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Implementation of Artificial Intelligence in Teachers' Technological Pedagogical and Content Knowledge in EFL Context

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ABSTRACT

Artificial Intelligence (AI) has become increasingly integral to education in today's technology-driven era, particularly within the Technological Pedagogical and Content Knowledge (TPACK) framework. This research investigates Indonesian EFL teachers' perspectives on the impact of AI in improving their instructional methods. It further analyzes how these perspectives affect the integration of TPACK in their teaching environments. The research employed a narrative inquiry approach, collecting data through semi-structured interviews with three EFL teachers of varying experience levels. The findings reveal that while teachers recognize AI's potential in personalizing students' learning and improving students' engagement, they face significant challenges in integrating AI effectively. These obstacles involve restricted resource availability, inadequate training, and inconsistent use of TPACK elements. The study highlights the need for professional development programs to build teachers' technological proficiency and foster a balanced integration of AI within the TPACK framework. Ultimately, the study recommends enhancing teacher training to ensure that AI is utilized to create dynamic and effective learning environments in EFL education.

Keywords: Artificial intelligence, EFL, TPACK

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INTRODUCTION

Nowadays, artificial intelligence (AI) has swiftly revolutionized multiple industries, including education. AI technologies offer educators new tools for enhancing teaching and learning experiences, providing personalized learning paths, automating assessments, and facilitating more efficient classroom management (Owan et al., 2023). The successful use of AI technology

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depends on teachers having the pedagogical expertise required to utilize AI-driven tools effectively (Cavalcanti et al., 2021).

These advancements make AI a powerful ally in modern educational settings, particularly within the Technological Pedagogical and Content Knowledge (TPACK) framework. As shown in Figure 1, the TPACK framework, introduced by Mishra and Koehler (2006), highlights the essential intersection of three core domains of teacher expertise: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK).

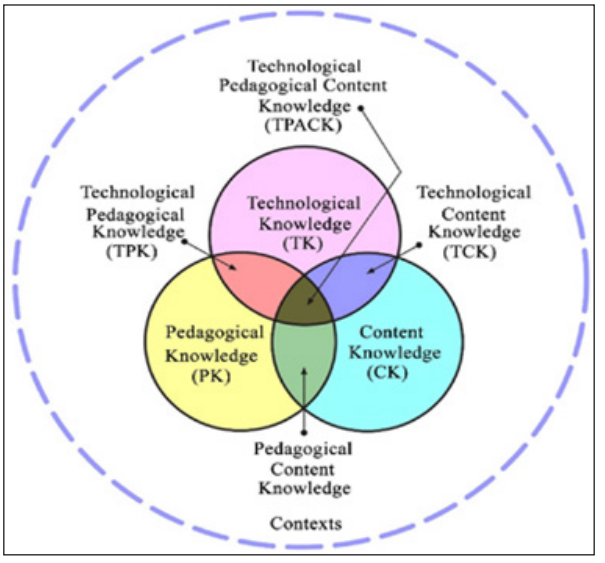

Figure 1. TPACK framework by Mishra and Koehler (2006)

While previous studies have explored the use of TPACK in various educational contexts, there is a significant gap in research regarding teachers' beliefs and practices concerning AI integration within the TPACK framework, especially in EFL settings. Consequently, there exists a limited comprehension of how educators interpret and assess decisions derived from AI technology (Celik, 2023). Therefore, understanding how EFL teachers perceive and integrate AI within the TPACK framework is crucial to developing professional development programs that better prepare educators for the demands of 21st-century teaching.

Recent studies answer several questions: (1) How do teachers believe in TPACK in EFL classrooms? (2) How does AI support teachers' implementation of TPACK in EFL classrooms? The study's novelty lies in the new perspective on teachers' perceptions of the possibilities and difficulties of AI, therefore impacting their approach to its integration in pedagogical settings.

METHODOLOGY

Research Design

Narrative inquiry was chosen because it is a valuable method for investigating teachers' beliefs about TPACK-integrated artificial intelligence.

Participant

The study involves three EFL English teachers, who were selected purposefully to represent varying experience levels with AI, as shown in Table 1.

Table 1
Participants' profile

Pseudonym	Age	Gender	Teaching Experience	Level School
Irfan	31	male	4 years	middle
Agnes	42	female	16 years	high
Rufa	28	female	7 years	middle

Data Collection

The researcher conducted a semi-structured interview. The researcher did narrative frame data collection. The interview was about an hour to two hours.

Data Analysis

The researcher analyzed all the collected data by organizing the narrative framework and the interviews. Then, the data was "restructured" into a broader analytical framework. Next, the researcher identified the data's key concepts, themes, and classifications. The codes were then linked to broader themes and categories within the TPACK framework. Finally, the researcher interpreted the data and connected it to previous studies.

FINDINGS AND DISCUSSION

Teachers' Belief in AI-TPACK in EFL Classrooms

Teachers generally view AI-based tools as helpful for improving content delivery and classroom management, aligning well with their current teaching approaches. They believe that AI enhances personalized learning, engages students through interactive activities, and supports the curriculum by offering flexible and up-to-date learning materials (Kong et al., 2024). These positive views motivate teachers to integrate AI into their lessons, considering it an essential tool for addressing the needs of 21st-century education.

They noted difficulties in helping students navigate AI technologies and develop digital literacy, which demands considerable time and effort. Concerns were also raised about AI

potentially affecting students' critical thinking skills, leading some teachers to be cautious in their approach to AI integration (Zhao, 2022). Therefore, applying AI within the TPACK framework requires more effort, especially in schools with fewer resources.

Artificial Intelligence in Teachers' Implementation of TPACK in EFL Classrooms

The three teachers agreed to improve their teaching quality by integrating multimedia AI technology to conduct a TPACK in the class. They utilize AI to motivate students, do assessments, deliver material, and create a supportive atmosphere. The incorporation of AI technology within the TPACK framework possesses the capacity to transform pedagogical methodologies and educational settings (Safriana et al., 2023). The proficiency of educators in integrating technology into classroom instruction, as an integral aspect of their pedagogical and professional competencies, is crucial for the attainment of effective teaching outcomes.

Experts in technology, pedagogy, or content knowledge frequently choose to teach by focusing on the individual aspect of TPACK rather than using the intersection of TPACK aspects. The teachers were inconsistent in practicing the balance of AI-TPACK in their classrooms. This finding aligns with Ning et al. (2024) observation that educators frequently struggle to balance these aspects, especially when confronted with emerging technologies like AI.

CONCLUSION

Teachers in this study recognized AI's ability to handle tasks like grading and feedback, allowing more focus on interactive language activities. However, implementing AI in the classroom was inconsistent, with some teachers focusing more on their expertise in either technology, pedagogy, or content knowledge rather than a balanced integration of all three. To fully benefit from AI in EFL education, teachers must develop proficiency across the TPACK model, ensuring AI supports meaningful language teaching.

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