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APPLICATION OF THE TPACK MODEL IN LANGUAGE TEACHING: AN ANALYSIS OF INTERNATIONAL SCIENTIFIC LITERATURE

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In the era of digital transformation and pedagogical innovation, there is an increasing need to fundamentally reconsider foreign language teaching methodology in general secondary and higher education. In contemporary language didactics, the use of information and communication technologies and digital platforms has moved beyond the role of merely supplementary or illustrative tools and has become a conceptual and structural component of the teaching and language-learning process. To develop learners' communicative competence and linguistic literacy in accordance with international standards, it is necessary to integrate pedagogical approaches and technological capabilities in a coherent manner.

The TPACK (Technological Pedagogical Content Knowledge) model proposed by P. Mishra and M. J. Koehler serves as the theoretical and methodological framework for this integrated approach. Particularly in teaching English and other foreign languages (EFL/ESL), the model has demonstrated substantial potential for systematizing teachers' professional competencies, individualizing the instructional process, and overcoming learners' psychological and linguistic barriers.

Numerous fundamental studies have been published in the global research community, particularly in internationally recognized scholarly and bibliometric databases such as Scopus, Web of Science (WoS), Springer Nature, and others, addressing the implementation of the TPACK model in language teaching, the assessment of teacher preparedness, and the integration of artificial intelligence tools. The aim of this article is to conduct a methodological and comparative analysis of the research of leading international scholars published in these prominent databases, trace the evolution of the TPACK model in language teaching, and systematize the findings to draw relevant conclusions.

The TPACK model emerged as a modification and extension of traditional pedagogical knowledge. It was formed through the addition of technological knowledge (TK) to the PCK (Pedagogical Content Knowledge) concept proposed by L. Shulman and through the interaction and intersection of these knowledge domains. In the context of language teaching, this approach implies that technology should not be treated as an independent object, but rather integrated with the pedagogical objectives and linguistic content of language instruction.

Based on an analysis of international scientific sources, the stages of the conceptual development of the TPACK model and its practical applications in language teaching and learning methodology can be systematized as follows:

1. P. Mishra & M. J. Koehler (2006) – TPACK modelining 7 ta tarkibiy elementdan (CK, PK, TK, PCK, TCK, TPK va TPACK) iborat nazariy va metodologik karkasini shakllantirgan hamda texnologiyani fan mazmunidan ayri holda qo‘llashning samarasizligini asoslagan.
2. D. A. Schmidt et al. (2009) – Bo‘lajak o‘qituvchilarning TPACK darajasini hamda ularning raqamli resurslar orqali dars o‘tish tayyorgarligini obyektiv o‘lchashga mo‘ljallangan psixometrik baholash so‘rovnomasi va metrikasini ishlab chiqqan.

3. C. R. Graham (2011) – Modelning nazariy hamda amaliy o‘lchov bo‘shliqlarini tahlil qilib, til ko‘nikmalarini (listening, speaking, reading, writing) raqamli resurslar bilan moslashtirishda metodologik chegaralarni aniqlashtirgan.

4. C. C. Chai, J. Koh & C. C. Tsai (2013) – Osiyo mamlakatlari va EFL (ingliz tili xorijiy til sifatida) kontekstida metatahlil o‘tkazib, o‘qituvchilarning TPACK darajasi ularning pedagogik e’tiqodlari hamda qadriyatlariga bevosita bog‘liq ekanligini ko‘rsatgan.

5. Y. Liu (2013) – Ingliz tili o‘qituvchilari uchun maxsus pedagogik karkasni ishlab chiqqan va darsda raqamli vositalardan foydalanish o‘quvchilarning "til to‘sig‘i" va muloqot xavotirini kamaytirishini isbotlagan.

6. Ch. P. Wu (2014) – O‘qituvchilarning TPACK bilimlari va ularning sinfdagi amaliyoti o‘rtasidagi korrelyatsiyani o‘rganib, yuqori TPACK darajasi o‘quvchiga yo‘naltirilgan (student-centered) raqamli metodlarni oshirishini ko‘rsatgan.

7. J. M. Tseng (2016) – Kompyuter yordamida til o‘rgatish (CALL) muhiti uchun maxsus TPACK-L (TPACK for Language Teachers) modelini taklif etgan hamda leksik-grammatik materialni vizuallashtirish prinsiplarini asoslagan.

8. M. Barrio-Parra et al. (2018) – Oliy ta’limda til va tarjimashunoslik kurslariga TPACK modelini integratsiya qilish jarayonida avtomatlashtirilgan tarjima hamda korpus lingvistikasi dasturlarining didaktik imkoniyatlarini ochib bergan.

9. J. C. Hong et al. (2020) – TPACK modeli asosida loyihalashtirilgan raqamli ta’limiy o‘yinlar (gamification) o‘quvchilarning so‘z boyligini va grammatik tuzilmalarni eslab qolish samaradorligini keskin oshirishini tajribada isbotlagan.

10. Sh. M. Tseng & Ch. S. Chai (2021) – Sun’iy intellekt (AI) va generativ tillar (ChatGPT, AI-assistentlar) davrida TPACK modelini qayta konseptuallashtirib, dars materiallarini avtomatik adaptatsiya qilish va personallashtirish mexanizmlarini ko‘rsatib bergan.

A methodological analysis of the studies conducted by these international scholars shows that research indexed in Scopus and Web of Science is predominantly empirical and experimental in nature. The scientific literature primarily employs quantitative, qualitative, and mixed-methods methodologies.

The studies of these scholars reveal a consistent trajectory in the development of the TPACK model for foreign language teaching. While early studies focused on establishing the model as a general pedagogical framework, subsequent research adapted it specifically to the characteristics of language didactics and computer-assisted language learning (CALL). More recent studies published by Springer Nature and other reputable outlets have increasingly focused on assessing the impact of generative AI and digital platforms.

The table below summarizes the studies of 10 international scholars indexed in Scopus, Web of Science, and Springer Nature, including their publication venues and principal research findings.

Table 1.

Analyzed Scientific Literature and Its Significance

Olim(lar)	Ilmiy baza / Jurnal	Ilmiy ahamiyati
Mishra & Koehler (2006)	WoS / Teachers College Record	Developed the theoretical framework of the TPACK model comprising seven components
Schmidt et al. (2009)	Scopus / JRTE	Developed a psychometric instrument for measuring teachers’ TPACK levels
Graham (2011)	Scopus (Q1) /	Modelning nazariy va o‘lchov 边界 larini

	Computers & Education	metodologik jihatdan aniqlashtirdi
Chai, Koh & Tsai (2013)	Springer / EdTech & Society	Demonstrated the relationship between language teachers' pedagogical beliefs and TPACK
Liu (2013)	Springer / Tech, Pedagogy & Ed	Developed a TPACK pedagogical model for EFL (English as a Foreign Language) teaching
Wu (2014)	Scopus / Computers & Education	Demonstrated the positive effect of TPACK level on digital and communicative classroom practices
Tseng (2016)	Scopus / CALL Journal	Developed a specialized TPACK-L model for computer-assisted language learning (CALL)
Barrio-Parra et al. (2018)	Springer / Higher Education	Integrated the TPACK model into language and translation courses in higher education
Hong et al. (2020)	Springer (Q1) / ETR&D	Demonstrated the effects of TPACK-based digital games on language acquisition and motivation
Tseng & Chai (2021)	Springer / AJET	Integrated artificial intelligence and generative AI technologies into the TPACK model

An analysis of the studies indicates that the successful implementation of the TPACK model in language teaching depends on three key factors. First, teachers' technological knowledge (TK) is not limited to computer literacy; rather, it is measured by their ability to align linguistic platforms, corpora, and interactive applications with the didactic objectives of a lesson. Second, the intersection of pedagogical knowledge (PK) and content knowledge (CK) requires consideration of typological and grammatical differences between learners' native language and the target language.

In Uzbek classrooms, the TCK and TPK dimensions proposed by international scholars are particularly relevant for overcoming linguistic interference and syntactic mismatches encountered in teaching English and other foreign languages.

International experience confirms that providing preservice and practicing language teachers with separate technology-focused and pedagogy-focused courses does not produce the expected outcomes. Instead, there is a need to organize practical seminars and training sessions within a modular-credit system that foster integrated TPACK development through lesson design and the creation of practical learning tasks.

An analysis of the research of 10 leading international scholars published in Scopus, Web of Science, and Springer Nature-indexed sources indicates that the TPACK model is recognized as a universal and dynamic framework in contemporary language didactics and language teaching methodology.

Based on the research findings, the following scientific and practical conclusions can be drawn.

First, digital technologies contribute to the development of learners' communicative and linguistic competence only when they are not introduced into language lessons merely as supplementary tools, but are deeply integrated with subject content and pedagogical strategies within the TPACK framework.

Second, empirical studies by international scholars confirm that teachers with higher levels of TPACK tend to move beyond traditional and reproductive teaching methods and make greater use of learner-centered, interactive, gamified, and AI-supported innovative approaches.

Third, the results of this international scientific and methodological analysis can serve as a theoretical and methodological basis for modifying teacher preparation and professional development curricula in the national education system and for developing digital educational resources.

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