The TPACK Framework in English Language Education Practice: A Bibliometric Analysis

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Article Info	ABSTRACT
	The Technological Pedagogical and Content Knowledge (TPACK) framework has emerged as a central framework for technology integration in English language education. This study conducts a bibliometric analysis of the research literature on TPACK in English language education (ELT) to examine publication trends, citation patterns, thematic clusters, and collaboration networks. The findings demonstrate steady interest in research, with intense acceleration during the digital shift precipitated by the COVID-19 pandemic. Some of the developing themes identified are teacher education, e-learning integration, and subject-area-specific applications. The research identifies both the benefits and challenges of TPACK implementation, demanding large-scale instructor training and organizational support. Longitudinal studies and the use of new technologies such as artificial intelligence and virtual reality in TPACK-based teaching approaches should be the subject of future studies.

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1. INTRODUCTION

The constantly speeding up progress in technology has also significantly transformed the face of education, particularly English language acquisition. Educators must integrate technology into their teaching so that they can respond to the needs of learners in the 21st century [1], [2]. For this integration to be effective, however, one requires more than just exposure to digital tools but a robust support system that connects technological, pedagogical, and content knowledge. The Technological Pedagogical and Content Knowledge (TPACK) model introduced by Mishra and Koehler in 2006 provides an integrated approach to examine the relationship among these three domains concerning effective pedagogy [3], [4].

English language teaching, being a continuously evolving, knowledge-based profession, offers an excellent platform to apply the TPACK model. As there is mounting awareness of the importance of communication skills, globalization, and knowledge of other cultures, ELT relies increasingly on internet-based materials and innovative techniques of pedagogy [5], [6]. Utilizing the TPK framework, teachers are better equipped to devise lesson plans that

integrate English language knowledge and knowledge of pedagogy along with utilizing a set of complementary technologies.

Despite the promise of TPACK to enhance English language instruction, its application and implications are yet to be thoroughly examined. The majority of studies only focused on teacher perceptions and general applications without an in-depth analysis of how TPACK is engaged in effective instruction. To address this limitation, the current study conducts a bibliometric review of research on the TPK framework of English language instruction. By examining trends, key themes, and seminal studies, the study aims to provide a more detailed understanding of the framework's impact on current ELT practice. The organization of this study is as follows: The methodology chapter outlines the bibliometric method, data collection, and analytical methods. Results and discussion describe the main findings, including publication patterns, citation analysis, and theme clusters.

2. LITERATURE REVIEW

2.1 TPACK in School Contexts

TPACK is widely acknowledged as a theoretical framework for prepping teachers to address the requirements of technology incorporation into pedagogical practice. Literature highlights teacher education programs in shaping TPACK skills [7]. Findings suggest that with appropriately balanced knowledge in CK, PK, and TK, teachers can conceptualize learning settings to enhance the participation and learning performance of students. However, efficient application of TPACK generally relies on factors such as institutional support, teachers' disposition, and availability of digital learning materials [8].

2.2 TPACK in English Language Education

In ELT, the TPK model provides a platform for crafting new pedagogies that combine conventional and digital methods. Studies have pointed out that TPACK enables instructors to align language learning objectives with appropriate technological resources, such as language learning apps, collaborative web tools, and multimedia content [1], [9]. For instance, interactive technologies like Duolingo and Quizlet have been seen to enhance the development of vocabulary and self-learning. Further, resources like Zoom and Microsoft Teams enable online classrooms, facilitating cross-cultural communication and cooperation [10], [11].

Despite its potential, issues exist in the adoption of TPACK in ELT. Technology use by instructors that is uncertain, insufficient resources for training, and unfamiliarity with TPACK principles may render its implementation challenging [4], [9], [10]. Cultural and contextual factors, such as differences in technological infrastructure, influence the success of TPACK integration.

Bibliometric analysis offers a quantitative lens to analyze scholarly trends, citation networks, and thematic clusters in TPACK research. Previous bibliometric analysis has mapped the evolution of TPACK literature across disciplines and identified areas of research gaps and seminal pieces [12]. The literature indicates a general rise in publications addressing TPACK, particularly in STEM education and teacher education programs. However, a focused bibliometric study of TPACK in English language education is not yet available.

2.3 Emerging Trends and Themes

New studies on TPACK indicate emerging themes such as personalized learning, gamification, and artificial intelligence use in learning. In ELT, these technologies offer potential to develop language skills through interactive and immersive settings. Virtual and augmented reality technology, for example, provides contextualized spaces for language learning, and AI-based apps offer instant feedback and adaptive learning paths.

The combination of TPACK with other models such as SAMR (Substitution, Augmentation, Modification, and Redefinition) and TIM (Technology Integration Matrix) has also been examined in a bid to come up with holistic models in the assessment of technology integration in instruction and learning [13]. These approaches also extend the application of TPACK to numerous learning contexts.

2.4 Research Gaps

While a great deal of work has been accomplished on the theoretical underpinnings of TPACK and general applications, the particular impact of TPACK on English language teaching is yet to be understood. There have been few studies that examined how teachers cope with the complexities of balancing CK, PK, and TK in multilingual and multicultural classrooms. Longitudinal studies of the long-term impact of TPACK-intervention are also nonexistent.

This review of the literature highlights the core contribution of the TPACK model to the evolution of English language instruction. It highlights the need for additional research and applied works addressing the contemporary challenges and capitalizing on current technological advances. The ensuing bibliometric analysis in this study seeks to bridge these gaps by providing an inclusive report of TPACK-related ELT studies.

3. RESEARCH METHODS

The study applies a descriptive bibliometric approach to examine publication patterns, frequency of citations, and thematic clustering of TPACK in ELT. Using Scopus as the data source, relevant studies to the study were identified from a combined keyword search using terms such as "TPACK," "Technological Pedagogical and Content Knowledge," and "English language teaching." The selection criteria consisted of peer-reviewed journal articles or conference proceedings printed between 2006 and 2025, English language, and particularly focusing on TPACK applications in ELT. Of 450 articles initially screened, 125 were shortlisted for bibliometric analysis.

Data were analyzed using bibliometric techniques, including descriptive analysis to map publication trends and leading contributors, citation analysis to identify key publications, and keyword co-occurrence analysis to discern thematic groups with the use of software like VOSviewer. Collaboration network analysis assessed collaborations between authors and institutions, while thematic analysis coded studies by topics such as teacher preparation, technology adoption, and student performance and revealed dominant themes and research gaps.

4. RESULTS AND DISCUSSION
4.1 Results
a. Publication Trends

The analysis revealed a steady increase in the number of publications addressing the TPACK framework in English language education since its introduction in 2011.
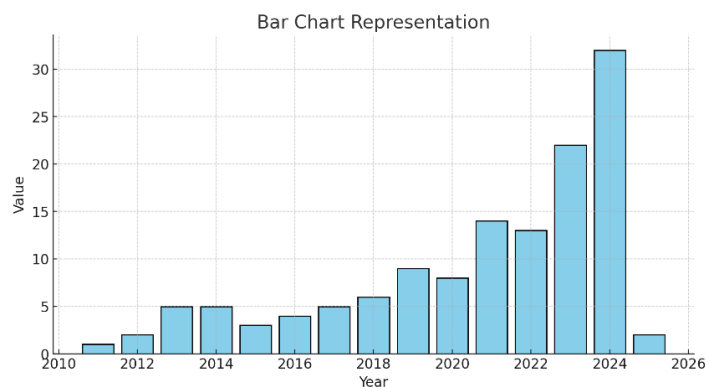
Figure 1. Trend Research

The graph illustrates the annual publication trend of research on the TPACK framework in English language teaching from 2011 to 2025. Initially, from 2011 to 2016, publications were sparse, representing the early exploration phase of TPACK in this field. There was a steady growth phase from 2017 to 2020, representing increasing interest as teaching professionals and researchers began embracing technology in English teaching. The biggest growth happened from 2021 to 2024, with the highest point in 2023, probably due to the large-scale use of digital solutions in the COVID-19 pandemic. The growth indicates an extensive effort to aid teachers in adjusting to online education. However, in 2025, there is a sharp decline in publications, which may be the result of incomplete data collection or a temporary slowdown in research output, requiring further investigation to determine if the trend will persist.

b. **Citation Analysis**

Table 2. Citation Analysis

No.	Document Title	Authors	Source	Citations
1	Development of survey of technological pedagogical and content knowledge (TPACK)	[14]	Turkish Online Journal of Educational Technology	141
2	Developing a technological pedagogical content knowledge (TPACK) assessment for preservice teachers learning to teach English as a foreign language	[15]	Computer Assisted Language Learning	92
3	How pre-service English teachers enact TPACK in the context of web-conferencing teaching: A design thinking approach	[16]	Computers and Education	78
4	Modeling English teachers' behavioral intention to use artificial intelligence in middle schools	[17]	Education and Information Technologies	72
5	Developing and validating a questionnaire for evaluating the EFL 'Total PACKage': Technological Pedagogical Content Knowledge (TPACK) for English as a Foreign Language (EFL)	[18]	Computer Assisted Language Learning	62
6	From tpack-in-action workshops to classrooms: Call competency developed and integrated	[19]	Language, Learning and Technology	57

No.	Document Title	Authors	Source	Citations
7	Evaluating novice and experienced EFL teachers' perceived TPACK for their professional development	[20]	Cogent Education	50
8	Development of the TTF TPACK survey instrument	[21]	Australian Educational Computing	46
9	Call teachers' professional development amid the covid-19 outbreak: A qualitative study	[22]	CALL-EJ	40
10	Investigating English language teachers in developing TPACK and multimodal literacy	[23]	Indonesian Journal of Applied Linguistics	40

The citation analysis reveals foundational contributions to TPACK research in English language teaching. [14] study (143 citations) is the most cited, providing a baseline model for TPACK measurement. [15] (92 citations) developed an assessment tool for preservice teachers, and [16] (78 citations) suggested a design-thinking-based TPACK training. EFL testing research, e.g., [18] (62 citations), focuses on contextualized testing.

Emerging themes include professional development during the COVID-19 era [22] 40 citations, reflecting shifting research agendas. Studies on teacher competencies [19], [20] maintain steady interest (40–60 citations), while local studies such as [23] (35 citations) emphasize the relevance of TPACK to local contexts.

c. **Thematic Clusters**

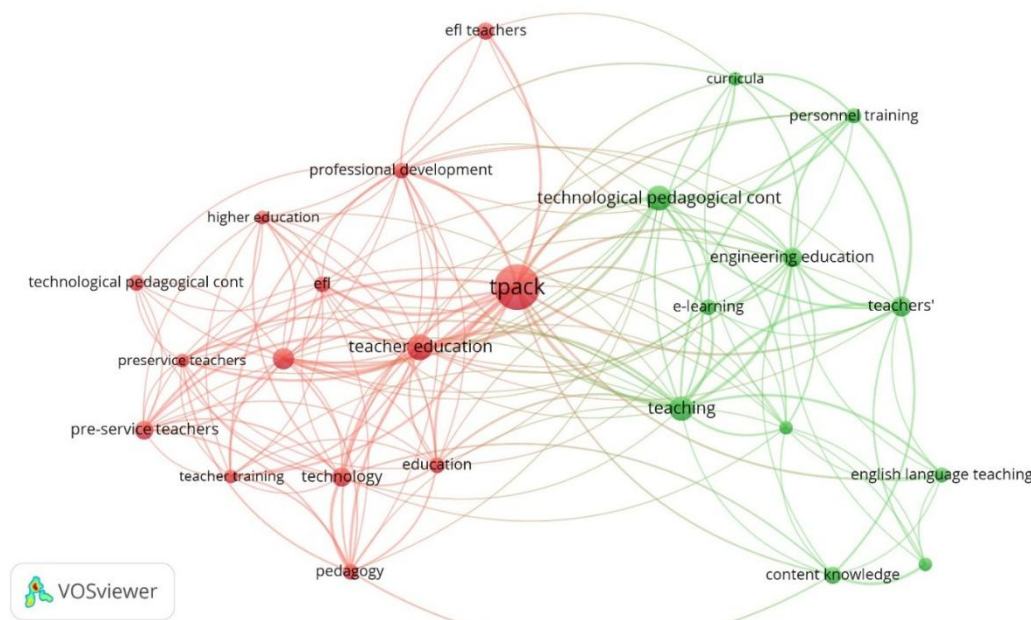Keyword co-occurrence analysis revealed four broad themes in the literature:

Figure 2. Keywords Analysis

Keyword analysis determines major themes and related clusters in TPACK studies. TPACK is the center, directly linked with teacher education, technology, pedagogy, and teaching. Red cluster is concerned with teacher education and professional development, particularly for preservice teachers, higher education, and EFL settings.

This reflects a strong interest in how TPACK supports teacher training and ongoing professional development. Concurrently, the green cluster addresses TPACK integration into e-learning and curriculum and its application in English language teaching and engineering education and identifies the significance of digital learning environments.

Some of the major trends are greater application of technology in teaching courses, growing participation of e-learning, and domain-specific application areas, such as EFL and engineering education. TPACK serves as an intermediary between pedagogy, content knowledge, and technology with professional learning closely related to e-learning. Trends such as English language instruction and content knowledge in emerging keywords demonstrate shifts towards discipline-based approaches within TPACK research to enhance its generalizability across different academic fields.

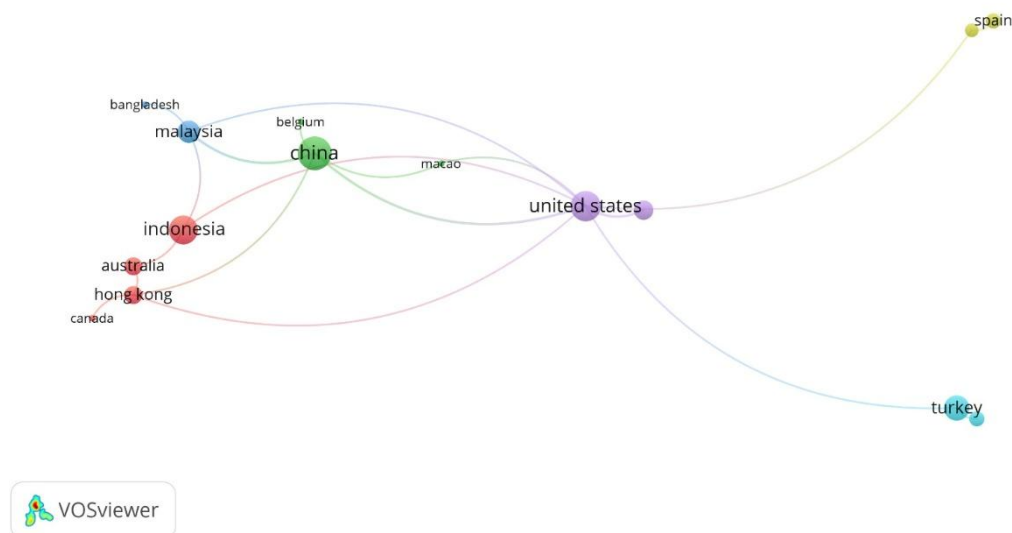d. **Research Networks and Collaboration**

Figure 3. Collaborations

The VOSviewer map is a representation of global research cooperation, with the United States in the center and highly connected with China, Spain, and Turkey. China, too, has a center with strong cooperation with Malaysia and Indonesia, citing rising research strength. Regional clusters also show high Asia-Pacific linkages (Indonesia, Australia, Hong Kong, Canada) and Southeast Asia-South Asia linkages (Malaysia, Bangladesh). The U.S. connects Western and Asian scholarship, with Spain and Turkey having lesser but considerable connections. Predominant US-China alliance, strong regional alliances, and new players like Turkey and Spain are some of the significant trends. More global partnerships can enhance research impact for less-connected countries.

4.2 Discussion

The findings indicate the increasing relevance of the TPACK framework in English language instruction, with a clear trend from theoretical discussion to real-world application. This is proof of efforts by

teachers to address the evolving needs of virtual learning environments. One of the strengths of TPACK is that it is transportable to several learning environments, and teachers can coordinate technology with teaching to produce more engaging and educational lessons. Research evidence shows that this helps teachers drive student motivation and performance, adding value to the framework in modern teaching.

Though it has benefits, the implementation of TPACK is hampered by factors such as inadequate teacher training and a lack of resources. These are in line with [24], who highlight the need for institutional support and policy reform to facilitate implementation. However, emerging technologies in education, including AI-driven tools and adaptive learning systems, offer new avenues for enhancing TPACK-based teaching. Future research should explore how these technologies can further enhance the efficacy of the framework in English language teaching.

4.3 Research Gaps and Implications

The bibliometric analysis reveals certain gaps in existing TPACK research, including the lack of longitudinal studies of its long-term implications, fewer explorations of leading-edge technologies like virtual reality and AI, and a lack of focus on socio-cultural determinants of implementation in multilingual and multicultural classrooms. Addressing these gaps requires cross-disciplinary teams, longitudinal research, and context-specific studies. In addition, policymakers and teachers need to collaborate in the development of training programs that equip teachers with the needed competencies and resources to effectively implement TPACK.

The findings are beneficial to the advancement of TPACK research in English language instruction. By understanding key trends and challenges, this research develops a roadmap for refining and further refining the application of the framework across different pedagogical settings. The advancement of research in these areas will promote the adaptability and effectiveness of TPACK in managing the evolving demands of digital and multilingual learning environments.

5. CONCLUSION

This study provides a structured bibliometric analysis of the use of TPACK in English teaching. New evidence shows growing numbers of research studies, greater emphasis on employing technology-based methods of teaching and teacher education. Despite the TPACK model providing significant advantages in terms of alignment of teaching approaches, curriculum knowledge, and technology tools, it is hindered by varying levels of teacher expertise, availability of material resources, and school support. Future trends hold promises for integrating artificial intelligence, gamification, and virtual learning environments into TPACK-based instruction. Longitudinal impacts, cultural awareness, and the evolving technology landscape need to be tackled by future studies to further enhance the framework's applicability across different educational settings. The stakeholders can maximize the potential of TPACK to improve English language acquisition globally by encouraging collaborative studies and systematic training programs.

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