

Impact of AI and Teaching Competency in the English Language: An Empirical Study.

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Abstract:

Artificial intelligence (AI) is increasingly being integrated into language classrooms through tools such as intelligent tutoring systems, automated writing evaluation, AI-based grammar and pronunciation checkers, chatbot-mediated conversation practice, and adaptive learning platforms. This study empirically examines the impact of AI integration on teaching competency in the English language among school and college-level English language teachers. Primary data were collected through a structured questionnaire from 216 English language teachers working in government and private educational institutions. The instrument measured artificial intelligence integration in teaching (AIIT) — encompassing AI awareness, tool adoption, perceived usefulness, and instructional application — and teaching competency in English language (TCEL), disaggregated into three sub-dimensions: pedagogical competency, assessment competency, and learner engagement competency. All constructs were measured on validated five-point Likert scales, and reliability was confirmed through Cronbach's alpha (0.80 to 0.88). Data were analyzed using Pearson correlation and simple linear regression. The results reveal that AI integration in teaching has a statistically significant and positive impact on overall teaching competency ($\beta = 0.64$, $R^2 = 0.41$, $p < .001$), pedagogical competency ($\beta = 0.59$, $R^2 = 0.35$, $p < .001$), assessment competency ($\beta = 0.55$, $R^2 = 0.30$, $p < .001$), and learner engagement competency ($\beta = 0.61$, $R^2 = 0.37$, $p < .001$). The findings indicate that teachers who adopt AI tools more extensively in their instructional practice report meaningfully higher levels of teaching competency across all measured dimensions, with the strongest effect observed for overall teaching competency and learner engagement. The paper concludes with theoretical and pedagogical implications, limitations, and directions for future research.

Keywords: Artificial intelligence; English language teaching; teaching competency; pedagogical competency; assessment competency; learner engagement; empirical study..

INTRODUCTION

The integration of artificial intelligence into education has accelerated rapidly over the past decade, transforming how languages are taught and learned. In English language classrooms specifically, AI-powered tools — including automated writing evaluation systems, intelligent tutoring systems, speech recognition software for pronunciation correction, AI chatbots for conversational practice, and adaptive learning platforms that personalize content delivery — have expanded the pedagogical repertoire available to teachers (Chen, Chen, & Lin, 2020; Huang, Spector, & Yang, 2021). Teaching competency, broadly conceptualized as the integrated set of pedagogical, content, assessment, and interpersonal skills that enable effective instruction (Shulman, 1987; Selvi, 2010), is a central determinant of language learning outcomes.

While AI adoption in education has been studied extensively from the perspective of student learning outcomes, comparatively less empirical attention has been paid to how AI integration reshapes and enhances the professional teaching competencies of English language teachers themselves. This is a meaningful gap, since teachers mediate the pedagogical value of any technology, and their competency in leveraging AI tools — rather than the mere presence of the tools — is likely to determine instructional effectiveness (Zhai, Wibowo, & Li, 2024). This study therefore empirically investigates the relationship between AI integration in teaching practice and multiple dimensions of teaching competency among English language teachers.

The paper proceeds as follows. Section 2 reviews relevant literature and develops the hypotheses. Section 3 details the research methodology. Section 4 presents the empirical data analysis. Section 5 discusses the findings, followed by the conclusion, implications, limitations, and directions for future research.

2. Review of Literature and Hypotheses Development

2.1 Artificial Intelligence in Language Teaching

AI applications in English language teaching span automated essay and writing evaluation (Warschauer & Ware, 2006), intelligent tutoring and adaptive learning systems that adjust content difficulty to learner proficiency (Huang et al., 2021), conversational agents and chatbots that provide low-stakes speaking practice (Fryer et al., 2020), and AI-based pronunciation and grammar feedback tools (Golonka et al., 2014). Collectively, these technologies are argued to extend teachers' capacity to individualize instruction, provide timely feedback, and manage larger or more heterogeneous classrooms (Chen et al., 2020).

2.2 Teaching Competency: Conceptual Foundations

Teaching competency is commonly conceptualized as a multidimensional construct comprising pedagogical competency (instructional design and delivery skill), assessment competency (the ability to design and interpret valid and reliable assessments), and competency in fostering learner engagement and motivation (Selvi, 2010; Darling-Hammond, 2006). The technological pedagogical content knowledge (TPACK) framework (Mishra & Koehler, 2006) further suggests that effective integration of technology, including AI, into teaching requires the interaction of technological, pedagogical, and content knowledge, implying that AI tool adoption alone is insufficient without corresponding pedagogical competency to deploy it meaningfully.

2.3 AI Integration and Overall Teaching Competency

Empirical studies suggest that teachers who integrate AI tools into their instructional routines report enhanced confidence, efficiency, and perceived effectiveness in their teaching practice (Zhai et al., 2024; Celik, 2023). On this basis:

H1: AI integration in teaching has a significant positive impact on overall teaching competency in the English language.

2.4 AI Integration and Pedagogical Competency

AI-supported adaptive learning and content-curation tools allow teachers to differentiate instruction more effectively and to design lessons responsive to individual learner needs (Huang et al., 2021), suggesting a positive relationship between AI integration and pedagogical competency. Thus:

H2: AI integration in teaching has a significant positive impact on pedagogical competency.

2.5 AI Integration and Assessment Competency

Automated writing evaluation and AI-based diagnostic assessment tools provide teachers with granular, real-time data on learner performance, which can strengthen assessment literacy and the precision of formative and summative assessment practice (Warschauer & Ware, 2006; Bailey & Lee, 2020). Accordingly:

H3: AI integration in teaching has a significant positive impact on assessment competency.

2.6 AI Integration and Learner Engagement Competency

Conversational agents, gamified AI applications, and interactive language-learning platforms have been shown to increase learner participation and motivation, which in turn places new demands — and offers new tools — for teachers seeking to sustain learner engagement (Fryer et al., 2020; Celik, 2023). Thus:

H4: AI integration in teaching has a significant positive impact on learner engagement competency.

2.7 Research Gap

Existing research has predominantly examined AI's effect on student-level learning outcomes or general teacher attitudes toward technology, with limited empirical work disaggregating the effect of AI integration across specific dimensions of English language teaching competency. This study addresses that gap by empirically testing the

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relationship between AI integration and three distinct competency dimensions alongside an overall composite measure.

3. Research Methodology

3.1 Research Design

The study employs a quantitative, cross-sectional, descriptive-cum-causal research design grounded in the positivist paradigm, suitable for empirical hypothesis testing (Saunders, Lewis, & Thornhill, 2019).

3.2 Sample and Data Collection

Primary data were collected through a structured, self-administered questionnaire distributed online and in person to English language teachers employed in government and private schools and colleges. A purposive-cum-convenience sampling technique was used. Of 280 questionnaires distributed, 232 were returned, and after screening for incomplete responses and failed attention-check items, 216 valid responses were retained for analysis (effective response rate: 77.1%), which meets the minimum sample size requirements for the regression models employed (Hair et al., 2019).

3.3 Measurement Instrument

The questionnaire comprised four sections. Section A captured respondent demographic and institutional profile data. Section B measured artificial intelligence integration in teaching (AIIT) using a 12-item scale adapted from Celik (2023) and Zhai et al. (2024), covering AI awareness, tool adoption frequency, perceived usefulness, and instructional application. Sections C, D, and E measured pedagogical competency (6 items), assessment competency (6 items), and learner engagement competency (6 items), respectively, adapted from Selvi (2010) and Darling-Hammond (2006), with an overall teaching competency composite computed as the mean of all 18 items. All items were measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

3.4 Reliability and Validity

Construct reliability was assessed using Cronbach's alpha; all constructs exceeded the recommended threshold of 0.70 (Nunnally & Bernstein, 1994), as reported in Table 1. Content validity was established through expert review by two English language education academicians and one instructional technology specialist, and a pilot study (n = 28) preceded full-scale data collection to refine item wording.

Table 1: Reliability Statistics of Study Constructs

Construct	No. of Items	Cronbach's Alpha
AI Integration in Teaching (AIIT)	12	0.88
Overall Teaching Competency (TCEL)	18	0.85
Pedagogical Competency (PC)	6	0.82
Assessment Competency (AC)	6	0.80
Learner Engagement Competency (LEC)	6	0.83

3.5 Data Analysis Techniques

Data were analyzed using IBM SPSS Statistics (Version 27). Descriptive statistics (mean, standard deviation) were computed for all constructs. Pearson product-moment correlation examined bivariate associations, and simple linear regression analysis tested hypotheses H1 through H4, with AI integration in teaching as the predictor variable in each model.

4. Data Analysis and Results

4.1 Demographic Profile of Respondents

Table 2: Demographic Profile of Respondents

Demographic Variable	Category	Frequency (n = 216)	Percentage (%)
Gender	Male	89	41.2
	Female	127	58.8
Teaching Experience	Up to 5 years	58	26.9
	6–10 years	84	38.9
	Above 10 years	74	34.2

Demographic Variable	Category	Frequency (n = 216)	Percentage (%)
Level Taught	School (Secondary/Senior Secondary)	121	56.0
	College/University	95	44.0
Institution Type	Government	112	51.9
	Private	104	48.1

4.2 Descriptive Statistics

Table 3: Descriptive Statistics of Study Constructs

Construct	Mean	Std. Deviation
AI Integration in Teaching	3.68	0.71
Overall Teaching Competency	3.79	0.63
Pedagogical Competency	3.83	0.66
Assessment Competency	3.70	0.69
Learner Engagement Competency	3.77	0.70

The descriptive results indicate a moderately high level of AI integration among the sampled English language teachers ($M = 3.68$, $SD = 0.71$), accompanied by moderately high self-reported teaching competency across all measured dimensions.

4.3 Correlation Analysis

Table 4: Pearson Correlation Matrix ($p < .01$, two-tailed)**

Construct	AIIT	TCEL	PC	AC	LEC
AIIT	1				
TCEL	0.64**	1			
PC	0.59**	0.71**	1		
AC	0.55**	0.68**	0.52**	1	
LEC	0.61**	0.73**	0.57**	0.49**	1

All correlations among the constructs are positive and statistically significant at the 0.01 level. AI integration is most strongly associated with overall teaching competency ($r = 0.64$), followed by learner engagement competency ($r = 0.61$), pedagogical competency ($r = 0.59$), and assessment competency ($r = 0.55$).

4.4 Regression Analysis and Hypothesis Testing

Simple linear regression was conducted separately for each dependent variable, with AIIT as the predictor.

Table 5: Summary of Regression Results and Hypothesis Testing (df = 1, 214)

Hypothesis	Dependent Variable	β (Standardized)	R^2	F	Sig. (p)	Result
H1	Overall Teaching Competency	0.64	0.41	148.66	< .001	Supported
H2	Pedagogical Competency	0.59	0.35	115.23	< .001	Supported
H3	Assessment Competency	0.55	0.30	91.71	< .001	Supported

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Hypothesis	Dependent Variable	β (Standardized)	R ²	F	Sig. (p)	Result
H4	Learner Engagement Competency	0.61	0.37	125.68	< .001	Supported

As presented in Table 5, AI integration in teaching significantly and positively predicts overall teaching competency ($\beta = 0.64$, $t = 12.19$, $p < .001$), explaining 41 percent of the variance ($R^2 = 0.41$, $F(1,214) = 148.66$, $p < .001$). AIIT also significantly predicts pedagogical competency ($\beta = 0.59$, $t = 10.73$, $p < .001$; $R^2 = 0.35$, $F(1,214) = 115.23$, $p < .001$), assessment competency ($\beta = 0.55$, $t = 9.58$, $p < .001$; $R^2 = 0.30$, $F(1,214) = 91.71$, $p < .001$), and learner engagement competency ($\beta = 0.61$, $t = 11.21$, $p < .001$; $R^2 = 0.37$, $F(1,214) = 125.68$, $p < .001$). All four hypotheses, H1 through H4, are therefore supported. The comparative effect sizes indicate that overall teaching competency and learner engagement competency are the most sensitive to AI integration, followed by pedagogical competency, with assessment competency showing the comparatively smallest, though still substantial, effect.

5. Discussion

The empirical findings provide strong support for the proposition that AI integration in teaching practice meaningfully enhances teaching competency in the English language across multiple dimensions. The relatively strong effect on learner engagement competency ($R^2 = 0.37$) is consistent with prior evidence that AI-mediated tools such as chatbots and gamified platforms increase interactivity and learner participation, thereby expanding teachers' repertoire for sustaining engagement (Fryer et al., 2020; Celik, 2023). The significant effect on pedagogical competency ($R^2 = 0.35$) aligns with the TPACK framework's proposition that technology integration, when coupled with pedagogical knowledge, enhances instructional design and delivery capability (Mishra & Koehler, 2006). The comparatively smaller, though still significant, effect on assessment competency ($R^2 = 0.30$) may reflect the fact that assessment design and interpretation remain more heavily reliant on teachers' independent professional judgment, with AI serving a largely supportive, rather than substitutive, role (Bailey & Lee, 2020).

These results collectively suggest that AI tools function as competency-amplifying resources rather than substitutes for core pedagogical skill, consistent with the broader technology-integration literature emphasizing that the value of educational technology is substantially mediated by teachers' capacity to deploy it purposefully (Mishra & Koehler, 2006; Zhai et al., 2024).

6. Conclusion

This study empirically examined the impact of artificial intelligence integration on teaching competency in the English language among 216 school and college-level teachers. The findings confirm that AI integration exerts a statistically significant and positive influence on overall teaching competency and on each of its three constituent dimensions — pedagogical competency, assessment competency, and learner engagement competency — with the strongest effects observed for overall competency and learner engagement. The study contributes empirical evidence to a literature that has largely emphasized student-level outcomes, offering instead a teacher-centered, competency-disaggregated perspective on AI integration in English language education.

6.1 Pedagogical and Managerial Implications

The findings suggest that educational institutions seeking to enhance English language teaching quality should invest not merely in AI tool procurement but in structured professional development that builds teachers' capacity to integrate these tools pedagogically. Given the comparatively smaller effect observed for assessment competency, targeted training in AI-assisted assessment design and interpretation may yield disproportionate gains. Institutions should also recognize that AI integration appears to most strongly benefit learner engagement strategies, suggesting priority investment in conversational and interactive AI tools where classroom engagement is a key institutional priority.

6.2 Limitations and Directions for Future Research

The study is subject to certain limitations. First, the cross-sectional design precludes strong causal inference; longitudinal designs would allow examination of how AI integration and teaching competency co-evolve as teachers gain experience with these tools. Second, the sample was drawn using purposive-cum-convenience sampling from school and college English language teachers, which may limit generalizability to other subject domains or educational contexts. Third, the study relies on self-reported perceptual measures of both AI integration and teaching competency rather than observed classroom performance or independent competency assessment; future research could triangulate self-report data with classroom observation or learner outcome data. Finally, future studies could examine moderating variables such as institutional AI infrastructure, teacher digital literacy, or years of AI tool exposure, and could employ structural equation modelling to examine the constructs within a single integrated model.

Declarations

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest: The author(s) declare no conflict of interest.

Data Availability: The datasets generated and/or analyzed during the current study are available from the **corresponding author** upon reasonable request.

Ethical Approval: All procedures involving human respondents were conducted in accordance with applicable ethical standards, and informed consent was obtained from all individual participants included in the study.

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