

Dissertation Title An Investigation into Factors Influencing Behavioral Intentions to Use AI-based Educational Technologies and AI-TPACK Educational Needs: A Mixed-Methods Study of Chinese Pre-Service EFL Teachers

Author Zongbi Qin

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Advisor Maneerat Chuaychoowong, Ed. D.

ABSTRACT

Artificial intelligence (AI) in education offers the potential for a more personalized, flexible, inclusive, and engaging learning experience and a more advanced educational environment. However, there is a noticeable gap in understanding the behavioral intentions (BI) of Chinese pre-service EFL teachers regarding their future use of AI-based educational technologies. Furthermore, the identification and analysis of the educational needs of pre-service EFL teachers in the context of AI-assisted EFL education remains limited.

The objectives of this study were to identify the factors influencing Chinese pre-service EFL teachers' behavioral intention to use AI-based educational technologies, to examine the degree of influence and correlations among these factors, to identify pre-service EFL teachers' AI-TPACK educational needs and examine stakeholder perceptions to inform effective EFL teacher preparation for AI-assisted EFL teaching and learning.

An extended Unified Theory of Acceptance and Use of Technology (UTAUT) model incorporating four AI-TPACK constructs was adopted. Nine factors, including performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating condition (FC), behavioral intentions, AI Technological Knowledge (AI-TK), AI Technological Pedagogical Knowledge (AI-TPK), AI Technological Content Knowledge (AI-TCK), and AI-TPACK, were examined. Following a convergent parallel mixed methods design, data were collected through a questionnaire and semi-structured interviews with pre-service EFL teachers, an administrator, ICT teachers,

and in-service EFL teachers. Structural equation modelling and comparative analyses were conducted. Quantitative and qualitative findings were triangulated.

Results showed that behavioral intentions were positively predicted by performance expectancy ($\beta = .259, p < .001$), social influence ($\beta = .391, p < .001$), and AI Technological Knowledge ($\beta = .481, p < .001$), with AI-TK being the strongest predictor. AI-TK had direct effects on AI-TPK ($\beta = .757, p < .001$) and AI-TCK ($\beta = .627, p < .001$), while its effect on AI-TPACK was non-significant. Facilitating conditions emerged as the most influential factor, exerting strong effects on PE, EE, and AI-TK. Unexpectedly, AI-TCK ($\beta = -.379, p < .001$) and AI-TPK ($\beta = -.326, p < .035$) negatively influenced effort expectancy, and some hypothesized paths were not supported.

For AI-TAPCK educational needs, the results indicate that AI-TK ($M = 3.57, SD = 0.64$) was the most critical area of need. However, in interviews, participants prioritized AI-TPACK, while AI-TK ranked last. Pre-service teachers demonstrated awareness of AI's pedagogical potential but lacked confidence in deep integration.

Administrators regarded AI as a tool rather than a replacement for teachers, ICT teachers highlighted efficiency and ethical concerns, and in-service EFL teachers emphasized insufficient AI training. All groups agreed on the importance of interdisciplinary collaboration, ethical awareness, and systematic training. For EFL teacher preparation, pedagogical foundations should be established before the integration of AI-based educational technologies. Pre-service teachers should be supported in developing technical adaptability, enhancing ethical awareness, and developing interdisciplinary competence to ensure effective and responsible educational AI applications. Furthermore, AI-related training should be started early, and building it up from basic knowledge to hands-on application to improve EFL teachers' preparedness.

This study contributes to research on AI technology acceptance in EFL education and provides implications for technology acceptance modeling in the AI era, EFL teacher education and professional development, school leadership, policy-making, and ethical dimensions of AI in education.

Keywords: Artificial Intelligence in Education, Behavioral Intention, China, Educational Needs, Pre-service EFL Teachers, Technology Adoption