Analysis of Elements in the Evaluation Model of AI Teaching Competency for University Teachers

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Abstract: This work aims to construct an evaluation model for the AI teaching competency of university teachers and analyse its core elements and their interrelationships. Through literature review and the Delphi method, four dimensions of evaluation elements were identified: technical ability, teaching ability, ethical awareness, and continuous learning. The research found that these elements are interconnected and mutually reinforcing, collectively forming the evaluation framework for AI teaching competency among university teachers. The results provide theoretical foundations and practical guidance for enhancing and assessing the AI teaching capabilities of university teachers.

Keywords: AI teaching, Competency evaluation, Model construction, Element analysis

1. Introduction

With the rapid development of artificial intelligence (AI) technology, its application in the field of education has become increasingly widespread[1][2]. As the backbone of education, the level of AI teaching competency among university teachers directly impacts educational quality and student development. However, current evaluations of AI teaching competency lack systematic and scientific approaches, necessitating the establishment of a robust evaluation model[3][4]. This work aims to analyze the core elements of AI teaching competency among university teachers and construct a comprehensive and scientific evaluation model, providing theoretical foundations and practical guidance for enhancing and assessing their AI teaching capabilities.

2. Connotation and Characteristics of AI Teaching Competency

The AI teaching ability of university teachers refers to the comprehensive manifestation of the knowledge, skills, attitudes, and values that teachers need to effectively carry out teaching activities in an AI-enabled teaching environment[5][6]. This competency exhibits several distinctive characteristics: First, it represents a deep integration of technology and education, requiring teachers not only to master the fundamental principles and application methods of AI technology but also to combine them organically with teaching practices. Second, it is dynamic and evolving, as teachers must continuously learn and adapt to the ongoing updates in AI technology and shifts in educational paradigms. Third, it emphasizes ethical awareness, requiring teachers to consider issues such as data privacy and algorithmic fairness when employing AI in teaching.

The connotation of AI teaching competency can be understood across multiple dimensions. In terms of knowledge, teachers need foundational AI knowledge, educational technology expertise, and subject-specific knowledge. For skills, they must master AI tools, instructional design, and data analysis. In attitudes, openness to learning and innovation is essential. In values, teachers must uphold ethical standards for technology and education. These dimensions intertwine to

form a holistic framework for AI teaching competency.

3. Construction of the Evaluation Model for AI Teaching Competency

Constructing an evaluation model for AI teaching competency is a systematic process. First, we conducted a comprehensive literature review of domestic and international research to preliminarily identify the dimensions of the evaluation model. Then, using the Delphi method, we invited 15 experts in educational technology, artificial intelligence, and university teaching to participate in multiple rounds of consultations to refine and optimize the evaluation elements. After three rounds of expert consultation, four core dimensions were finalized: technical ability, teaching ability, ethical awareness, and continuous learning.

Under the technical ability dimension, we established three secondary indicators: foundational AI knowledge, tool application skills, and data literacy. The teaching ability dimension includes three secondary indicators: AI-integrated instructional design, personalized student guidance, and teaching effectiveness evaluation. The ethical awareness dimension covers three secondary indicators: data privacy protection, algorithmic fairness, and boundaries of technology use. The continuous learning dimension consists of three secondary indicators: willingness to learn new technologies, initiative in professional development, and reflective improvement ability. Each secondary indicator is further broken down into specific observation points, forming a complete evaluation index system.

To ensure the scientific rigor and practicality of the evaluation model, we employed the Analytic Hierarchy Process (AHP) to determine the weights of each indicator. Experts compared pairwise judgment matrices to calculate the relative importance of each dimension and indicator. The results showed that the teaching ability dimension had the highest weight (0.35), followed by technical ability (0.30), ethical awareness (0.20), and continuous learning (0.15). This weighting reflects the experts' emphasis on the educational essence of AI teaching while also highlighting the importance of technical foundations. AI reduces repetitive tasks like grading, data organization, and performance analysis, allowing instructors to focus on curriculum design and research. Students also benefit from self-paced learning and instant feedback, significantly enhancing efficiency.

4. Analysis of Elements in the Evaluation Model for AI Teaching Competency

In the technical ability dimension, foundational AI knowledge is the prerequisite for teachers to understand and apply AI technology, including basic concepts such as machine learning and natural language processing. Tool application skills refer to the ability to operate AI teaching tools, such as intelligent teaching platforms and virtual laboratories. Data literacy emphasizes the ability to collect, analyze, and interpret teaching data, which is a critical foundation for AI teaching. These three elements mutually support each other, forming the technical foundation for teachers in an AI-enabled environment.

The core of the teaching ability dimension lies in the organic integration of AI technology with teaching practices. AI-integrated instructional design requires teachers to design teaching activities based on the characteristics of AI technology. Personalized student guidance emphasizes the use of AI to analyze student learning traits and provide targeted support. Teaching effectiveness evaluation focuses on using AI tools for feedback and improvement. These three elements reflect the fundamental purpose of AI technology in serving education.

The ethical awareness dimension holds special significance in AI teaching. Data privacy protection involves the appropriate use of student information. Algorithmic fairness requires avoiding biases in AI-driven decisions. Boundaries of technology use remind teachers to define the limits of AI-assisted teaching. Together, these elements form the ethical framework for AI teaching, ensuring the legitimacy of technological applications.

The continuous learning dimension reflects the dynamic nature of AI education. Willingness to learn new technologies measures teachers' openness to adopting new tools. Initiative in professional development examines teachers' motivation for self-improvement. Reflective improvement ability evaluates teachers' capacity to optimize teaching based on practice. These elements ensure the sustainable development of teachers' AI teaching competency.

5. Recommendations for Applying the Evaluation Model for AI Teaching Competency

To effectively apply this evaluation model, the following strategies are recommended:

First, universities should integrate evaluation results with teachers' professional development, offering targeted

training for identified weaknesses. For example, workshops on AI tools could be organized for teachers lacking technical skills, and seminars on ethics could be held for those with insufficient ethical awareness.

Second, evaluations should focus on process-oriented assessment rather than one-time examinations. A growth portfolio for teachers' AI teaching development could be established to track their progress across different stages. Simultaneously, self-assessment and peer evaluation should be encouraged to form a multi-dimensional evaluation system. Third, the use of evaluation results should balance motivation and development. Outstanding teachers should be recognized, while supportive environments should be created for those needing improvement. An AI teaching innovation fund could be established to encourage teachers to explore AI applications in teaching.

Finally, the evaluation model itself requires iterative updates. As AI technology evolves and educational needs change, the evaluation dimensions and indicators should be adjusted periodically to maintain relevance and applicability. Experts should be convened every two years to revise the model.

Conclusion

This work constructed an evaluation model for AI teaching competency among university teachers, encompassing four core dimensions: technical ability, teaching ability, ethical awareness, and continuous learning. It provides a systematic framework for assessing the AI teaching capabilities of university teachers. The research found that these dimensions are interconnected and mutually reinforcing, collectively forming a comprehensive picture of AI teaching competency. The application of this evaluation model will help enhance the AI teaching proficiency of university teachers and improve overall educational quality. Future research could further explore the differences in AI teaching competency across disciplines and the adaptability of the evaluation model in different institutions.

Acknowledgements

References

[1] Zheng Zhaona. Application of AI Technology in Education Under Big Data [J]. China Information Times, 2024, (09): 190-192.

[2] Wang Wen. Applications and Future Development of Big Data Technology in Education [J]. Chinese Character Culture, 2024, (14): 180-182.

[3] Wang Shaofang. Motivational Factors and Development Paths for University Teachers' Professional Development in the AI Era [J]. Journal of Higher Education, 2024, 10(16): 7-11+16.

[4] Feng Xiaoying, Xu Xin, Guo Wanrong. How to Understand, How to Act, How to Become? Reflections on Teachers' Professional Development in the AI Era [J]. Open Education Research, 2024, 30(02): 31-41.

[5] Zhang Qingrong, Li Wei, You Yongzhi. Analysis of the Evaluation Index System for Teaching Competency of New Liberal Arts Teachers in Universities [J]. Higher Education Forum, 2025, (05): 25-30.

[6] Hu Xiaoyong, Tu Guoguo, Xie Yaqi. Research on Continuous Assessment of Teachers' Teaching Competency Supported by Large Models [J]. China Educational Technology, 2025, 31(03): 31-40.