Research on the Development Path of an Artificial Intelligence Faculty Training System Based on the Construction of National First-Class Majors

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Abstract: With the deepening development of national first-class majors in higher education institutions, high-level artificial intelligence faculty has become crucial for ensuring the quality of talent cultivation. Based on the context of national first-class major construction, this study reviews the research status of Artificial Intelligence faculty training both domestically and internationally. The research identifies four core issues in the current Artificial Intelligence training system in higher education: the lack of unified standards connecting faculty training systems with first-class major criteria; disconnection between curriculum content and cutting-edge technological advancements as well as actual industry needs; singular approaches to effectiveness evaluation; and the absence of mechanisms for translating training outcomes into teaching resources. To address these issues, a systematic development pathway is proposed: establishing a faculty competency framework and training standards aligned with national first-class major certification criteria, promoting a training model deeply integrated with industry, academia, research, and application, and creating a comprehensive evaluation system combining process-oriented and developmental approaches. This research provides theoretical reference and practical paradigms for the systematic and high-quality implementation of Artificial Intelligence faculty training in national first-class majors, thereby strongly supporting the sustainable development of these majors and the strategic cultivation of innovative talent.

Keywords: National First-Class Major; Computer; Artificial Intelligence; Teacher Training; Construction Path

1. Introduction

Under the backdrop of the national first-class majors construction initiative, enhancing teachers' AI (Artificial Intelligence) teaching capabilities has become a core element in measuring and improving education quality. Strengthening the AI faculty is of paramount importance. Higher education institutions should intensify AI literacy training for educators, encouraging them to participate in high-level domestic and international AI academic conferences and workshops to master the latest technologies and teaching methodologies in the field. This will enable educators to provide students with superior teaching resources, offer robust support for cultivating high-level AI talent, and further advance the development of national first-class majors.

With the rapid advancement of artificial intelligence technologies, the education sector is undergoing profound transformations. In this rapidly evolving educational environment, teachers must not only possess solid disciplinary knowledge but also the ability to flexibly utilize modern teaching technologies and methods to address students' diverse and personalized learning needs. First-class major construction in application-oriented universities should seize the opportunities presented by digital-intelligent transformation, deeply understand the connotations of new quality productive forces, and further optimize the structure of academic disciplines and majors to enhance the alignment between programs and industry needs.

AI faculty training, as a critical component in enhancing teaching capabilities, is increasingly prominent. In recent years, China has placed significant emphasis on AI education. In July 2017, the country released the New Generation Artificial Intelligence Development Plan, which proposed the development of intelligent education. In 2025, China issued the Opinions

on Deepening the "AI+" Initiative and the Opinions on Accelerating the Digitalization of Education, calling for intensified efforts in AI-assisted faculty development, training to enhance teachers' digital literacy and AI application skills, and the establishment of a comprehensive AI education system spanning primary schools to universities. AI is deeply fostering reform and innovation in education and teaching. The construction of national first-class majors in higher education must leverage the opportunities of digital-intelligent transformation. Through systematic and scientific AI training, teachers can continuously update their educational philosophies and improve their teaching skills, thereby better adapting to the demands of educational reform, promoting the integration of education and industry, and advancing the development of major construction. However, the effectiveness of such AI faculty training and whether it truly achieves the goal of enhancing teaching capabilities require verification through scientific and objective evaluation.

Research on the training and evaluation of teachers' AI teaching capabilities has been emerging among scholars domestically and internationally. These studies delve into various aspects, including training content, methods, and outcomes.

1.1 Affiliations

Artificial intelligence teaching competency has become an essential quality for modern educators. In her "Review of Artificial Intelligence Education Application Research," Gao & Guo systematically examined the connotations, key technologies, typical models, and cases of AI in education. She pointed out that the deep integration of AI and education can enhance educational performance and emphasized the need for strengthened regulation and exploration in information security, ethics, and practical applications in the future [1].

The cultivation of teaching competency among higher education faculty has always been a focus of national first-class major construction, with AI literacy being a top priority. Many scholars have researched training models for AI educators. Jiang et al. conducted research and practice on the cultivation and training models for university teachers' teaching competency, proposing the establishment of a diversified training system [2]. In his article "AI Teacher

Training Must Come First," Chen argued that AI has entered a phase of rapid development [3]. In "Wan & Chen Reflections on Teacher Training in the AI Era," indicated that against the backdrop of the comprehensive promotion of new AI technologies, AI significantly impacts teacher training and analyzed strategies for optimizing teacher training through AI technologies[4].

Constructing a scientific evaluation system is key to assessing the effectiveness of teacher training. Liu & Jing developed a high-quality training system for university teachers' teaching competency, emphasizing that training content should be closely integrated with teaching practice and that high-quality training programs should be introduced [5].In "AI Education and Innovative Talent Cultivation from the Perspective of Teacher Training and Professional Development," Sun & Zheng stated that AI education is an important pathway for cultivating a new generation of innovative talents and proposed recommendations for restructuring AI teacher training systems [6].

The effectiveness of AI teacher training is influenced by various factors. In "University Faculty Training from an AI Perspective," Wang analyzed the status and influencing factors of university faculty training from an AI perspective, proposing a new framework for AI faculty training from four aspects [7]. Xie analyzed the current status and effectiveness of teaching competency training for young university teachers in Zhejiang, discovering that the relevance of training content, the diversity of training methods, and teachers' individual learning motivation significantly affect training effectiveness [8].

Training content should be closely aligned with teachers' actual needs, focusing on practical teaching training and industry-academia collaboration. Huang researched the current status and countermeasures for teaching competency training of young teachers in application-oriented universities, proposing an increase in practical teaching components [9]. In "Exploring New Paths for In-Service Training of Vocational College Teachers from an AI Perspective," Zhang suggested that in-service training for university teachers should actively utilize AI technologies to enhance overall quality and educational teaching standards [10]. In "Research on Strategies for Improving University Teachers' Informatization Teaching

Ability in the AI Era," Li studied strategies for enhancing university teachers' informatization teaching ability, proposing measures such as strengthening top-level design, establishing sound mechanisms, creating intelligent environments, and conducting training activities [11]. Luo et al., in "Practical Exploration of AI Teacher Training in Higher Education under the Background of Industry-Education Integration," analyzed industry-academia collaborative AI teacher training, emphasizing the importance of integrating training with practice and providing optimization suggestions [12]. In "AI-Empowered Teacher Training: Educational Implications and Practical Dimensions," Liu studied research hotspots in AI education applications, arguing that AI technologies have transformed teacher training concepts and practices. He emphasized the organic integration of AI training and teaching practice, maintaining a practice-oriented approach to support iterative exploration of teaching practice and promote the enhancement of teaching competency [13].

Training methods should be diversified, including online training, offline workshops, teaching observations, and various other forms. In "Research on Teacher Training Demand Analysis and Course Innovation Mechanism Based on DeepSeek," Wang pointed out problems in the application of DeepSeek technology in teacher training and proposed countermeasures [14]. In "Research on the Development of Online Teaching Ability of University Teachers in the AI Era," Ge & Wei explored strategies for improving the online teaching ability of university teachers [15]. In "Current Status and Improvement Strategies of University Teachers' Informatization Teaching Ability in the AI Era—A Case Study of Hubei University of Economics," Zhang proposed strategies for enhancing university teachers' teaching ability in the AI era [16].

Establishing a scientific evaluation mechanism to regularly assess training effectiveness and adjust strategies promptly is crucial. Tong et al. constructed an evaluation system for university teachers' teaching competency, including dimensions such as instructional design ability, teaching implementation ability, and teaching evaluation ability, providing a reference for evaluating teacher training effectiveness [17]. In his book "Basic Research on Education Evaluation in the New Era," Yu systematically expounds the fundamental theories of education evaluation, providing theoretical support for evaluating the effectiveness of teacher training[18].

1.2 International Research Status

Bern Tsaklau, in his publication "The Complexity of Teacher Digital Skills and Teaching Competence in the Digital and AI Era and Response Measures," further explores strategies for enhancing teachers' digital skills and global trends in educational digital transformation. The study emphasizes that governments worldwide need to strengthen investments in teacher digital skills training [19]. Yong-Jik et al., in their study "Korean In-Service Teachers' Perceptions of Implementing Artificial Intelligence (AI) Education for Teaching in Schools and Their AI Teacher Training Programs," explored South Korean in-service teachers' views on implementing AI education in schools and their perceptions of AI teacher training programs. The study found that teachers generally believe AI will have a positive impact on society and education and hold an optimistic attitude toward AI teaching. However, they expressed a desire for training programs to be more practice-oriented to better facilitate application in actual teaching contexts [20].

European countries place greater emphasis on the theoretical depth and systematic structure of teacher training, stressing that such training should be grounded in theoretical frameworks such as educational psychology, curriculum and teaching methodology. Through specialized lectures, case studies, workshops, and other forms, these initiatives aim to enhance teachers' educational philosophies and teaching strategies. In terms of effectiveness evaluation, European countries commonly combine quantitative and qualitative research methods, focusing not only on changes in teaching behaviors before and after training but also on the impact of teacher training on student learning outcomes. Omega A K et al. conducted coaching-based training for teachers in Kenyan public secondary schools and found that this approach significantly improved teaching competence [21]. Teresa C L et al. provided scenario-based teaching training to science teachers in Spain and found that this method significantly enhanced both teaching competence and student learning interest [22]. Maik Beege et al., in their study "AI in STEM Education: The Relationship between Teacher Perceptions and ChatGPT Use," investigated

German STEM teachers' perceptions of ChatGPT usage in education, exploring its potential, challenges, and impact on teaching quality. The results indicated that ChatGPT holds potential in areas such as lesson planning and assessment, but teachers expressed concerns regarding legal and ethical issues. Improvements in teaching quality were positively correlated with the active use of ChatGPT [23].

International research reveals that, despite variations in teachers' cognitive perceptions, there is a generally positive attitude toward AI education, with broad consensus on its potential to enhance teaching quality and efficiency. However, challenges related to technology and resources persist during implementation. Moving forward, strengthening teacher training, providing abundant teaching resources, and offering technical support will be crucial for promoting the smooth implementation and sustainable development of AI education.

1.3 Main Content

Based on the review of previous research status, significant progress has been made both domestically and internationally in the field of teacher training competency development and effectiveness evaluation. Domestic research focuses on the cultivation of informationization teaching ability, emphasizing the close integration of training content with teaching practice, and prioritizing practicality and targetedness in training. Simultaneously, a diversified training system and a scientific evaluation framework have been constructed. Researchers have found that training effectiveness is influenced by various factors, including teachers' individual learning motivation, training content, and training methods. Consequently, they propose establishing a mechanism for the transfer of training outcomes to facilitate the application of these achievements in teaching practice. In contrast, international research places greater emphasis on the theoretical depth and systematic nature of teacher training. Through specialized lectures, case studies, and other formats, it aims to enhance teachers' educational philosophies and teaching strategies, adopting a combined quantitative and qualitative approach to comprehensively evaluate training effectiveness. This article aims to review the current state of research on teacher training competency and effectiveness evaluation both domestically and

internationally, analyze existing problems and challenges, and propose strategies and recommendations for optimizing the training system and improving training outcomes. Through this research, we hope to provide more scientific guidance for teacher training initiatives, promote the continuous enhancement of teacher training competencies, and thereby contribute to the overall improvement of education quality.

2. Analysis of Issues in the AI Teacher Training System

2.1 Lack of Unified Standards in the AI Teacher Training System

Currently, there is no unified standard for the training system of teachers' AI instructional competencies. Significant disparities exist in training systems across different regions, schools, and even academic disciplines, leading to inconsistencies in training content and methods. This lack of standardized criteria makes it difficult to measure and compare the effectiveness of teacher training, thereby hindering the improvement of training quality.

2.2 Disconnect Between AI Teacher Training Content and Actual Needs

Some AI teacher training content fails to align with the practical needs of educators. Certain training programs are overly theoretical, lacking practical applicability and specificity, making it difficult to meet teachers' concrete requirements in teaching practice. As a result, teachers struggle to apply the acquired knowledge in actual teaching scenarios after training, ultimately compromising the effectiveness of the training.

2.3 Monotonous Training Methods with Insufficient Innovation

Traditional AI teacher training methods predominantly rely on lecture-based instruction, lacking interactivity and innovation. This monotonous approach tends to cause fatigue among teachers and reduces their engagement in training. Furthermore, the absence of innovative training methods fails to meet the demands of educators in the new era, consequently impeding the enhancement of training outcomes.

2.4 Incomplete Evaluation System Lacking Scientific Rigor

The current evaluation system for assessing the

effectiveness of AI teacher training remains underdeveloped, lacking scientific rigor and objectivity. Some evaluation indicators are overly broad and vague, making it difficult to accurately reflect teachers' actual teaching proficiency. Additionally, the evaluation process is often influenced by subjectivity and human factors, casting doubt on the fairness and accuracy of the assessment results.

3. Development Pathways for the AI Teacher Training System

3.1 Establish National AI Teacher Training Standards and Guidance Framework

To address the lack of unified standards in AI teacher training systems, it is recommended that educational authorities or relevant authoritative institutions take the lead in organizing expert teams to conduct in-depth research. By integrating advanced domestic and international experiences with educational practices, a set of training standards and teacher competency frameworks aligned with national first-class major certification criteria should be developed. This should adopt a training model deeply integrated with industry, academia, research, and application, establish a comprehensive evaluation system combining process and developmental assessments, and create a closed-loop transformation pathway of "training-practice-reflection-improvement." The framework should clearly define key components such as training objectives, content, methods, and evaluation, providing scientific and standardized training guidance for educational departments and schools at all levels.

3.2 Enhance the Relevance and Practicality of AI Teacher Training Content to Achieve Close Integration with Teaching Practice

To tackle the disconnection between AI teacher training content and actual needs, training organizers should conduct thorough investigations into teachers' practical requirements and teaching challenges. Based on the findings, AI teacher training content should be designed with teacher involvement in the development process to ensure it genuinely meets educators' needs. The content should emphasize practicality and specificity, encouraging and supporting teachers to attend academic conferences to stay connected with domestic and international academic frontiers. It

should focus on introducing the latest teaching concepts and methods, along with sharing and analyzing real teaching cases. Experts should be invited to campuses to deliver lectures on AI technologies, broadening teachers' academic perspectives, fostering a rich academic atmosphere, and enhancing their AI academic literacy.

3.3 Diversify AI Teacher Training Methods to Achieve Organic Integration of Online and Offline, Theory and Practice

To resolve the issue of monotonous AI teacher training methods, a diversified approach is recommended, including online learning, offline workshops, teaching observations, and hands-on practice. All teachers should receive systematic training in AI technology applications. Online learning can provide abundant resources and flexible schedules, while offline workshops facilitate communication and interaction among educators. Furthermore, theory and practice should be closely integrated through regular AI teacher training sessions. By employing simulated teaching and case analysis, teachers can learn and enhance their instructional skills in practical contexts. Starting in 2025, Ningbo University of Finance and Economics implemented a systematic online AI training program for all faculty. Through this comprehensive cultivation, teachers demonstrated significant progress in updating their AI knowledge and practical abilities. In teaching, they introduced more cutting-edge cases and practical experiences, raising the average classroom satisfaction rate to over 90%. The number of AI-related research projects led or participated in by teachers increased by nearly 30%, driving overall improvement in the program's research level and teaching quality.

3.4 Develop a Scientific and Comprehensive AI Teacher Training Evaluation System for Multi-Dimensional Assessment and Feedback

To address the inadequacies in the AI teacher training evaluation system, it is advised to construct a scientific and comprehensive evaluation framework for teacher instructional competency. This system should encompass multiple dimensions, including instructional design capability, teaching implementation ability, and teaching evaluation skills, employing a combination of quantitative and qualitative methods for assessment. Additionally, a regular

evaluation mechanism should be established to periodically assess and provide feedback on the effectiveness of AI teacher training, enabling timely adjustments to training strategies and optimization of the training system.

4. Conclusion

This paper has reviewed the current research status regarding artificial intelligence teacher training systems and effectiveness evaluation both domestically and internationally, while analyzing existing problems and challenges. The study reveals that domestic research focuses on cultivating AI teaching competencies, emphasizes the practicality and targetedness of training content, and has preliminarily established an AI teacher training framework. However, numerous issues persist in this field, including the lack of unified training standards, disconnection between training content and actual needs, singular and insufficiently scientific evaluation methods, and inadequate mechanisms for translating training outcomes.

To address these problems, this paper proposes development pathways for constructing an AI teacher training system. First, national standards and guidance frameworks for AI teacher training should be established to ensure systematic and scientific training content. Second, training content must closely align with teachers' practical needs, emphasizing both practical applicability and forward-looking perspectives. Simultaneously, diversified evaluation methods should be introduced, combining quantitative and qualitative assessments to comprehensively and objectively reflect training effectiveness. Finally, effective mechanisms for translating training outcomes should be established to promote the application of AI training achievements in teaching practice, enabling continuous improvement of AI teacher training initiatives.

In summary, research on AI teacher training and effectiveness evaluation holds significant importance for enhancing education quality. Future efforts should further optimize the AI teacher training system and improve training outcomes, thereby contributing to the sustainable development of educational endeavors.

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