase in the number of citations as of 2000.

Q4. *Who are the most prolific scholars on teacher emotions?*

Table 1 below presents the ten most prolific scholars publishing on teacher emotions.

Table 1. *The Most Prolific Scholars*

No.	Author	The number of articles	The number of citations	Total Link Strength
1	Anne C. Frenzel	16	529	36568
2	Thomas Goetz	9	472	22945
3	Irena Burić	9	110	22214
4	Jamie I. Taxer	7	270	16521
5	Reinhard Pekrun	5	210	13882
6	Nathan C. Hall	6	44	12747
7	Anna Sliskovic	4	38	10890
8	Junjun Chen	6	127	10722
9	Gerda Hagenauer	5	163	10048
10	Eva S. Becker	3	151	8973
Total		70	2114	-

As Table 1 presents, the total number of articles by the ten most prolific scholars is 70. The three most prolific scholars are *Anne C. Frenzel*, *Thomas Goetz*, and *Irena Burić*. Anne C. Frenzel is the most prolific one, with 16 articles based on the total link strength. Although Nathan C. Hall and Anna Sliskovic have the fewest articles, they are in the middle of the most influential scholar list, thanks to their total link strength.

Q5. *What are the most cited/ most influential articles on teacher emotions?*

Table 2 presents the most cited ten articles on teacher emotions.

As Table 2 displays, the most cited ten articles were published between 2005 and 2014. The article titled *"Teacher job satisfaction and motivation to leave the teaching profession: Relations with school context, feeling of belonging, and emotional exhaustion"* by Skaalvik & Skaalvik (2011) ranks first with 428 citations. It was followed by Hong's article titled "Pre-service and beginning teachers' professional identity and its relation to dropping out of the profession" (2010). Although the article titled *"You choose to care: Teachers, emotions, and professional identity"* by O'Connor (2008) ranks fourth by the number of citations, it ranks third by the annual average number of citations ($\bar{X}$= 21,7). On the other hand, articles by Chang (2013) and Becker et al. (2014) rank seventh and eighth by the number of citations, but their average number of citations by year is high. Eight out of ten most cited articles were published in *"Teaching and Teacher Education."* The two remaining articles were published in *"Educational Psychologist"* and *"Motivation and Emotion."*

Table 2. *The Most Cited Articles*

	Title	Authors	Source Title	Year of Publication	Number of Citations	Average by Years
1	**"Teacher job satisfaction and motivation to leave the teaching profession: Relations with school context, feeling of belonging, and emotional exhaustion"*	*Skaalvik, EM and Skaalvik, S	Teaching And Teacher Education	2011	428	42,8
2	**"Pre-service and beginning teachers' professional identity and its relation to dropping out of the profession"*	*Hong, JY	Teaching And Teacher Education	2010	304	27,6
3	**"Teachers' emotions in educational reforms: Self-understanding, vulnerable commitment, and micropolitical literacy"*	*Kelchtermans, G	Teaching And Teacher Education	2005	303	18,3
4	**"You choose to care: Teachers, emotions and professional identity"*	*O'Connor, KE	Teaching And Teacher Education	2008	283	21,7
5	**"Discovering emotion in classroom motivation research"*	*Meyer, DK; Turner, JC	Educational Psychologist	2002	275	14,5
6	**"Discursive practices, genealogies, and emotional rules: A poststructuralist view on emotion and identity in teaching"*	*Zembylas, M	Teaching And Teacher Education	2005	189	11,8
7	**"Toward a theoretical model to understand teacher emotions and teacher burnout in the context of student misbehaviour: Appraisal, regulation and coping"*	*Chang, ML	Motivation and Emotion	2013	146	18,3
8	**"The importance of teachers' emotions and instructional behavior for their students' emotions - An experience sampling analysis"*	*Becker, ES; Goetz, T; Morger, V; Ranellucci, J	Teaching And Teacher Education	2014	127	18,1
9	**"Teachers' sense-making about comprehensive school reform: The influence of emotions"*	*Schmidt, M; Datnow, A	Teaching And Teacher Education	2005	126	7,9
10	**"One teacher's identity, emotions, and commitment to change: A case study into the cognitive-affective processes of a secondary school teacher in the context of reforms"*	*van Veen, K; Sleegers, P; van de Ven, PH	Teaching And Teacher Education	2005	122	7,6

Q6. *What is the articles on teacher emotions classification based on the WoS Core Collection categories?*

Figure 4 below shows the classification of the articles based on WoS Core Collection categories.

Figure 4. *The frequency distribution of the articles based on WoS categories*

Figure 4 includes the categories in which at least ten articles were published. Based on these criteria, nine categories emerged. The *"Education Educational Research"* category had the most articles (*f*=344), which accounted for 66% of all the publications. In other words, two-thirds of publications were related to education and educational research. It is followed by *Psychology Educational* (*f*=68), accounting for 13% and *Psychology Multidisciplinary* (*f*=37), accounting for 7% of the publications.

Q7. *Which universities published the most articles on teacher emotions?*

Figure 5 below displays the frequency distribution of the published articles by universities.

Figure 5. *The Number of Articles Published by Universities*

Figure 5 displays the universities which published at least ten articles on teacher emotions. The findings showed that eight universities satisfied this criterion. The *University of Munich* ranks first with 21 articles (4%), the *Education University of Hong Kong* ranks second with 18 articles (3.4%), and the *Chinese University of Hong Kong* ranks third with 15 articles (2.87%).

4. Conclusion and Discussion

This study revealed the bibliometric profiles of the articles on teacher emotions indexed in WoS. To this end, the study examined *the most frequently used keywords and their network of relationships, the countries with the most publications and their network of relationships, the number of publications and citations by year, the most prolific scholars, the most cited articles, the classification of articles based on WoS categories, and the universities where the authors work.*

"*Emotion regulation and teacher education*" were the most frequently used keywords. Teaching is described as an emotional effort (Hargreaves, 1998). To attain desired instructional outcomes, the teacher may sometimes have to regulate their emotions within this spirited effort (Fried, 2011; Sutton & Harper, 2009). Thus, teacher emotions are frequently discussed together with the *regulation of these emotions* in literature (Jiang et al., 2016; Uzuntiryaki-Kondakci et al., 2021). Another keyword with a relatively high frequency is "*teacher education*", handled with teacher emotions. Teacher emotions directly affect the success of educational activities by reflecting on their qualifications (Zembylas, 2011). Emotions are especially an integral part of teacher training. The literature suggests that emotions also affect cognitive performance, motivation, success, decision making, and problem-solving (Anttila et al., 2016). Additionally, it is not enough to have field expertise and use proper methods and techniques (Hargreaves, 1998). Considering the association between emotions and teaching/learning, it is inevitable that an emotional perspective to rationality in teachers' professional development should be integrated to increase teacher effectiveness (Chen, 2020; Chen & Cheng, 2021). In this sense, it can be said that emotions have a critical role in teacher training (Hong, 2010). The third most frequently used keywords were "*teaching, teacher identity,* and *emotional labor*", respectively. The five most commonly used keywords were the same based on Total Link Strength. However, their ranks changed within themselves. It was observed that "*teacher identity*" is used more frequently than "*emotional labor*", but "*emotional labor*" had more network relations with other keywords. Shortly, teacher emotions have a critical role in teaching, students, and teachers themselves (Chen, 2019b; 2021).

"*Anger* and *enjoyment*" were used together four times in the articles indexed in WoS. Anger is a negative emotion that may have detrimental effects on teachers' psychological and professional functioning (Burić & Frenzel, 2019). Previous literature suggests that anger is among the negative emotions experienced by teachers (Burić et al., 2018; Dilekçi, 2018; Hong et al., 2016; Uzuntiryaki-Kondakci et al., 2021). On the other hand, "*enjoyment*" is associated with lower teacher burnout, higher job satisfaction, and improved student outcomes (Wang & Hall, 2021). In literature, enjoyment is one of the most prominent positive teacher emotion (Dilekçi, 2018; Frenzel et al., 2016; Hong et al., 2016; Uzuntiryaki-Kondakci et al., 2021). The keywords which were used three times together are as follows: "*teacher education and student-teacher*", "*anxiety and enjoyment*", "*emotion regulation and teacher well-being*", "*emotional labor and emotion regulation*", "*emotion labor and emotional rules*" and "*emotion labor and China*". To conclude, it can be said that articles dealing with teacher emotions mostly focus on teacher education, teacher identity, teaching, emotion regulation, and emotional labor. The most commonly discussed emotion types are anger, enjoyment, anxiety, and stress.

The findings also suggested that the scholars who published on teacher emotions were from 54 countries. The *U.S.A.*, *China*, *Germany*, *Australia*, and *England* are at the top. Scholars from Germany and Switzerland had the most collaborations. Each of the country pairs of "*the U.S.A. and China*", "*the U.S.A. and Germany*", "*the U.S.A. and Canada*", "*Canada and Germany*" had seven collaborations. Based on Total Link Strength, which does not consider whether it is a different country, the first five countries were Germany, the U.S.A., Canada, Switzerland, and Australia. These findings suggested that Western countries contributed to the literature on teacher emotions more than others (Chen, 2019b; King & Chen, 2019; Oplatka & Arar, 2018; Uitto et al., 2015). Chen (2019b) stated that political, social, and cultural differences might play a role in this difference between countries. On the other hand, there is a lack of scientific knowledge and capacity to inform policymakers and practitioners in teacher education which can be shown as another reason for the scarcity of research conducted in Asian countries on teacher emotions (Chen, 2019b).

The findings indicated that the first article in WoS on teacher emotions was published in 1986. However, there was not a considerable increase in publications until the beginning of the 2000s. On the other hand, the literature witnessed a slight increase between 1991 and 1995. Again, from 1995 to the beginning of the 2000s, few articles on teacher emotions in WoS were published. In other words, teacher emotions did not attract

much attention from researchers until the late 1990s. Adopting a rational perspective, the policymakers and administrators ignored the emotional aspect of the teaching profession (Chen & Cheng, 2021). This suggests that teacher emotions were ignored for a long time (Atmaca et al., 2020; Frenzel et al., 2016). As of 2017, there was a rapid increase in articles published in WoS. More than half of the articles were published in the following years, showing that scholars increasingly recognise teachers' emotions (Chen, 2019b; Chen et al., 2020). Another striking finding was that most publications were in 2019. It can be said that the number of publications that increased consistently from 2016 reached its peak in 2019. However, there were fewer publications in 2020 and 2021 than in 2019, which can be attributed to the Covid-19 pandemic. The researchers directed their attention to studies on pandemics (Chahrour et al., 2020; Wang & Tian, 2021). Shortly, the frequency distribution of articles suggested that interest in teacher emotions increased in the 21st century (Burić, 2019). However, it can be said that the literature on teacher emotions is still in its infancy (Chen et al., 2020). There was a consistent correlation between the number of publications and the number of citations by year. The number of citations, which was horizontal until the beginning of the 2000s, increased continuously with minor breaks in the following years. This indicates an increased research capacity on teacher emotions. As expected, more publications on teacher emotions resulted in more citations.

The findings showed that *Anne C. Frenzel, Thomas Goetz, Irena Burić, Jamie I. Taxer, Reinhard Pekrun, Nathan C. Hall, Anna Sliskovic, Junjun Chen, Gerda Hagenauer,* and *Eva S. Becker* were the most prolific scholars on teacher emotions in the WoS database. These scholars had 70 publications in total. The most prolific three scholars were Anne C. Frenzel, Thomas Goetz and Irena Burić. Anne C. Frenzel has most publications on teacher emotions based on total link strength. Nathan C. Hall and Anna Sliskovic had few citations among the most prolific scholars, but their total link strength carried them to the sixth and seventh ranks in the most prolific scholars list. The finding that the most prolific scholars were from Western countries was consistent with the frequency distribution of articles by country.

The top ten articles by the number of citations were published between 2005 and 2014. The article by Skaalvik and Skaalvik (2011) ranks first, followed by Hong (2010). Although O'Connor's (2008) study ranks fourth by the number of citations, it ranks third by the annual average number of citations. On the other hand, eight out of the top ten articles were published in *"Teaching and Teacher Education"*. *"The Impact Factor of this journal is 3.272, ranking it 65 out of 264 in Education & Educational Research and this journal is indexed in 26 international databases as of 10th March 2022."* (https://www.journals.elsevier.com/teaching-and-teacher-education)

The findings suggested that at least ten articles by WoS categories emerged nine categories. The diversity of the number of categories can be attributed to the interdisciplinary nature of emotions. Emotions are interdisciplinary because they are handled from various disciplines such as psychology, sociology, neurology, behavioural sciences, education, and economics (Küpers & Weibler, 2008). As expected, most articles were in the *"Education Educational Research"* category, which accounted for two-thirds of all articles. It is followed by "*Psychology Educational*" and "*Psychology Multidisciplinary*" categories.

Considering the universities with which the scholars were affiliated, the findings suggested that eight of them had at least ten publications. The *University of Munich* ranks first by the number of publications which can be explained by the contributions of Anne C. Frenzel and Reinhard Pekrun working for this university. On the other hand, the *Education University of Hong Kong* ranks second by the number of publications. This can be attributed to scholars Junjun Chen and Hui Wang. The *Chinese University of Hong Kong* ranks third by the number of publications. It is noteworthy that there were two universities from Hong Kong among the top three universities, which shows a growing interest in teacher emotions as a research field in Asia (Chen, 2019b).

5. Limitations and Recommendations

This study has some limitations. *First*, the data was limited to the WoS database. Articles in other databases such as Scopus, was not included in the study. *Second*, the articles investigated in the study were published by 2021. *Third*, early access, book chapters, and proceedings papers were excluded from the analysis. Although there is a growing interest in teacher emotions, which has been ignored for a long time, it is still in its infancy. Thus, further studies on teacher emotions can contribute to the existing literature, expanding the keyword network, universities and countries publishing on teacher emotions, and the number of publications, citations, and scholars. Further studies can also investigate the different bibliometric profiles of articles on teacher emotions.

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