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Comparative Study on Task-Based Teaching and Learning: A Scientometric Analysis in CiteSpace

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Abstract
This study conducted a scientometric analysis using CiteSapce based on literature from the Web of Science (WoS) core collection and the China National Knowledge Infrastructure (CNKI) between 2013 and 2022. The primary objective is to comparatively explore the current status, themes, and emerging trends in task-based teaching and learning to understand this field comprehensively. The results provided insights for researchers to explore more in this field.

Keywords: Task-based teaching and learning; Comparative study; Scientometric analysis; CiteSpace

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1.0 Introduction

The pedagogical significance of task-based teaching and learning (TBTL) is conspicuous in its emerging new trends in interdisciplinary studies and technology-assisted TBTL. Chinese scholars paid substantial attention to TBTL, particularly since research in this field constantly expands and grows in depth. However, different current statuses, themes, and trends were elicited when comparing TBTL publications in WoS and CNKI. Thus, exploring TBTL to provide researchers with holistic overviews of the field is pertinent and essential.

To date, reviews have yet to be reported on TBTL within the last decade, from 2013 to 2022. No literature appears to have been found to compare TBTL publications through a scientometric analysis using CiteSpace, which was used to compare TBTL-related literature retrieved from the Web of Science (WoS) core collection and China National Knowledge Infrastructure (CNKI) between 2013 and 2022.

The major objectives of the study are to explore the current status, themes, and emerging trends of TBTL publications in WoS and CNKI databases. The research questions addressed in this paper are:

1. What is the current status of TBTL publications from 2013 to 2022 in WoS and CNKI databases?
2. What themes emerged in TBTL publications from 2013 to 2022 in WoS and CNKI databases?
3. What are the emerging trends in TBTL publications from 2013 to 2022 in WoS and CNKI databases?

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2.0 Literature Review

Originating from the experiential learning theory of Kolb (1984), TBTL has attracted considerable attention over the past three decades. According to Wright (2000), TBTL underlines practice and emphasizes the crucial links between abstract concepts and real-world experiences. Notwithstanding, no unified definition of tasks is found, and common task features have been pointed out, including process-directed, goal-oriented, meaning-centered, and communication-focused (Ellis, 2012). Due to these features, TBTL is considered more effectual than other types of learning approaches (Long, 2016).

As a process-oriented and student-centered approach, TBTL is critical to developing students' language skills (Aliasin et al., 2019). Xue (2020) maintained that the approach of TBTL could improve students' second language acquisition (SLA) and enhance language fluency and accuracy. In addition, TBTL promotes classroom interactions, boosts students' confidence, provides more opportunities for carrying out communicative strategies, and increases target language input (Aliasin et al., 2019; Page & Mede, 2018).

Besides language-based subjects, TBTL has also been employed in other disciplines, such as social sciences inter-disciplines, scientific disciplines, and computer science inter-disciplinary applications. For instance, Guo et al. (2022) employed online task-based teaching in geophysical courses and found that this approach enhanced teaching flexibility and promoted teaching effectiveness in science and engineering. Tasir et al. (2018) devised a task-based problem-solving model to facilitate students in fostering problem-solving skills in STEM education, i.e., science, technology, engineering, and mathematics. Their study presented evidence for the suitability of the task-based model in contexts of STEM education. Likewise, Burston (2017) and Mulyadi et al. (2021) also explored the integration of technologies, especially computers or mobile technologies into TBTL.

3.0 Methodology

As mentioned earlier, two databases were used as the search engine. Firstly, the key search terms adopted in the first phase of WoS were limited to (“task-based” AND (“teaching” OR “learning”)). The refinement was made using the keywords “English” as well as document types, i.e., "Article" and "Review" which were chosen for the refinement of the results. A total of 1799 records between 2013 and 2022 were retrieved. As for the CNKI, under the advanced index, the terms "任务型教学(task-based teaching)" and "任务型学习(task-based learning)" were searched separately and then combined with "OR." The document type of "Articles" and the subject classification "language and education" was used for refinement. After deduplicating and sorting, the final dataset in CNKI contained 2320 records. The total number of publications retrieved from the two databases is shown in Table 1. After a cursory examination, it was found that papers published in CNKI appear to be mostly conducted in China compared with those published in WoS, which were essentially international studies.

Table1. Retrieval results of the WoS and CNKI database

Database	Year	Retrieving Results
WoS core collection	2013-2022	1799
CNKI	2013-2022	2320

Next, co-word analyses, including co-word citation, co-word clustering, burst detection, and analysis of major citing articles of detected keywords, were conducted on CiteSpace (6.1.R2) to examine the themes and emerging trends in TBTL studies.

4.0 Findings & Discussion

4.1 Comparison of current development status in TBTL

The comparison of the publication distribution records between 2013 and 2022 is presented in Fig. 1. The solid red line represents the publication trend in WoS. The black broken line shows the trends of papers published in CNKI. The dotted line with an arrow is the exponential trend in WoS. As seen in the figure, TBTL publications in WoS are generally growing exponentially, indicating that this field is not saturated, i.e., there is still room for further development. It is evident that from 2019 on, yearly publications are more than 200. In contrast, TBTL publications in CNKI are declining annually.

It is evident that the publications have undergone three development phases. In Phase 1 (2013-2015), studies on TBTL were active, with more than 400 yearly publications. In Phase 2 (2015-2017), there is a sharp decline in the number of publications. However, the publications were relatively stable despite a slow decline in Phase 3 (2017-2022).

Two possible reasons exist for the disparity in papers published in WoS and CKNI. Firstly, unlike papers published in WoS, which are highly diversified, innovative, and combine theoretical discussions with empirical studies, papers published in CNKI are primarily confined to theoretical discussions, lacking innovative empirical studies and in-depth investigations. Secondly, high similarity in research content and discussions and a mere focus on the language field have been found in CNKI publications. Therefore, on the surface, TBTL publications in CNKI appear saturated. More diversified directions need to be expanded, and more empirical studies need to be explored.

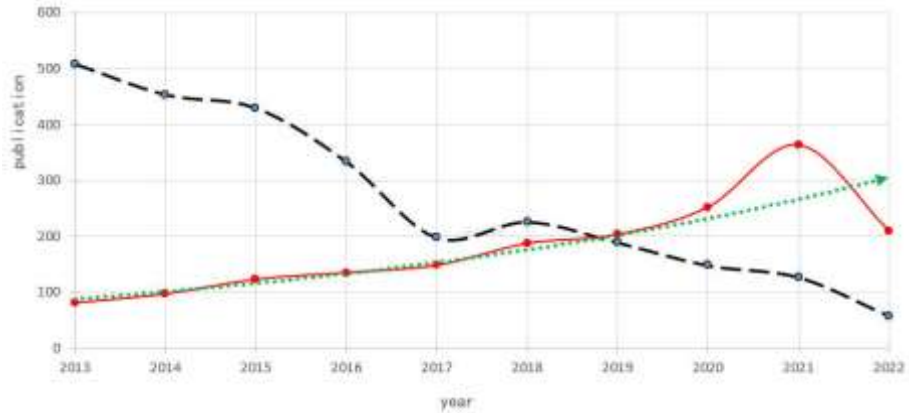

Fig. 1. TBTL publications in WoS and CNKI (2013-2022)

4.2 Comparison of TBTL themes

Co-word citations and co-word clusters were employed to analyze the TBTL themes in the two databases. Major keywords retrieved in CNKI and WoS are presented in Fig. 2 and Fig. 3. The larger the node, the higher the co-citation is.

In Fig. 2 and 3, the modularity of the timeline network respectively reached 0.8633 and 0.8152(>0.7), indicating that the co-cited keywords are well-defined (Chen, 2017). Betweenness centrality (BC) was also used to determine the significance of a node's position in the network. According to Chen et al. (2012), BC is highly connected to other nodes within or between clusters.

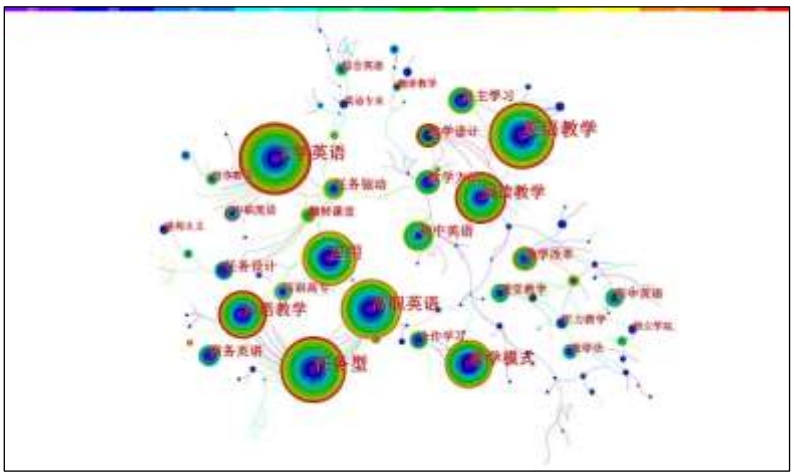

Fig. 2 Keywords of TBTL retrieved in CNKI

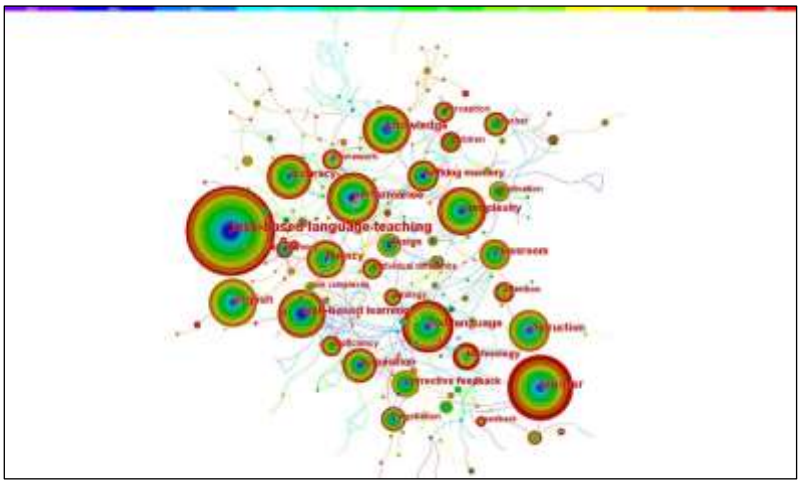

Fig. 3 Keywords of TBTL retrieved in WoS

The keywords are also summarized in Tables 2 and 3. As seen in the tables and figures, both similarities and differences between the TBTL themes were identified in the two databases.

In terms of similarities, first, TBTL publications in both databases focus on task-based English teaching, and the keywords include

task-based learning, *English teaching*, etc. A closer look at the "Node Details" shows that Ellis (2016), who redefined the focus-on-form in SLA, is the highest citing paper. Second, task designs are the research priority in both databases to examine their effects on language learning. The keywords that emerged are *task design*, *working memory*, and *task complexity*. Third, besides classroom teaching, the technology-assisted method is also the research focus, and the emphasis is combining learning in and out of class. This is evident in the keywords, i.e., *classroom learning*, *technology*, and *flipped classroom*.

Regarding differences, firstly, TBTL publications in CNKI appear to focus on teaching and learning of English language. However, in WoS, TBTL publications focus on other second languages besides English. The keywords in WoS include *second language* and *acquisition*, etc. The keywords in CNKI are *English teaching*, *college English*, etc. Second, TBTL publications in CNKI mainly fall into two distinct categories. One category comprises studies based on different school-running and student enrollment modes (Chen, 2018; Liu, 2022). The keywords include *college English*, *vocational English*, *junior school English*, *high school English*, *secondary vocational English*, and *independent college*. The other category comprises studies of specific skills and subjects. The keywords include *reading teaching*, *speaking teaching*, *listening teaching*, *writing teaching*, *Business English*, and *comprehensive English*.

Table 2. Keywords of TBTL retrieved in CKNI

Keywords	Citation Frequency	BC	Keywords	Citation Frequency	BC
英语教学 (English teaching)	245	0.12	自主学习 (autonomous learning)	41	0.02
任务型 (task-based)	231	0.26	教学设计 (teaching design)	39	0.07
大学英语 (college English)	209	0.12	高中英语 (high school English)	36	0.02
高职英语 (vocational English)	177	0.16	教学改革 (teaching reform)	33	0.26
应用 (application)	140	0.06	课堂教学 (classroom teaching)	28	0.05
教学模式 (teaching model)	124	0.05	合作学习 (cooperative learning)	27	0.01
阅读教学 (reading teaching)	119	0.03	翻转课堂 (flipped classroom)	27	0.43
口语教学 (speaking teaching)	101	0.13	中职英语 (secondary vocational English)	24	0.03
初中英语 (junior school English)	53	0.04	听力教学 (listening teaching)	22	0.12
任务驱动 (task-motivated)	43	0.49	综合英语 (comprehensive English)	19	0.06
任务设计 (task design)	43	0.24	写作教学 (writing teaching)	18	0.02
商务英语 (business English)	43	0.02	建构主义 (constructivism)	18	0.00
教学方法 (teaching approach)	42	0.39	独立学院 (independent college)	17	0.05

Table 3. Keywords of TBTL retrieved in WoS

Keywords	Citation Frequency	BC	Keywords	Citation Frequency	BC
TBLT	259	0.04	Technology	43	0.06
Learner	134	0.07	Working memory	39	0.16
Knowledge	97	0.02	Corrective feedback	38	0.03
Task-based learning	88	0.06	Design	36	0.05
Performance	81	0.24	Proficiency	29	0.05
Second language	81	0.22	Framework	29	0.17
Complexity	80	0.07	Perception	29	0.02
English	69	0.00	Children	28	0.01
Accuracy	61	0.08	Motivation	26	0.16
Instruction	58	0.06	Negotiation	26	0.10
Fluency	55	0.26	Attention	25	0.02
Acquisition	53	0.03	Individual difference	23	0.09
Classroom	48	0.06	Task complexity	17	0.26

In contrast, the TBTL themes published in WoS focus on three aspects. The first aspect is the effects of learners' learning performance and cognitive differences on SLA, and identified keywords include *performance*, *proficiency*, *complexity*, *accuracy*, *fluency*, and *individual difference*. The second aspect is the impact of feedback on the development of SLA and the promotion of mutual interaction, and the keywords identified are *instruction*, *corrective feedback*, etc. The third aspect focuses on the reciprocal effects of affective factors and the development of SLA, and the keywords include *motivation*, *attention*, etc.

In addition, the log-likelihood ratio test method (LLR) was adopted to label the co-word clusters to understand the differences in TBTL themes better. The Top 10 clusters were identified for comparative analysis of the publications in WoS and CNKI, and the results are presented in Fig. 4, Fig. 5, and Table 4. In general, a higher ranking entails a bigger cluster.

When the co-word clusters of TBTL were compared in the two databases, multiple similar themes, such as task-based learning and second language, were identified.

The differences in the co-word clusters are also evident. As seen in Table 4, one of the major themes in CNKI's TBTL publications is *teaching reform*. Visualization of the co-word clusters shows that the cluster *teaching reform* includes keywords such as task-led, professional English, vocational ability, and English course. In addition, "teaching reform" as a keyword also appears in other clusters, such as *high school English*, *college English*, *vocational English*, etc. (Li & Xue, 2022). *Business English* appears as another major theme. This is seen with the increased number of colleges in China applying to offer Business English as an independent major or subject. Keywords in the *Business English* cluster include task-based teaching and learning, teaching and learning practice, speaking teaching, communication, etc. Interestingly, the Uyghur language, which the Uygur minority group mainly speaks in Xinjiang of China, is also a keyword in this cluster, indicating that Business English among the minority groups is also gaining increasing attention.

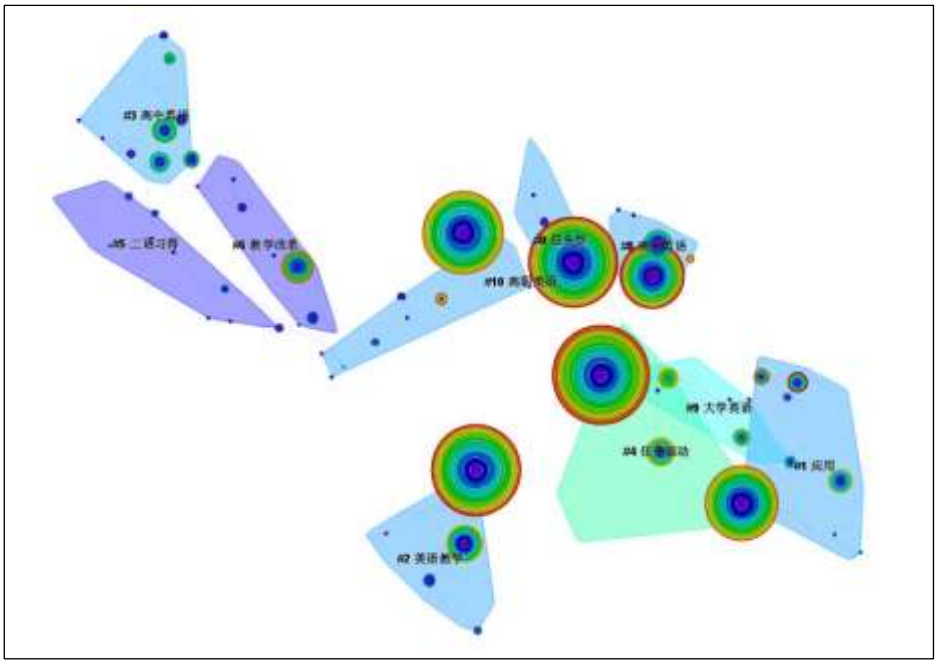

Fig. 4 Co-word clusters of TBTL retrieved in CNKI

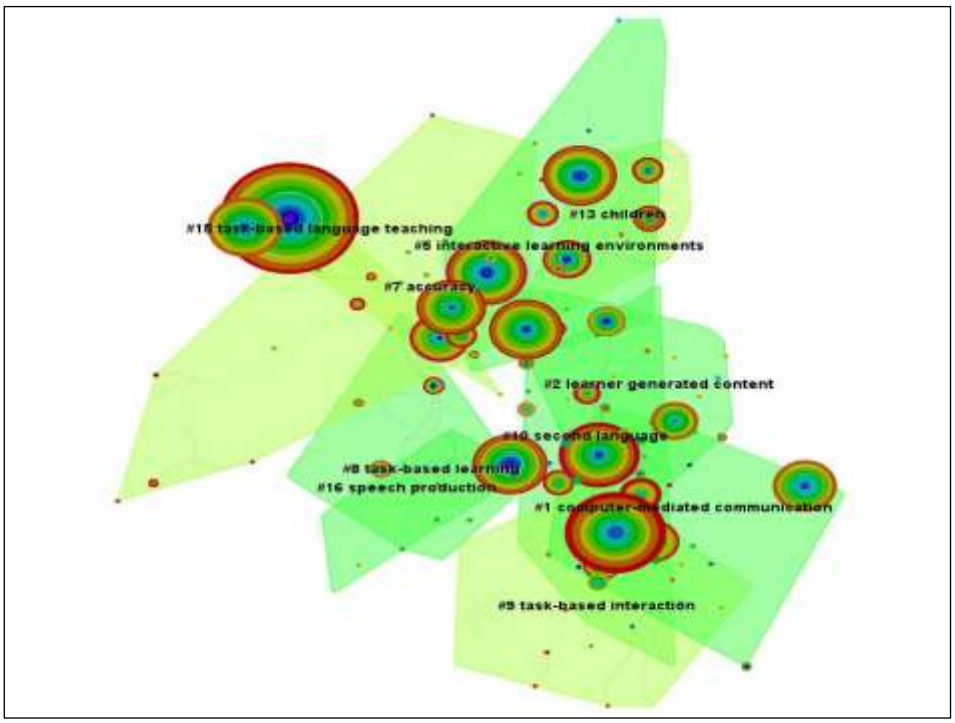

Fig. 5 Co-word clusters of TBTL retrieved in WoS

On the other hand, two key themes are evident in the WoS publications in TBTL, i.e., *interactive learning environments* and *task-based interaction*. In addition to classroom interactions, increasing attention is being paid to teacher-student and student-student interactions facilitated by technologies. The keywords include virtual environments, working memory, individual difference, and preschool children et al. *Computer-mediated communication* is another identified theme in WoS TBTL publications. Scholars mainly investigated how technology-assisted TBTL facilitated second language development (Mayo et al., 2019) and the effects of technology-assisted learning environments on learners' collaborative learning (Calloway-Graham et al., 2016). This cluster includes keywords of technology-mediated TBLT, cooperative learning, et al. *Learner-generated content* is also a critical theme prominent in WoS TBTL studies. This cluster searched most for the influence of learner factors (including engagement, peer interaction, etc.) and task design (incorporating pre-task preparation, content instruction, teacher feedback, etc.) on learning content and learning outcomes. Keywords, such as engagement and pre-task planning, etc., are identified.

Table 4 Comparison of co-word clusters of TBTL in CNKI and WoS (TOP 10)

	CNKI	WoS
1	任务型 (task-based learning)	Computer-mediated communication
2	应用 (application)	Learner-generated content
3	英语教学 (English teaching)	Interactive learning environments
4	高中英语 (high school English)	Accuracy
5	任务驱动 (task-motivated)	Task-based learning
6	二语习得 (second language)	Task-based interaction
7	教学改革 (teaching reform)	Second language
8	商务英语 (Business English)	Children
9	大学英语 (college English)	Task-based language teaching
10	高职英语 (vocational English)	Speech production

4.3 Comparison of emerging trends in TBTL

In this study, burst detection of keywords was also conducted to examine the emerging trends of TBTL publications in WoS and CNKI. Table 5 presents the Top 10 keywords with the most robust citation bursts between 2013 and 2022. Keywords with strong values in the column of "strength" signify essential landmarks in the research field.

Table 5 Keyword burstness of TBTL between 2013 and 2022 in China and abroad (TOP 10)

Keywords (CNKI)	Strength	Burst Duration	Keywords (WoS)	Strength	Burst Duration
翻转课堂 (flipped classroom)	5.93	2017-2020	TBL	7	2013-2015
线上教学 (online teaching)	4.87	2020-2022	Task repetition	3.97	2020-2022
阅读教学 (reading teaching)	4.33	2017-2019	Classification	3.55	2019-2022
初中英语 (junior school English)	3.71	2016-2018	Computer-mediated communication	3.53	2016-2017
高级英语 (advanced English)	3.52	2016-2017	Engagement	3.37	2019-2020
英语语法 (English grammar)	3.52	2018-2019	Feature	3..37	2019-2020
核心素养 (core competencies)	3.47	2018-2020	Competence	3.32	2017-2018
听说教学 (listening and speaking)	3.22	2020-2022	Corrective feedback	3.31	2020-2022
教学方式 (teaching methods)	3.02	2016-2017	Technology	3.19	2019-2022
翻译教学 (translation teaching)	2.85	2019-2020	TBLT	3.15	2016-2018

Three developmental phases are identified through keywords burst detection in CNKI's TBTL publications. In the first phase (2016-2017), primary burst keywords included *advanced English*, *teaching methods*, *junior school English*, *reading teaching*, and *flipped classroom*s. Among them, the keyword *flipped classroom* has the highest strength value (*n*=5.93) and the most extended burst duration. Whereas the research popularity of *flipped classroom*s gradually declined in the past two years. Albeit *reading teaching* also has a high strength value (*n*=4.33) in this phase, research on *reading* gradually decreased since 2019. In the second phase (2018-2019), burst keywords include *English grammar*, *core competencies*, and *translation teaching*. Keyword burst duration is relatively short in this phase. The third phase is from 2020 to 2022. Two burst keywords are detected, i.e., *online teaching* and *listening and speaking*, representing the latest emerging trends in TBTL studies in China. Upon analyzing the major citing articles, it is found that research on the two keywords, i.e., *online teaching* and *listening and speaking*, is primarily concentrated on vocational English, followed by secondary vocational English and college English. For instance, Zhang (2020) took the computer major in a vocational college as an example to compare and analyze the advantages and disadvantages of online and offline teaching. Li (2021) discussed the application of TBTL to English listening and speaking in vocational colleges.

By contrast, as seen in Table 5, in WoS TBTL studies, *task-based learning (TBL)* has the highest strength value (*n*=7). Since 2016, *computer-mediated communication*, *TBLT*, and *competence* attracted increasing attention, indicating that technology-assisted TBL was a hot spot. Starting in 2019, *engagement* and *feature*s became hot spots for a short period. While the keywords *classification*, *task repetition*, *corrective feedback*, and *technology* foreshadow the latest research trends in WoS TBTL publications. The main reason is that the burst duration of the four keywords lasted until 2022 (the latest research year of this paper), and the average burst duration reached 2-3 years.

Citing articles of the detected keywords were also analyzed to understand the emerging trends in TBTL better. Specifically, active citing articles of keywords *classification*, *task repetition*, *corrective feedback*, and *technology* were examined. It is found that emerging trends of TBTL in WoS studies primarily fall into three aspects. The first aspect is technology-assisted TBL, especially mobile-supported TBL. Fang et al. (2021) pointed out that mobile-assisted TBTL facilitates learners' second language development. The second aspect is learners' oral proficiency development, including the training in oral fluency (Suzuki, 2021), the promotion of interactive communication skills (Fang et al., 2021), and the enhancement of speaking teaching through literacy practice (Shakhsi et al., 2020). Third, feedback is a critical emerging trend in WoS TBTL studies. Kim et al. (2022) reported that corrective feedback enhanced students' task-based collaborative writing performance. Other emerging trends include the influence of cognitive ability and learning environments on SLA development (Li et al., 2019; Sato & Storch, 2022).

5.0 Conclusion & Recommendations

This paper employed the scientometric analysis method using CiteSpace to compare TBTL studies retrieved from WoS and CNKI from 2013 to 2022. The current status, major themes, and emerging trends of TBTL studies were compared, and the major findings include the following:

Unlike the exponential growth in WoS TBTL studies, TBTL studies in CNKI showed a downward trend. Two main reasons were identified for the disparities: a) TBTL research in China is generally confined to theoretical discussions, while international TBTL research combines theoretical discussions with empirical studies; b) TBTL research in China has a high similarity in research content and design, with a lack of innovation. Nonetheless, international TBTL research presents diversified perspectives and expands to various disciplines.

Both similarities and differences were identified in TBTL themes in WoS and CNKI. Task-based English teaching, task design, and technology-assisted teaching are major themes in both databases. While in WoS, in addition to the English language, studies are also found to be conducted on other second languages. The relevant themes include learning performance and cognitive differences, feedback guidance, interactive learning, computer-mediated communication, learner-generated learning content, and the influence of affective factors on second language development. Nonetheless, major TBTL themes in CNKI include vocational English, Business English, teaching reform, etc., which are generally based on different school-running and student enrollment modes.

Through keyword burstness and major citing articles analysis, online teaching and speaking and listening teaching are prominent trends of TBTL in CNKI. By contrast, emerging trends in WoS studies involve technology-assisted learning, especially mobile-assisted task-based learning. Oral proficiency development and corrective feedback were also detected as major emerging trends in WoS TBTL studies.

This study is not without limitations. First, scientometrics analysis was conducted by using CiteSpace to extract the themes and emerging trends of TBTL. Different results may be generated if other tools, such as VOSviewer and Science of Science (Sci2) Tool, were employed. Second, in predicting potential trends, inevitable deviations may exist. Despite these limitations, there is no denying that this study has shed light on TBTL field and future researchers are recommended to address these limitations to verify the findings of the study.

In addition, new directions were provided for future researchers interested in TBTL and scholars who focus on the China context. Through the comparison of TBTL studies in WoS and CNKI, it is found that TBTL research in China needs to be further developed, and future researchers could conduct more empirical studies instead of merely focusing on theoretical discussions. In addition, as TBTL research in China is mainly confined to language education, interdisciplinary research should be explored more in the future, such as investigating the combination of TBTL with the subjects of psychologies and information technologies.

Acknowledgments

None

Paper Contribution to Related Field of Study

This study will contribute to the area of task-based teaching and learning in the educational field. Analyzing the current status, themes, and emerging trends in this field provided insights for researchers interested in TBTL and scholars who focus on the China context.

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