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 CiteSpace 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?
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 effective 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.

<table>
<thead>
<tr>
<th>Database</th>
<th>Year</th>
<th>Retrieving Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>WoS core collection</td>
<td>2013-2022</td>
<td>1799</td>
</tr>
<tr>
<td>CNKI</td>
<td>2013-2022</td>
<td>2320</td>
</tr>
</tbody>
</table>

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 CNKI. 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.
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.

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.

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.
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)

<table>
<thead>
<tr>
<th>Keywords (CNKI)</th>
<th>Strength</th>
<th>Burst Duration</th>
<th>Keywords (WoS)</th>
<th>Strength</th>
<th>Burst Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>翻译教学 (translation teaching)</td>
<td>5.93</td>
<td>2017-2020</td>
<td>TBL</td>
<td>7</td>
<td>2013-2015</td>
</tr>
<tr>
<td>线上教学 (online teaching)</td>
<td>4.67</td>
<td>2020-2022</td>
<td>Task repetition</td>
<td>3.97</td>
<td>2020-2022</td>
</tr>
<tr>
<td>阅读教学 (reading teaching)</td>
<td>4.33</td>
<td>2017-2019</td>
<td>Classification</td>
<td>3.55</td>
<td>2019-2022</td>
</tr>
<tr>
<td>初中英语 (junior school English)</td>
<td>3.71</td>
<td>2016-2018</td>
<td>Computer-mediated communication</td>
<td>3.53</td>
<td>2016-2017</td>
</tr>
<tr>
<td>高级英语 (advanced English)</td>
<td>3.52</td>
<td>2018-2019</td>
<td>Engagement</td>
<td>3.37</td>
<td>2019-2020</td>
</tr>
<tr>
<td>核心素养 (core competencies)</td>
<td>3.22</td>
<td>2020-2022</td>
<td>Competence</td>
<td>3.32</td>
<td>2017-2018</td>
</tr>
<tr>
<td>听说教学 (listening and speaking)</td>
<td>3.02</td>
<td>2016-2017</td>
<td>Corrective feedback</td>
<td>3.31</td>
<td>2020-2022</td>
</tr>
<tr>
<td>翻译教学 (translation teaching)</td>
<td>5.93</td>
<td>2017-2020</td>
<td>TBL</td>
<td>7</td>
<td>2013-2015</td>
</tr>
</tbody>
</table>

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 classrooms. 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 classrooms 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, TBL, and competence attracted increasing attention, indicating that technology-assisted TBL was a hot spot. Starting in 2019, engagement and features 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 TBL 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, scientometric 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 (Sc2) 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.

References


