THEORETICAL FRAMEWORK AND PRACTICAL STRATEGIES FOR ENHANCING AI LITERACY AMONG CHINESE UNIVERSITY TEACHERS

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ABSTRACT

This study aims to explore the enhancement of AI literacy among Chinese university teachers and proposes corresponding theoretical frameworks and practical strategies. Through research, it analyzes the current status and challenges of AI literacy among Chinese university teachers, revealing widespread deficiencies in knowledge, skills, and attitudes. We propose a comprehensive theoretical framework encompassing the cultivation of knowledge, skills, and attitudes and recommend diverse practical strategies, including training courses, resource support, and collaborative exchanges. The theoretical framework and strategies presented in this study aim to guide the enhancement of AI literacy among Chinese university teachers, promoting the integration of education and artificial intelligence. Further research and practice are needed to optimize the training models for AI literacy among university teachers.

Keywords: Artificial Intelligence Education, Teacher Training Programs Digital Transformation in Education, AI Literacy Enhancement, Pedagogical Innovation Strategies.

I.   INTRODUCTION

In the era of rapid AI development, enhancing AI literacy among university teachers has become crucial in education. This study focuses on enhancing AI literacy among Chinese university teachers, aiming to construct relevant theoretical frameworks and propose practical strategies. It systematically analyzes the current status, challenges, and critical elements of AI literacy among Chinese university teachers. The study finds that Chinese university teachers' current AI literacy level is generally low, with significant deficiencies in knowledge, skills, and attitudes. Based on these findings, the study proposes a comprehensive theoretical framework covering three dimensions: knowledge, skills, and attitudes, and suggests diverse practical strategies, including training courses, resource support, and collaborative exchanges. This study aims to provide theoretical guidance and practical references for enhancing AI literacy among Chinese university teachers, facilitating deep integration of education and artificial intelligence.

II.   CURRENT STATUS OF AI LITERACY AMONG CHINESE UNIVERSITY TEACHERS

The overall AI literacy level among Chinese university teachers could be more optimistic, characterized by notable deficiencies in knowledge, insufficient skills, and varied attitudes. In terms of knowledge, only some teachers have a precise understanding of core AI concepts and fundamental principles, with most limiting their understanding to superficial levels of deep learning, machine learning, and other critical technologies. The performance in skills is even more concerning, with few teachers proficient in using standard AI teaching tools such as intelligent grading systems and personalized learning platforms; the proportion capable of independently developing or improving AI applications needs to be revised. Regarding attitudes, although most teachers acknowledge the importance of AI in education, many feel perplexed and concerned about effectively integrating AI technologies into teaching. Notably, there are significant differences in AI literacy levels among teachers from different disciplinary backgrounds: STEM teachers generally perform better. In contrast, teachers from humanities and social sciences exhibit relatively lower AI literacy levels. These disparities reflect the uneven AI literacy status among current university teacher cohorts, necessitating targeted enhancement strategies.

III.   THEORETICAL FRAMEWORK FOR ENHANCING AI LITERACY

3.1 Knowledge Dimension: AI Applications in Education

3.1.1 Intelligent Teaching Systems and Personalized Learning Platforms

AI applications are increasingly prevalent in education, with intelligent teaching systems and personalized

learning platforms standing out. These systems utilize advanced algorithms to provide customized learning paths and resources based on students' learning behaviors, performance, and preferences. For example, intelligent teaching systems can identify students' difficulties in specific topics and dynamically adjust teaching content to meet their personalized needs. Personalized learning platforms, through intelligent recommendation engines, recommend reading materials and exercises suitable for students' learning levels and interests, thereby enhancing learning efficiency and motivation. (Fig.1)

3.1.2 Applications of Artificial Intelligence in Teaching Management and Student Counseling

Artificial intelligence plays a role in personalized content delivery and demonstrates significant potential in teaching management and student counseling. AI assistants can automatically track students' learning progress, provide timely feedback, and offer counseling advice. At the teaching management level, AI systems assist teachers in classroom management tasks such as attendance tracking, assignment distribution, and grade recording, thereby reducing teachers' administrative burden. Furthermore, by analyzing students' learning data, teachers can better understand student needs and provide more targeted guidance.

3.1.3 Collection, Analysis, and Application of Educational Big Data

Collecting and analyzing educational big data represent another critical aspect of AI application in education. By gathering students' learning activity data, educational institutions can gain valuable insights to improve course design and teaching strategies. Extensive data analysis helps identify problem areas in teaching, predict students' academic performance, and discover potential educational trends. By applying this data, educators can develop more scientifically grounded teaching plans, optimize resource allocation, and enhance educational quality.

3.2. Skill Dimension

3.2.1 Basic Application Skills

The foundational application skills of teachers are primarily reflected in their proficiency with artificial intelligence (AI) educational tools. These tools include intelligent assessment systems capable of automatically grading student assignments and exams, providing timely feedback; personalized learning software that recommends suitable learning resources based on students' progress; and intelligent classroom management platforms that assist teachers in efficiently managing classroom activities. Mastery of these tools enables teachers to conduct instructional design and student assessment better, enhancing teaching effectiveness.
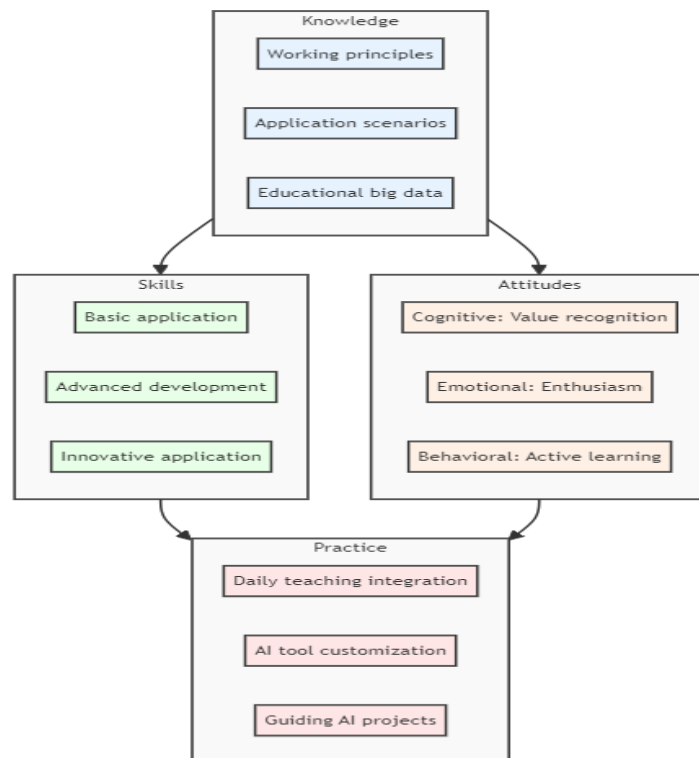

Fig.1 Theoretical Framework for Enhancing AI Literacy

Integrating AI technology into daily teaching activities is essential for teachers to improve their instructional skills. Teachers can create a more interactive and engaging learning environment by incorporating AI elements into their courses. For instance, teachers can use AI-assisted language learning tools to provide students with simulated language environments for oral practice and pronunciation correction. Additionally, AI technology can simulate experiments and virtual scenarios, enhancing students' practical experience.

Teachers can leverage AI auxiliary tools for instructional design and assessment to improve the targeting and effectiveness of their teaching. AI tools can analyze students' learning data, helping teachers understand students' strengths and weaknesses and thus design teaching plans that better meet students' needs. AI systems can provide objective assessment reports during the assessment phase, helping teachers understand students' learning outcomes and adjust teaching strategies promptly.

3.2.2 Advanced Development Skills

Mastering simple programming languages like Python is fundamental to a teacher's advanced development skills. Through programming, teachers can analyze complex data and train machine-learning models to meet specific educational needs. For example, by analyzing students' online learning behaviors, teachers can develop predictive models to identify at-risk behaviors for early intervention.

Understanding and mastering the basic usage methods of mainstream AI frameworks such as TensorFlow and PyTorch enables teachers to develop more advanced AI applications. These frameworks provide powerful tools and libraries to support teachers in researching and practicing cutting-edge technologies such as deep learning and natural language processing, thereby promoting instructional innovation.

Teachers' advanced development skills are reflected in their ability to customize or improve existing AI tools according to educational needs. This requires teachers to have technical knowledge, innovative thinking, and problem-solving skills. Teachers can make AI tools better serve specific teaching scenarios through customized development, improving teaching efficiency and quality.

3.2.3 Innovative Application Skills

Teachers with innovative application skills can design and implement innovative teaching models based on AI. These models may include adaptive learning systems, intelligent tutoring robots, and personalized learning path planning using AI. Teachers can provide students with a more personalized and flexible learning experience through these innovative models.

In subject teaching, teachers with innovative application skills can develop new AI applications to solve specific teaching problems. For example, teachers can develop AI-assisted problem-solving tools in mathematics teaching to help students understand complex mathematical concepts and solution steps.

Finally, teachers with innovative application skills can also guide students in AI-related research and projects. This not only stimulates students' innovative thinking and research interests but also cultivates students' practical abilities and technical application skills, laying a solid foundation for students' future learning and career development.

3.3. Attitude Dimension

3.3.1 Cognitive Attitude

The cognitive attitude of educators is first manifested in their deep understanding of the value and potential of AI in the field of education. AI technology greatly enhances teaching efficiency and learning outcomes by providing personalized learning experiences, automated assessments, and extensive data analysis. Educators recognize that AI is a tool and a force that can promote educational innovation and a learning revolution. This understanding prompts them to actively explore the application of AI in education and recognize its potential to improve the quality and accessibility of education.

Educators clearly understand the importance of continuous learning and updating AI knowledge and skills. AI is a rapidly developing field with new technologies and methods constantly emerging. Educators need to continue learning to keep abreast of the latest developments and apply this new knowledge to their teaching practices. This attitude of continuous learning is crucial for teachers' professional development and the improvement of educational quality.

3.3.2 Emotional Attitude

Their interest and enthusiasm first demonstrate the emotional attitude of educators toward using AI technology. This positive emotion drives them to explore AI's application in teaching actively actively, and they are willing to try new tools and methods. The enthusiasm of educators can stimulate students' interest in learning and create a positive learning environment.

In the face of educational changes brought about by AI, educators show openness and adaptability. They are willing to accept new technologies and adapt to the changes in teaching models and methods caused by AI. This adaptability helps teachers with their professional growth and helps students better adapt to the future technology-driven society.

The emotional attitude of educators also includes their acceptance and trust in human-computer collaboration. They recognize that AI can act as an assistant to teachers, not a replacement, helping with tasks such as data analysis and student assessment. Educators trust in the capabilities of AI and are willing to cooperate with it to improve teaching efficiency and quality.

3.3.3 Behavioral Tendency

The willingness to actively learn and try AI technology is reflected in the behavioral tendencies of educators. They are not satisfied with the status quo but continue to seek to improve their technical abilities to serve teaching and students better.

In teaching and research, educators actively integrate AI elements. They regard AI technology as a tool to improve the quality of teaching and research depth and continuously explore the application of AI in different disciplines and teaching scenarios.

Educators also show a willingness to share and exchange experiences when applying AI. They recognize the importance of teamwork and knowledge sharing. Through forums, seminars, and other forms, they share their insights and experiences to promote the development of the entire educational community.

The behavioral tendencies of educators also include integrating into the overall digital transformation strategy of colleges and universities. They understand that AI technology is a crucial part of the digital transformation of colleges and universities and actively participate in this transformation process, promoting innovation in educational models and optimization of the educational environment. In this way, educators enhance their individual teaching practices and contribute to the progress of the entire education system.

IV.   PRACTICAL STRATEGIES FOR ENHANCING AI LITERACY

4.1. Design and Implementation of Training Curriculum System

The AI training for college teachers should be based on a tiered approach to meet the needs of teachers at different levels. Introductory courses aim to popularize the basic concepts of AI and its potential applications in education, which are suitable for all teachers regardless of their background. This course will give teachers a comprehensive perspective, helping them understand how AI can be combined with teaching and learning processes. Advanced courses are for teachers with a sure foundation in AI, delving into core technologies such as machine learning and natural language processing. Professional courses focus more on specific disciplines, exploring how to deeply integrate AI technology with subject content to achieve innovation in teaching methods and learning experiences.

Training should take various forms to adapt to the learning habits and schedules of different teachers. Online courses are provided through MOOC platforms, allowing teachers to learn flexibly according to their timetable. Offline workshops focus more on practical operations and teacher interaction, providing a platform for solving specific problems and sharing experiences. Blended learning combines the advantages of online and offline, aiming to provide a richer and more interactive learning experience while ensuring that teachers can receive the necessary support and guidance.

4.2. Educational Resource Support and Platform Construction

Establish a comprehensive AI educational resource library, collecting and organizing high-quality educational resources, including teaching videos, case studies, academic papers, etc. These resources should cover different disciplines and levels to meet the needs of different teachers. At the same time, teaching cases suitable for different disciplines should be developed to help teachers understand how to integrate AI technology into

specific teaching activities. In addition, it provides user guides for AI tools and software to help teachers overcome technical obstacles.

Build a cloud-based AI experimental platform to reduce the hardware threshold for teachers to use AI technology. Teachers can experiment and explore without expensive hardware equipment by providing online access to commonly used AI frameworks and tools. Design interactive teaching modules to support real-time demonstrations and practice, enabling teachers to understand AI technology's working principles and application scenarios intuitively.

Develop intelligent teaching assistance systems, including intelligent lesson preparation systems, intelligent assessment platforms, etc., to improve the efficiency and quality of teachers' teaching. Intelligent lesson preparation systems can help teachers design courses integrating AI, providing recommendations for teaching resources and course structure design support. Intelligent assessment platforms use data analysis technology to help teachers assess students' learning outcomes, identify problems promptly, and make adjustments. In addition, personalized teaching recommendations should be provided to support teachers in teaching students according to their different needs and abilities.

4.3. Intercollegiate Cooperation and Exchange Mechanism

Establish close cooperation with AI enterprises to introduce the latest technologies and applications, enabling teachers to understand and master industry trends promptly. Set up enterprise practice bases to provide teachers with practical operation opportunities, allowing them to apply their learned AI knowledge in a natural environment. Carry out school-enterprise joint training projects to enhance teachers' practical and innovative abilities through project cooperation, internships, seminars, and other forms. This cooperation not only helps the professional development of teachers but also facilitates the transfer of knowledge and application of technology between colleges and enterprises. In this way, teachers can better combine theory with practice, improve the quality of teaching, and enhance students' employability.

V.   CONCLUSION

This study systematically explored the need to enhance AI literacy among college teachers in China, proposing a set of theoretical models and practical plans. The research found that although teachers are interested in AI, they generally need more relevant knowledge, skills, and attitudes. To address this challenge, we designed a comprehensive

VI.   REFERENCE

[1]   Sridharan K, Sequeira RP. "Artificial Intelligence and Medical Education: Application in Classroom Instruction and Student Assessment Using a Pharmacology & Therapeutics Case Study," BMC Medical Education, Vol. 24, Issue 1, 2024, pp. 431.

[2]   Hamilton A. "Artificial Intelligence and Healthcare Simulation: The Shifting Landscape of Medical Education," Cureus, Vol. 16, Issue 5, 2024, pp. e59747.

[3]   Liaw SY, Tan JZ, Lim S, et al. "Artificial Intelligence in Virtual Reality Simulation for Inter professional Communication Training: Mixed Method Study," Nurse Education Today, Vol. 122, 2023, pp. 105718.

[4]   Morrow E, Zidaru T, Ross F, et al. "Artificial Intelligence Technologies and Compassion in Healthcare: A Systematic Scoping Review," Frontiers in Psychology, Vol. 13, 2023, pp. 971044.

[5]   Ng FYC, Thirunavukarasu AJ, Cheng H, et al. "Artificial Intelligence Education: An Evidence-Based Medicine Approach for Consumers, Translators, and Developers," Cell Reports Medicine, Vol. 4, Issue 10, 2023, pp. 101230.

[6]   Ng DTK, Leung JKL, Su J, Ng RCW, Chu SKW. "Teachers' AI Digital Competencies and Twenty-First Century Skills in the Post-Pandemic World," Educational Technology Research and Development, Vol. 71, Issue 1, 2023, pp. 137-161.

[7]   de-Torres E, Canaleta X, Fonseca D, Alsina M. "Automated Monitoring of Human-Computer Interaction for Assessing Teachers' Digital Competence Based on LMS Data Extraction," Sensors (Basel), Vol. 24, Issue 11, 2024, pp. 3326.

[8]   Wood EA, Ange BL, Miller DD. "Are We Ready to Integrate Artificial Intelligence Literacy into Medical School Curriculum: Students and Faculty Survey," Journal of Medical Education Curriculum Development, Vol. 8, 2021, pp. 23821205211024078.