Exploring Artificial Intelligence Literacy and Teacher Identity among Pre-Service EFL Teachers: A Study in China

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Abstract. In this study, 86 Chinese pre-service English as a Foreign Language (EFL) teachers' teacher identities and artificial intelligence (AI) literacy are examined. It evaluated three facets of teacher identity (self-efficacy, beliefs, and career perception) and four facets of AI literacy (perception, knowledge and skills, application and innovation, and ethics) using validated scales. Overall, descriptive findings showed high levels in all dimensions. AI Application and Innovation had the highest scores among AI literacy factors, followed by AI Perception and AI Ethics. In terms of teacher identity, Career Perception came in first. Correlation analyses showed that while general attitudes toward AI had little effect, knowledge of AI, creative application, and ethical awareness were positively correlated with important aspects of teacher identity. The findings highlight the necessity of integrating practical, reflective AI into teacher education programs and the significance of ethical engagement and practical competence in forming professional identity during teacher preparation.

Keywords: Artificial Intelligence Literacy, Teacher Identity, Pre-service EFL Teachers, Educational Technology, Teacher Education

1. Introduction

The advancement of artificial intelligence (AI) has reached a major turning point in recent years. These sophisticated systems can comprehend and produce language that is similar to that of humans because they have been trained on enormous text datasets [1, 2]. These days, ChatGPT and other AI have shown impressive abilities, such as few-shot reasoning, task adaptation across a variety of domains, and coherent text generation [3, 4]. These advantages have led to the growing integration of AI technologies in a variety of fields, including education, where they enable sophisticated tasks like automated assessment, adaptive instruction, and real-time feedback [1, 4]. In addition to increasing productivity, these applications put traditional teaching roles to the test, which has led to a redefining of professional identity in AI-mediated learning environments [5].

The application of artificial intelligence in education has witnessed significant growth [1, 6]. As AI technologies integrate into the work of teachers—key figures within the educational sphere [7]—they exert profound impacts on both educational research and teaching practice. Artificial intelligence is reshaping the role of teachers, enhancing their professional capabilities, and creating

new opportunities for them to function as mentors and facilitators [5]. These tools provide supportive resources for improving teaching efficiency [5, 8].

Teacher identity (ID), a subject of considerable attention within educational research, is undergoing profound transformation. Identity constitutes a core element of professional development, exerting significant influence on teachers' attitudes and behaviours [9, 10]. Over the past two decades, researchers have defined teacher identity as the manner in which educators comprehend and fulfil their responsibilities within specific teaching contexts [11, 12]. According to Barkhuizen [13], teacher identity encompasses not only personal aspirations but also reflects complex interactions between sociocultural experiences and external contexts. Research indicates that numerous interrelated factors collectively shape teachers' professional identities, including affective experiences, sociocultural influences, pedagogical cognition, equity perceptions, and professional preparation [14-16].

Pre-service teachers (PSTs) constitute a significant cohort, possessing a unique role as future educators while confronting particular challenges in adapting to AI-assisted educational environments. The attitudes and skills PSTs develop towards AI during their early career stages will profoundly influence their subsequent teaching strategies, thereby shaping students' understanding and utilisation of AI tools [17]. However, prospective teachers encounter similar obstacles when integrating AI into teaching, particularly during critical career phases when their pedagogical approaches and professional identities are still developing, necessitating adaptation to this technological shift [10, 18]. With the rapid advancement of AI technologies, these challenges become particularly pronounced, compelling future educators to continually adjust and update their understanding of AI and its application methodologies.

Critical gaps still exist despite the relatively solid foundation of knowledge provided by current research on foreign language teachers' identities, especially in light of the quick development of educational technologies like artificial intelligence. Conventional research has mostly ignored the impact of sophisticated digital tools and platforms in favor of concentrating on the sociocultural, pedagogical, and institutional elements that shape the identity of foreign language teachers. Most significantly, a crucial factor in identity formation is understudied due to the startling lack of research on the connection between AI literacy and identity construction among pre-service foreign language teachers in China.

Furthermore, despite the fact that academics have recognized that a variety of factors, such as individual experiences, technological affordances, institutional support, and peer interaction, work has not sufficiently examined the ways in which teacher identity and AI literacy are mutually influencing. Additionally, there is a gap in our knowledge of the adaptation processes teachers go through because there is a lack of documentation on the coping and coordination strategies they use when integrating traditional roles with new roles brought about by AI. Furthermore, there has not yet been a thorough analysis of the unique opportunities and difficulties Chinese foreign language instructors encounter when incorporating AI tools, as well as the ways in which these experiences affect their sense of self as professionals.

Thus, in the context of teaching English as a foreign language (EFL) in China, the current study intends to investigate the relationship between AI literacy and teacher identity among English teachers. Teachers' sense of professional identity may be significantly impacted by their level of AI literacy as the technology continues to gain traction in educational settings. Consequently, the following research questions (RQs) are put forth:

RQ1: What are the levels of AI literacy and professional identity among Chinese pre-service EFL teachers?

RQ2: What are the correlations between different dimensions of AI literacy and professional identity in this group?

2. Method

2.1. Participants and data collection

Participants in this study were 86 pre-service English teachers enrolled in teacher education programs across several universities in China. All respondents were pursuing qualifications to become certified English language teachers and had completed or were completing foundational coursework in education and pedagogy.

Data were collected using an online questionnaire distributed through Wenjuanxing, a widely used Chinese survey platform. The instrument included items related to demographic background, AI literacy, and dimensions of teacher identity. Prior to distribution, all participants were informed of the voluntary and anonymous nature of their participation.

Among the participants, 38 individuals (44.19%) were female and 48 individuals (55.81%) were male. Among respondents, 24 individuals (27.91%) aspired to teach at primary schools, 30 (34.88%) at secondary schools, 19 (22.09%) at sixth form colleges, and 13 (15.12%) at universities. Furthermore, 33 participants (38.37%) indicated they had never used artificial intelligence tools, while 53 participants (61.63%) reported having used AI-related products or technologies (such as chatbots or intelligent teaching assistants). This distribution reflects the varying levels of digital literacy among prospective foreign language English teachers, enabling us to investigate the connection between AI knowledge and professional identity development.

Table 1. Demographic information

Category	Frequency	Percentage
Gender		
Male	48	55.81
Female	38	44.19
Intended teaching level		
Primary school	24	27.91
Junior high school	30	34.88
High school	19	22.09
University	13	15.12
AI Usage Experience		
Have used AI technologies/products	53	61.63
Have not used AI technologies/products	33	38.37

2.2. Instruments

To evaluate participants' AI literacy and teacher identity, the current study used a composite questionnaire made up of two validated tools. Every questionnaire item used in this study was first created in English and then rigorously translated and back-translated into Chinese. Two bilingual applied linguistics specialists independently examined the translated materials to guarantee semantic correctness and contextual suitability. Where required, both tools were modified to better suit the

requirements and traits of the intended audience. To improve clarity and contextual relevance, minor changes were made to the item wording. A five-point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree," was used to score each item.

Specifically, we measure AI literacy with the Artificial Intelligence Literacy Scale for Teachers (AILST) developed by Ning et al. [19]. This scale was specifically devised to explore the multifaceted nature of AI literacy in the teaching domain. It comprises 36 items organized into four conceptually distinct dimensions: AI perception, AI knowledge and skills, AI application and innovation, and AI ethics. Each dimension corresponds to attitudes of individuals towards AI, individuals' familiarity with concepts and functions related to AI, individuals' innovational skills in using AI tools in teaching, and individuals' ethical familiarity with applications of AI. The internal consistency of the four subscales in our study was satisfactory to excellent, with Cronbach's alpha ranging from 0.900 to 0.929 (Table 2).

2.3. Data analysis

IBM SPSS Statistics 26.0 was used to process the quantitative data. To guarantee the overall quality of the data, the dataset was thoroughly examined for outliers, inconsistent responses, and missing entries prior to conducting any statistical tests. For the purpose of summarizing the demographic backgrounds of the participants and outlining the general distribution patterns of their scores across the main constructs, basic descriptive statistics were first created.

Cronbach's alpha was then used to evaluate the internal consistency of each subscale in the teacher identity and AI literacy measures. The instruments showed satisfactory reliability for research purposes, as indicated by the fact that all of the coefficients were above 0.70.

The relationships between the main variables were then investigated using Pearson correlation analyses. In particular, the three dimensions of teacher identity and the four dimensions of AI literacy. This study provided initial insights into possible connections between these constructs by shedding light on how various aspects of AI literacy might co-vary with pre-service teachers' perceptions of their professional identities in the Chinese EFL context.

3. Results

3.1. Descriptive analysis

The overall distributional characteristics of the four dimensions of AI literacy, three of teacher identity, and the major constructs were captured through descriptive analyses. The means, skewness, kurtosis, standard deviations (SD), and minimum and maximum scores for each variable are compiled in Table 3.

Participants' reported levels of AI literacy were generally quite high. With the highest mean score (M = 3.836, SD = 0.856) among the four dimensions, AI Application and Innovation was closely followed by AI Perception (M = 3.819, SD = 0.762) and AI Ethics (M = 3.782, SD = 0.845). The mean for the AI Knowledge and Skills dimension was marginally lower (M = 3.757, SD = 0.905). This pattern indicates that pre-service EFL teachers felt somewhat less confident about their technical mastery or hands-on competence with AI tools, despite their general positive attitudes toward AI and openness to its educational use. This finding is consistent with other reports from teacher education contexts.

When it came to teacher identity, the mean scores once more showed a generally positive orientation. The greatest mean was achieved by Career Perception (M = 3.899, SD = 0.933),

followed by Teacher Beliefs (M = 3.744, SD = 0.947) and Teacher Self-efficacy (M = 3.826, SD = 0.930). According to these findings, the majority of participants believed that teaching was a fulfilling career and that they were reasonably confident in their pedagogical convictions and classroom skills.

Examining the distribution indices showed that all variables had negative skewness (teacher identity: -1.593 to -1.363; AI literacy: -1.723 to -1.332), indicating that participants tended to choose higher Likert scale points. To put it another way, most people had positive opinions about AI and high opinions of themselves as professionals. All of the kurtosis values (0.27 to 1.78) were positive, suggesting leptokurtic, or somewhat peaked, distributions in which the responses were more closely clustered around the mean than in a normal curve.

When combined, these descriptive results show a fairly homogeneous sample of Chinese pre-service EFL teachers who consider themselves to be professionally dedicated and moderately AI-literate. In later analyses, this pattern offers a stable empirical foundation for examining the interactions between the two domains.

Table 3. Descriptive statistics

Dimension	Min	Max	Mean	SD	Skewness	Kurtosis
AI Literacy						
AI Perception	1.600	4.700	3.819	0.762	-1.700	1.569
AI Knowledge and Skills	1.500	4.700	3.757	0.905	-1.373	0.266
AI Application and Innovation	1.375	4.750	3.836	0.856	-1.723	1.622
AI Ethics	1.625	4.750	3.782	0.845	-1.332	0.423
Teacher Identity						
Teacher Self-efficacy	1.444	4.778	3.826	0.930	-1.593	1.022
Teacher Beliefs	1.250	5.000	3.744	0.947	-1.363	0.604
Career Perception	1.000	5.000	3.899	0.933	-1.519	1.777

3.2. Correlation analysis

To examine how the major constructs were related, Pearson correlation coefficients were computed among the four dimensions of AI literacy and the three dimensions of teacher identity. Table 4 presents the full correlation matrix.

Overall, the analysis found a number of significant positive correlations between teacher identity dimensions and AI literacy. With significant correlations with Teacher Self-efficacy (r =.320, p <.01), Teacher Beliefs (r =.304, p <.01), and Career Perception (r =.372, p <.01), AI Knowledge and Skills displayed the most consistent pattern of associations among them. Practically speaking, pre-service teachers who were more assured of their operational skills and knowledge of AI also tended to believe that they were more capable teachers, support more learner-oriented pedagogical views, and find teaching to be a more desirable career path.

AI Application and Innovation showed a somewhat similar but more selective pattern, and it was significantly associated with Teacher Beliefs (r =.364, p <.01) and Teacher Self-efficacy (r =.377, p <.01), but not with Career Perception (r =.058, n.s.). Even though it doesn't directly affect their teaching, this research indicates that teachers' confidence and contemporary teaching perspective may be enhanced by their ability to creatively incorporate AI tools into their lessons.

Teacher Self-efficacy (r =.280, p <.01), Teacher Beliefs (r =.226, p <.05), and Career Perception (r =.258, p <.05) showed positive and significant correlations with AI Ethics. These findings suggest that a stronger sense of professional identity may be associated with a greater ethical awareness in the application of AI. On the other hand, AI Perception, which reflects general attitudes toward AI, was only associated with Teacher Beliefs (r =.247, p <.05) and not with the other two aspects. This suggests that while positive attitudes alone may influence pedagogical thinking, they are not enough to affect teaching confidence or career identification.

When combined, the correlation results show that there are significant relationships between important aspects of teacher identity and AI literacy, particularly in its skill, innovation, and ethical dimensions. The notion that fostering pre-service teachers' AI competencies may act as a basis for fostering greater self-efficacy, more adaptive pedagogical beliefs, and a more distinct sense of professional belonging is supported by the fact that AI knowledge and practical application skills seem to have the greatest influence among these.

Table 4. Correlation between AI literacy and teacher identity

Dimension	1	2	3	4	5	6	7
AI Perception	1						
AI Knowledge and Skills	0.276*	1					
AI Application and Innovation	0.133	0.243*	1				
AI Ethics	0.281**	0.292**	0.164	1			
Teacher Self-efficacy	0.126	0.320**	0.377**	0.280**	1		
Teacher Beliefs	0.247*	0.304**	0.364**	0.226*	0.263*	1	
Career Perception	0.121	0.372**	0.058	0.258*	0.150	0.334**	1

Note: * p < .05, ** p < .01.

4. Discussion

This study looked at the relationship between Chinese pre-service EFL teachers' identities and different facets of AI literacy. The findings provide credence to the notion that teachers' developing professional self-concepts are influenced, at least in part, by their training experiences and technological proficiency. Participants' levels of professional identity and AI literacy were generally moderately high, and there was a positive correlation between a number of their subdimensions.

An in-depth analysis of the findings indicates that knowledge and skills related to artificial intelligence are particularly significant. The positive association between these competencies and teachers' perceptions of their career trajectories and self-efficacy corroborates prior research findings—namely, that digital literacy enhances teachers' engagement and sense of competence. For instance, Williams et al. [20] observed that pre-service teachers' confidence in curriculum design capabilities often increases following exposure to educational technology. In this study, participants who self-reported possessing more extensive AI knowledge likewise demonstrated greater confidence in their career choices and teaching abilities. Kent and Giles [21] noted that teachers' perceptions of their technological capabilities frequently influence how they integrate teaching tools, a trend that appears equally applicable within the domain of AI knowledge.

The results pertaining to AI innovation and application paint a complementary picture. Higher levels of self-efficacy and more adaptable, student-centered pedagogical orientations were typically displayed by participants who felt more at ease experimenting with AI tools. This resonates with

Yang et al. [22], who argue that meaningful engagement with new technologies can foster mastery experiences that reinforce efficacy beliefs. It also brings to mind Ertmer et al. [8]'s finding that practice-based technology interactions have the power to progressively alter instructional beliefs. According to this viewpoint, using AI creatively in the classroom could serve as a mental and emotional practice for developing into a self-assured, flexible teacher.

Despite being frequently disregarded, ethical literacy turned out to be another significant correlate. All three aspects of identity were positively correlated with AI ethics. This result emphasizes that ethical knowledge is more than just theory. Teachers who are more sensitive to concerns about accountability, transparency, and fairness may feel more equipped to use professional judgment as AI systems increasingly mediate decisions in the classroom. In turn, this ethical consciousness appears to strengthen self-assurance and a feeling of direction in the teaching profession.

In contrast, only Teacher Beliefs were associated with AI Perception, which reflects general attitudes toward AI. This weaker association implies that, even though optimism about AI is beneficial, it is not enough to affect deeper or more operational aspects of identity unless it is combined with skill and practice. Sperling et al. [17] note that genuine experience and competence are the true forces behind change, as enthusiasm by itself rarely translates into pedagogical readiness. It's possible that while many pre-service teachers have a positive theoretical view of AI, they haven't yet internalized what this technology means for their daily work activities.

Collectively, these findings support the idea that AI literacy is a complex concept rather than a singular skill. It seems that ethical reasoning, skills, and creative engagement are more important for professional development than awareness or a positive outlook. There are obvious ramifications for teacher education from this distinction. Training programs may place more emphasis on practical experience, introspection, and critical discussion of the pedagogical and ethical aspects of technology than on AI literacy as a superficial body of knowledge. Identity transformation in the digital age hinges on how aspiring educators resolve the conflict between established pedagogical principles and new technological requirements, as Lan [18] reminds us.

Finally, the results broaden the current theory on teacher identity by including AI skills as a contextual factor. While previous work has focused on social and institutional conditions [10, 11], the present study highlights how technological skills can themselves influence how teachers perceive their tasks and their capacity for action. This is particularly relevant in the field of teaching English as a foreign language in China, where AI-based learning systems are increasingly being integrated into course design and specialised discourse. Ji et al. [6] argue that collaboration between AI and humans requires new forms of co-agency, a concept that is reflected in the positive correlations observed here between AI skills and identity.

In short, pre-service teachers who use AI with competence, creativity, and ethical awareness appear to develop stronger and more coherent professional identities. Beyond preparing teachers to handle new technologies, cultivating AI literacy may thus shape who they become as educators, technologically capable, reflective, and ethically grounded professionals.

5. Limitations and future directions

While this study offers useful evidence on the relationship between AI literacy and teacher identity among Chinese pre-service EFL teachers, several caveats should be noted to properly situate the findings.

Firstly, the sample was relatively small and geographically concentrated. The 86 participants came from a limited number of teacher training institutions, which inevitably limits the

generalisability of the results. Training opportunities, institutional priorities, and access to AI-assisted teaching may vary from region to region, which could impact both AI skills and identity development. Future studies could broaden the scope by recruiting participants from a wider range of provinces, programme types, and institutional environments. A multi-centre or inter-institutional design would help highlight how local contexts influence the relationship between skills and identity and improve the relevance of comparisons.

Another limitation stems from the cross-sectional design. Correlation analyses reveal patterns of association but do not determine the direction or nature of the influence. It is unclear whether stronger AI skills foster a stronger sense of identity or whether confident and effective teacher candidates are simply more inclined to use AI tools. A longitudinal study following prospective teachers through different phases, including courses, placements, and entry into professional life, would be more appropriate for capturing these evolving dynamics. Such designs could also provide insights into possible interactions between skills and identity that remain hidden in cross-sectional surveys.

The third point concerns reliance on self-reported data. Although the instruments employed have been validated, responses may still be influenced by social desirability effects, overestimation of skills, or differences in item interpretation. Participants' perceptions of their AI application may not align with their actual classroom practices. Future research could therefore combine self-assessment with performance-based evaluation, teaching demonstrations, or analysis of digital usage traces to provide a more comprehensive picture of teachers' AI engagement.

Beyond these methodological limitations, the underlying mechanisms linking AI knowledge to teachers' professional identity warrant deeper exploration. Factors such as institutional support, prior experience with information and communication technologies, accessibility of digital infrastructure, and supervisory quality may all influence how technical skills become internalised as part of one's professional identity. Mixed-methods or qualitative research approaches could further illuminate how AI reshapes more personalised and contextualised dimensions of teachers' self-perception. As AI policies and pedagogies evolve within teacher training, these perspectives are increasingly coming to the fore.

In sum, acknowledging these limitations not only clarifies the scope of the present study but also points to promising directions for future work. Expanding the evidence base across contexts, adopting longitudinal designs, and integrating multiple data sources will allow for a more nuanced and developmentally grounded account of how technology and professional identity co-develop in the preparation of future educators.

6. Conclusion

The purpose of this study was to investigate the relationship between various aspects of AI literacy and teacher identity among Chinese pre-service EFL teachers. An analysis of 86 participants using validated instruments revealed that stronger indicators of teacher identity, especially self-efficacy, pedagogical beliefs, and career perception, were consistently associated with higher levels of AI knowledge, application ability, and ethical awareness. According to these findings, teachers' development during their preparation years may be significantly influenced by AI literacy, which is a multifaceted ability that includes technical proficiency, creative application, and ethical awareness.

Additionally, the findings show that not all facets of AI literacy are equally important. While there are only weak correlations between teacher identity and general attitudes toward AI, technical proficiency and the capacity to use AI creatively seem to be the most strongly correlated. This discrepancy suggests an important pedagogical conclusion: increasing public knowledge of AI is

insufficient. Future teachers must be able to work with AI, including experimenting, reflecting, and assessing its application in real-world learning environments, thanks to teacher education programs. Such deeper engagement may be essential for developing a cohesive sense of professional self as well as for teaching proficiency as AI technologies continue to impact classrooms around the world.

When combined, the study presents AI literacy as a formative aspect of professional identity as well as a cognitive resource. By doing this, it contributes to more general conversations about how teacher preparation can adapt to changing technology. In order to ensure that pre-service teachers enter the field not only as proficient technology users, but also as reflective and adaptable professionals prepared to handle a changing educational landscape, the evidence presented here encourages teacher education programs to incorporate AI in ways that are pedagogically grounded, ethically mindful, and personally transformative.

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