

The Research on Global Competence of Cross-Border E-Commerce Students under AI-Assisted Teaching

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Abstract: With the rapid development of artificial intelligence (AI) in higher education, AI-assisted teaching has become a powerful driver for cultivating students' global competence in the digital economy. This study investigates the relationship between AI engagement and global competence among cross-border e-commerce students in Chinese universities. The AI engagement construct includes four dimensions: personalization and adaptivity, interactivity and feedback, learning analytics support, and perceived usefulness of AI tools. Global competence is measured by knowledge, cognitive, and action dimensions. Using a quantitative approach, data were collected from 428 undergraduate students through validated questionnaires. Structural Equation Modeling (SEM) was employed to examine the relationships among constructs. Results indicate that AI engagement significantly enhances students' global competence, particularly through personalization and feedback mechanisms. Learning analytics support and perceived usefulness also positively influence the cognitive and action dimensions of global competence. The findings highlight the pedagogical importance of integrating AI tools into e-commerce education to promote digital readiness, intercultural communication, and employability in global markets.

Keywords: AI-assisted Teaching; AI Engagement; Global Competence; Cross-Border E-Commerce; Structural Equation Modeling.

1. Introduction

In today's globalized digital economy, cross-border e-commerce professionals must possess not only technical and marketing knowledge but also the capacity for intercultural communication, ethical decision-making, and sustainable action[1][2]. As the boundaries between technology, commerce, and culture become increasingly blurred, the cultivation of global competence through AI-enhanced pedagogy becomes a crucial educational goal[3]. Despite growing interest in AI-supported learning, empirical studies examining how AI engagement influences students' global competence remain limited[4]. This study aims to fill this research gap by investigating the relationship between AI engagement and global competence among cross-border e-commerce students. This study aims to measure AI engagement levels among cross-border e-commerce students, assess their global competence across knowledge, cognition, and action dimensions, and analyze how AI engagement influences global competence. The research will employ structured methods to evaluate these relationships, providing insights into the role of AI in enhancing global competence[5].

2. Research Methodology

2.1. Research Design

This study adopted a quantitative correlational research design to examine the relationship between students' AI engagement and their global competence in the context of cross-border e-commerce education. A structured questionnaire survey was used as the primary data collection instrument, allowing for systematic and reliable measurement of the constructs under investigation. The questionnaire comprised two main sections. The first section focused on students' engagement with AI-assisted teaching technologies, while the second measured their level of global competence.

This design was suitable for identifying the strength and direction of relationships among the variables and testing the proposed conceptual model using structural equation modeling (SEM).

2.2. Instruments

Two validated scales were adapted for this study. The AI Engagement Scale was developed based on prior models of technology-enhanced learning and user acceptance [6][7][8]. It consisted of four dimensions: personalization and adaptivity (4 items), interactivity and feedback (4 items), learning analytics support (4 items), and perceived usefulness of AI tools (4 items). These dimensions captured how students experienced AI-based learning environments in terms of adaptability, interactivity, feedback quality, performance monitoring, and perceived educational value.

The Global Competence Scale was adapted from frameworks developed by the OECD [1] and Deardorff [5]. It measured three dimensions: knowledge (4 items), cognitive (4 items), and action (4 items). These dimensions reflected students' understanding of global issues, their ability to analyze perspectives and think critically, and their willingness to act responsibly in multicultural or international contexts. All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), providing quantitative measures of participants' responses.

2.3. Participants

Data were collected from 428 undergraduate students majoring in cross-border e-commerce at four universities in China. The participants were selected using a purposive sampling method to ensure relevance to the research objectives. Among them, 61% were female and 39% were male, with an average age of 20.4 years. All participants had prior exposure to AI-assisted teaching tools within their academic programs, ensuring familiarity with the constructs

measured.

2.4. Data Analysis

Data analysis was conducted using Structural Equation Modeling (SEM) with AMOS 26.0. The analysis followed a two-step approach. First, Confirmatory Factor Analysis (CFA) was performed to assess the measurement model's validity and reliability, including tests for construct validity, composite reliability, and average variance extracted (AVE). Second, model fit was evaluated using standard indices such as Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and the Chi-square/degrees of freedom ratio (χ^2/df). Finally, path analysis was employed to test the hypothesized relationships between AI engagement dimensions and global competence outcomes, providing empirical evidence for the study's conceptual framework, as shown in Figure 1.

3. Results

Table 1. Reliability and Convergent Validity of Measurement Constructs

Construct	Cronbach's α	CR	AVE
Personalization & Adaptivity	0.89	0.90	0.68
Interactivity & Feedback	0.91	0.92	0.71
Learning Analytics Support	0.87	0.88	0.66
Perceived Usefulness	0.88	0.89	0.67
Knowledge	0.90	0.91	0.69
Cognitive	0.89	0.90	0.68
Action	0.88	0.89	0.65

Structural Equation Modeling (SEM) was employed using AMOS 26.0 to examine the relationship between AI engagement and global competence among cross-border e-commerce students. The measurement model demonstrated strong psychometric properties. All factor loadings were above 0.70 and significant at $p < .001$, indicating good convergent validity. Composite reliability (CR) values ranged from 0.83 to 0.91, and average variance extracted (AVE) values exceeded the 0.50 threshold, confirming construct reliability and validity, as shown in Table 1.

Table 2. Model Fit Coefficients for SEM Analysis

Model Fit Indices	Value	Recommended Threshold
χ^2/df	2.34	< 3.00
CFI	0.95	> 0.90
TLI	0.94	> 0.90
RMSEA	0.052	< 0.08

The overall model fit indices indicated a satisfactory fit between the hypothesized model and the observed data ($\chi^2/df = 2.34$, CFI = 0.95, TLI = 0.94, RMSEA = 0.052). These values meet commonly accepted criteria (CFI and TLI > 0.90, RMSEA < 0.08), supporting the adequacy of the model structure, as shown in Table 2.

Path analysis revealed that all hypothesized relationships between AI engagement dimensions and global competence dimensions were significant ($p < .001$). Specifically, Interactivity and Feedback exerted the strongest influence on Cognitive Competence ($\beta = 0.42$), demonstrating that interactive learning and timely feedback from AI systems effectively enhance students' analytical and reflective

thinking skills. Personalization and Adaptivity significantly predicted Knowledge Competence ($\beta = 0.38$), highlighting the importance of adaptive AI systems in facilitating understanding of global and professional concepts. Meanwhile, Learning Analytics Support and Perceived Usefulness of AI Tools both had significant positive impacts on Action Competence ($\beta = 0.34$ and $\beta = 0.29$, respectively), suggesting that performance tracking and the perceived value of AI tools motivate students to apply their learning in real-world, multicultural contexts.

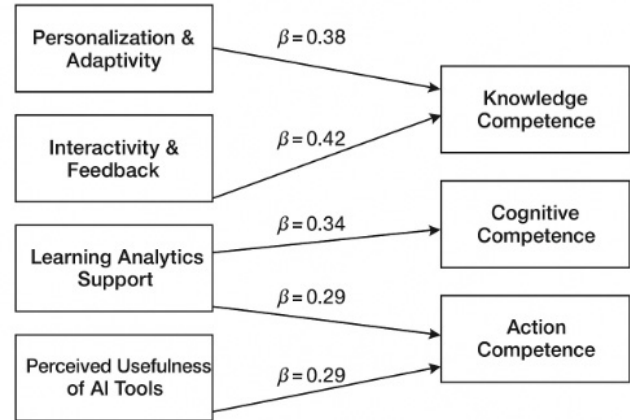


Figure 1. Model Path Coefficients for SEM Analysis

Overall, the findings confirm that AI engagement contributes meaningfully to the development of students' global competence. Among all predictors, interactivity and adaptivity emerged as key drivers of higher-order cognitive and knowledge-based outcomes, while learning analytics and perceived usefulness foster students' readiness for global action and problem-solving in digital commerce settings.

4. Discussion

The findings of this study confirm that AI engagement serves as a crucial factor in cultivating students' global competence, particularly in the context of cross-border e-commerce education [3][9]. By integrating AI-driven technologies into teaching and learning, students are able to engage with knowledge in more personalized, reflective, and globally oriented ways[2]. Personalized and adaptive AI learning environments empower students to access culturally diverse content and tailor their learning strategies to global contexts, thereby promoting inclusivity and cross-cultural understanding[4]. This adaptive capacity enables learners to develop flexible thinking and respond effectively to the dynamic nature of international business environments [1][10].

Moreover, interactive AI feedback mechanisms play a central role in enhancing cognitive engagement and reflection[11]. Real-time feedback provided by AI systems allows students to evaluate their understanding continuously, identify learning gaps, and adjust their strategies accordingly[4]. This reflective process deepens comprehension, strengthens problem-solving abilities, and contributes to the development of intercultural empathy, an essential component of global competence[5][12]. Similarly, learning analytics support gives students valuable insights into their learning behaviors and progress[13]. By visualizing data on performance and participation, AI analytics encourages self-regulated and autonomous learning, which in

turn nurtures global awareness and responsibility[2].

In addition, students' perceived usefulness of AI tools significantly influences their motivation and behavioral engagement. When learners recognize AI technologies as beneficial for improving efficiency, creativity, and professional readiness, they are more likely to apply their knowledge in authentic cross-border business settings[2]. This intrinsic motivation enhances not only their academic performance but also their readiness to operate in global digital marketplaces[14].

Overall, the study supports the notion that AI-assisted teaching extends beyond academic enhancement[15]. It plays a transformative role in preparing students for the global digital economy by fostering analytical thinking, intercultural sensitivity, and action-oriented learning[3]. These findings highlight the strategic value of AI integration in higher education, underscoring its potential to bridge technological innovation with global competence development[1][9].

5. Conclusion

This study reveals that AI engagement significantly enhances the global competence of cross-border e-commerce students. The four dimensions collectively strengthen students' knowledge, cognitive skills, and action abilities in global contexts. Practically, curriculum designers should integrate AI tools to foster intercultural learning, teachers should apply adaptive feedback systems to personalize instruction, and institutions should provide AI literacy training and technical support. However, as the study relies on self-reported data from a single country, future research should include longitudinal and cross-national investigations for broader validation.

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