Exploration of the "Learning-Research-Application" Integrated Practice Teaching Model in the Field of Education in the Age of AI

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Abstract: *This paper primarily explores the construction and optimization of the "Learning-Research-Application" integrated practice teaching model in the field of education within the context of the AI era. It aims to address issues prevalent in teacher education, such as the disconnect between theory and practice, the fragmentation of research and teaching, and the lag in internship guidance. Starting from a reconceptualization of the connotations of "Learning-Research-Application," this paper discusses the functional mechanisms of AI technology in reshaping learning contexts, data-driven scientific research, and intelligent internship management. It proposes practical pathways for intelligent learning, data-based research, and precise internships. By empowering the deep integration of coursework learning, scientific research training, and educational practice with AI, this model effectively enhances the classroom teaching ability, scientific research inquiry capability, and digital literacy of student teachers. Consequently, it promotes the development of educational internships towards a more scientific, traceable, and iterative direction.*

Keywords: *AI Empowerment; "Learning-Research-Application" Integration; Education Major*

Introduction

The development of AI technology is driving profound changes in the field of education. At present, the undergraduate training model for primary education professionals in China is not yet fully developed. One manifestation of this is that practical teaching has not received sufficient attention; indeed, it has become the weakest link in the current undergraduate training process for primary school teachers[1]. In the current talent cultivation practices of teacher-training universities and colleges in China, practical teaching is simply equated with educational practice, which is further reduced to educational observation and internships[2]. This narrow understanding not only weakens the systematic nature of practical teaching but also diminishes its role in the professional growth of teachers. However, for the cultivation of primary school teachers, the value of educational practice is irreplaceable. As some scholars have pointed out, "A true understanding of education can only be gained through rich, real-world educational practice." Correctly understanding and striving to construct a practical teaching model for the primary education major is thus of great significance for the development of practical teaching within the undergraduate primary education program and for the design of its professional curriculum system[3]. AI technology can provide more authentic virtual teaching scenarios and intelligent data analysis tools. Furthermore, by integrating learning, research, and practice across multiple dimensions, it allows students to acquire theories through learning, solve problems through research, and accumulate experience through internships, thereby breaking away from singular classroom instruction. This enables student teachers to develop comprehensive abilities in knowledge transfer, research inquiry, and educational application within a digital environment, ultimately achieving a deep integration of theory and practice, as well as research and teaching[4].

1. Reconceptualizing the Connotation of the "Learning-Research-Application" Integration in the Field of Education within the AI Era

1.1 The Intelligent Reshaping of the Learning Paradigm

AI technology is driving the transformation of the learning paradigm in the field of education from static knowledge reception to dynamically intelligent, data-driven learning. Traditional courses mostly

rely on lectures by teachers and presentations in textbooks, lacking contextualized experiences and immediate feedback, which results in a disconnect between theoretical knowledge and the actual teaching context. The integration of AI enables a multimodal presentation of course content and allows for the personalization of learning pathways. Consequently, learning transforms from one-way indoctrination to interactive generation. Supported by intelligent recommendation algorithms and adaptive learning platforms, students can accurately access teaching cases, classroom videos, and simulated scenarios based on their individual levels. Within these simulated classroom environments, they can engage in training activities such as lesson preparation, question design, and classroom management. This approach not only consolidates their understanding of educational theories but also enables the direct application of learning outcomes to actual teaching practice, thereby breaking the cycle of "learning without application" inherent in traditional models[5].

1.2 The Practical Embeddedness of Scientific Research Training

Educational research has long been characterized by a theoretical and fragmented nature, with research topics lacking an organic connection to primary school teaching practice. AI provides data-based and contextualized support for scientific research training, enabling research questions to be directly informed by the context of educational internships. Classroom behavior analysis systems, speech recognition tools, and learning situation monitoring platforms can automatically collect and organize data on student performance, interaction frequency, teacher language structure, and other elements, forming quantifiable and traceable research samples. Leveraging AI's data modeling capabilities, students in the field of education can transform classroom issues into research variables, accomplishing the entire process from problem identification to data verification. This embedded approach to research not only enhances the relevance and effectiveness of scientific inquiry but also fosters the ability of student teachers to improve teaching based on evidence, thus creating a cycle of "promoting teaching through research"[6].

1.3 The Intelligent Upgrade of the Internship Phase

Educational internships serve as a critical juncture for the integration of "Learning-Research-Application." In traditional models, guidance relies on the transmission of experience, feedback lags behind practice, and objective data support is lacking. With AI assisting in internship management, intelligent teaching analysis systems can conduct multi-dimensional analyses of student teachers' classroom language, pacing control, interactive strategies, and more, automatically generating visual evaluation reports. In conjunction with mentor assessments, this forms a feedback mechanism that reflects both quantitative and qualitative data, significantly shortening the cycle for teaching improvement. AI platforms can also aggregate teaching videos, student evaluations, and self-reflections to create growth portfolios, clearly charting the trajectory of teaching skill development and providing a decision-making basis for internship guidance. This data-driven internship model, centered on empirical evidence, transforms internships from passive observation into proactive improvement, enabling students to complete the professional transition into the role of a teacher within authentic settings.

1.4 The Compound Orientation of Competency Cultivation

The AI-driven reconstruction of "Learning-Research-Application" represents not only a technological innovation but also involves a redefinition of the competency training objectives in the field of education[6]. This new model requires future teachers to possess competencies across three dimensions: they must be able to leverage AI for curriculum resource integration and classroom improvement, which constitutes digital teaching competency; they must utilize data tools for action research, directly applying research findings to teaching practice; and they must engage in self-iteration within educational internships through intelligent feedback, thereby achieving continuous development. This compound orientation aligns with the demands of basic education for research-oriented and practice-oriented teachers, while also addressing the imperative for upgrading teacher competency structures under the national education digitalization strategy.

2. AI-Empowered Practical Pathways for "Learning-Research-Application"

2.1 The Construction and Applied Research of Intelligent Learning Situations

AI facilitates the transformation of learning methods in the field of education from passive reception to active generation. In primary education major courses, the traditional single model, which primarily relies on textbooks and lectures, fails to meet students' needs for perceiving and training within authentic teaching situations. AI-powered teaching simulation platforms can highly restore typical scenarios of primary school classrooms, incorporating complex elements such as classroom questioning, emotional management, and differentiated student interactions. Consequently, the learning process shifts from abstract theory to concrete practice. Intelligent situations enhance student immersion in learning, while the immediately generated quantitative feedback helps them identify their weak areas, thereby strengthening the orientation towards "learning for application."

The problem lies in the fact that some courses remain at the stage of making PPT presentations and delivering theoretical explanations, failing to integrate AI tools with the teaching content. This makes it difficult to apply what has been learned to actual practice. To solve this problem, a progressive process of "course learning-simulation-practice" must be established. Course learning lays the theoretical foundation, AI simulation is used for imitative practice, and real classrooms serve as the arena for testing and improvement. This is the only way to achieve the understanding of knowledge, the exercise of abilities, and the adaptation to authentic teaching situations.

2.2 Data-Driven Research Embedding and the Exploration of the Practice Cycle

Since the advent of AI, scientific research is no longer limited to literature review and conceptual analysis; instead, it has become directly embedded in teaching practice, transforming into data-driven, real-time research. With the assistance of classroom behavior recognition, language analysis, and learning situation tracking, AI can convert elements such as the types of teacher questions, the distribution of student attention, and the frequency of interactions into quantifiable indicators, thereby providing direct evidence for educational research. Compared to traditional lagging research methods that rely on questionnaires and interviews, this immediate and objective data collection significantly shortens the research cycle, enabling problem identification, intervention implementation, and outcome validation to all be completed during the educational internship.

However, the effectiveness of this research embedding depends on student teachers' ability to interpret data and design studies. If they lack sufficient statistical literacy and an educational perspective, the data generated by AI can easily remain at a "demonstrative" level, devoid of true research value[7]. Therefore, it is necessary to strengthen students' capabilities in educational statistics, data interpretation, and action research design through dedicated research training courses. This approach enables them to integrate AI data with educational contexts, forming a research paradigm centered on "using evidence to drive improvement," thereby allowing research to directly inform and enhance teaching practice.

2.3 The Application of Intelligent Management and Precise Guidance in Educational Internships

Educational internships serve as a critical juncture for the integration of "Learning-Research-Application." However, the traditional internship model suffers from issues such as scattered management, lagging guidance, and formalized feedback. In contrast, an AI-empowered internship management platform can integrate classroom videos, student feedback, and mentor evaluations, automatically analyzing aspects like student teachers' instructional language, blackboard design, and classroom pacing, and subsequently generating visual reports. This enables mentor teachers to provide precise guidance based on data, while students gain access to a more intuitive trajectory of their growth, thereby strengthening their capacity for self-diagnosis and improvement.

3. Challenges and Countermeasures in Model Implementation

3.1 Lagging Concepts and the Disconnect in Technology Application

In the process of advancing the AI-empowered "Learning-Research-Application" model, some teachers and student teachers remain anchored to traditional teaching concepts and operational habits.

They tend to treat AI tools merely as supplementary technological aids, lacking the intention to deeply integrate AI with educational theories and teaching objectives. This conceptual lag results in the application of AI in the classroom being confined to superficial levels, such as playing resources or grading assignments. Consequently, its deeper value in areas like learning pathway planning, research integration, and internship guidance remains largely untapped.

Countermeasures: Efforts must be made from two aspects: concept renewal and training mechanisms. On the one hand, AI education technology should be integrated into the pedagogy curriculum system. Through methods such as case analysis and scenario simulation, student teachers can appreciate the logical connection between technology and education, thereby consolidating the concept of technology application that is "centered on educational purposes." On the other hand, special digital education training sessions should be organized for supervising teachers and administrators to enhance their ability to integrate AI tools and transform them for classroom use. This will facilitate the integration of AI into the overall structure of "Teaching-Research-Application."

3.2 Data Ethics and Privacy Protection Risks

The empowerment of educational internships and research by AI involves a significant amount of classroom video footage, student behavior data, and learning situation data. If the collection, storage, or use of such data lacks standardized management, it can easily lead to privacy breaches and ethical controversies. This is particularly sensitive within the realm of basic education. As evidenced by some practical cases, certain student teachers have used unauthorized classroom recordings in their research, which reflects an insufficient emphasis on data compliance within internship management.

Countermeasures: It is necessary to establish a rigorous ethical management mechanism. Within university-local cooperation agreements, the scope of data collection, desensitization procedures, storage duration, and usage boundaries must be clearly defined to ensure that these operations comply with legal regulations and meet educational ethical standards. A data access grading system should be created, allowing only those with authorized credentials to access data for research purposes. Instruction on data ethics should be strengthened within research and internship courses, encouraging students to develop a lawful and compliant concept of data use and ensuring that the bottom line of privacy protection is not ignored for the sake of technical convenience.

3.3 Insufficient Digital Literacy of Faculty Hindering Model Implementation

The AI-empowered "Learning-Research-Application" model places higher demands on the digital literacy of supervising faculty. However, in practice, some teachers' understanding of AI tools is limited to their basic functions, rendering them unable to fully leverage AI's potential in teaching design, research guidance, and internship management. This results in AI applications that remain superficial, and internship guidance that lacks a systematic and precise approach.

Countermeasures: A systematic "digital mentor" cultivation system for university faculty should be established. Through on-campus training, enterprise collaboration, and cross-university teaching research, educators can be assisted in mastering advanced AI functionalities such as classroom analysis, data interpretation, and research support. In the context of educational internship management, a hybrid guidance model combining an "AI platform + mentorship system" could be adopted, with lead teachers proficient in AI guiding the teams. This approach will facilitate an overall enhancement of the faculty's digital literacy, thereby ensuring the professional operation of the model.

3.4 Uneven Resource Distribution and Disparities in Application Environments

The application of the AI-empowered "Learning-Research-Application" model shows significant disparities between urban and rural areas, as well as among different institutions. Some local teacher-training universities or elementary schools serving as internship bases, constrained by limited funding, equipment, and network conditions, are unable to provide an adequate AI-supported environment. This directly impacts the effectiveness of practical teaching and the integration of research.

Countermeasures: Efforts should be made to bridge the gap through resource coordination and collaborative platform development. By relying on the National Smart Education Platform and regional educational resource centers, cross-institutional resource sharing can be achieved. The creation of cloud-based platforms for virtual teaching practice and data analysis for student teachers should be

pursued. Furthermore, the exploration of "lightweight AI tools," such as classroom analysis and virtual lesson preparation functions accessible via mobile terminals, can help reduce hardware costs. This approach ensures that the model can be implemented effectively even in resource-constrained environments.

3.5 Insufficient Reflection and a Fractured Cyclical Mechanism

With the assistance of AI, some student teachers tend to rely heavily on automatically generated analytical reports, failing to engage in deep reflection on the pedagogical logic underlying teaching behaviors. This phenomenon of "tools replacing thinking" weakens the reflection and improvement phases within the "Learning-Research-Application" cyclical mechanism, making it difficult to manifest the emergent and developmental nature of practical teaching.

Countermeasures: Guidance on data-based teaching reflection should be strengthened. During internships and research training, the process of "AI diagnosis result - pedagogical interpretation - improvement strategy design" should be established as a mandatory step. Students should be guided by their mentors to transform data into theoretical analysis of educational actions. Furthermore, students should be required to test the effectiveness of their improvements in subsequent teaching cycles. Through this iterative cycle of "data - theory - action," AI can assist students in rebuilding their reflective capacity, thereby truly forming a sustainable "Learning-Research-Application" cycle.

Through the design of countermeasures addressing a series of issues—including lagging concepts, ethical risks, faculty competency, resource disparities, and insufficient reflection—the AI-empowered "Learning-Research-Application" model can be comprehensively enhanced from concept to mechanism. This will provide strong support for practical teaching and educational internships in the field of education, contributing to the high-quality cultivation of future primary school teachers.

4. Practical Outcomes and Promotion Value

4.1 Promoting the Deep Integration of Learning and Research

The AI-empowered "Learning-Research-Application" model bridges the gap between theory and practice. By utilizing intelligent classroom simulations and data-driven action research, student teachers can identify problems within teaching scenarios, rely on AI to conduct data collection and analysis, and formulate evidence-based teaching improvement plans. Classroom behavior data, such as the levels of questioning, interaction frequency, and student engagement, provide concrete evidence for teaching diagnosis. This approach transforms research from abstract theorization into practical validation, fostering a cycle of "problem identification—strategy adjustment—outcome verification," thereby significantly enhancing the applied relevance and immediacy of scientific research.

4.2 The Professionalization and Precision Enhancement of Educational Internships

AI transforms internship guidance from being experience-based to being data-driven. Quantitative indicators generated from classroom video analysis and speech recognition serve as an objective basis for mentor guidance, significantly shortening the feedback cycle. The mechanism of "AI diagnosis - mentor interpretation - action improvement" allows interns to iteratively refine their teaching multiple times within a short period. As revealed through practice, interns demonstrate more stable classroom management, clearer and more precise teaching language, more strategically layered questioning techniques, and a more rational overall classroom structure. Consequently, both the precision and effectiveness of internship guidance have been optimized.

4.3 Promoting the Competency Development of Compound Primary School Teachers

This model enhances the synergistic cultivation of classroom teaching ability, scientific research inquiry capability, and digital literacy. AI simulation training provides interns with experience in classroom response, thereby improving their organizational and interactive skills. The embedding of research enables students to conduct small-scale action research based on data, applying their findings directly to teaching practice. The application of digital tools cultivates students' ability to use technology to solve problems within educational contexts. This pathway for competency development aligns with the demands of primary education for research-oriented and innovative teachers, providing

a realistic basis for the cultivation of compound teachers.

4.4 Constructing a Generalizable Educational Internship Management Model

AI-empowered internship management achieves data integration, process consolidation, and intelligent guidance, resolving the traditional challenges of scattered information and delayed feedback. The platform synthesizes classroom diagnostics, internship evaluations, and mentor feedback, transitioning internships from an experience-based approach to a data-driven one. Its reflection and improvement mechanism, grounded in intelligent analysis, enables the completion of teaching diagnosis and refinement within a short timeframe, forming a replicable management model. This model can be promoted and applied collaboratively across different education majors and regional teacher training initiatives.

Conclusion

The advent of the AI era brings new opportunities for the cultivation of professionals in the field of education, while also setting higher standards for the integrated "Learning-Research-Application" practical teaching model. Supported by AI technology, learning is no longer confined to classroom indoctrination, research is no longer limited to post-hoc theorization, and internships are no longer merely about substitute teaching and observation. Intelligent tools, data-driven approaches, and contextual integration enable the organic connection of learning, research, and application. This model not only transforms the learning pathways and competency structures of student teachers but also propels educational internship management towards greater scientific rigor and precision, forming a complete chain that runs through coursework learning, research training, and practical application[8].

In the future, with the continuous advancement of AI technology and the gradual improvement of the smart education ecosystem, the scope of this model's promotion and application will become even broader[9]. On the one hand, it is necessary to deepen the integration of pedagogical theories, AI technology, and teaching practice, forming a comprehensive cultivation framework that spans courses, contexts, and platforms. On the other hand, efforts must also be made to enhance the co-construction and sharing of regional resources, promoting collaborative action among universities, internship base schools, and educational platforms. This will help reduce the disparity in educational resources between different regions, thereby enabling this model to effectively serve educational equity and the improvement of teacher cultivation standards[10].

References

[1] Yin Xia, Yuan Wenting, Wang Shuangni, et al. Exploration on the Optimization of Practical Teaching Pathways for the Primary Education Major in Universities under the Background of Digital Education. Journal of Social Science of Jiamusi University, 2025, 43(07): 173-176.
[2] Lyu Shuxuan. Exploration on the Development Path of the Primary Education Major in Universities under the Background of Digital Education. Innovation and Entrepreneurship Theory and Research Practice, 2025, 8(09): 85-87.
[3] Zhou Wenna. The Digital Transformation of the "Pedagogy" Course for the Primary Education Major Driven by Knowledge Graphs: Logic, Path, and Evaluation. Journal of Chuxiong Normal University, 2025, 40(02): 88-99.
[4] Zhong Xingxia, Li Xueping, Chen Xuan. The Implication and Construction of Authentic Assessment in Primary Education from the Perspective of Core Competencies. Modern Primary and Secondary Education, 2025, 41(03): 89-94.
[5] Huang Xinqun. Problems and Countermeasures in the Construction of the Teaching Resource Database for the Primary Education Major. Knowledge Library, 2024, 40(22): 187-190.
[6] Xia Guoping. Exploration and Practice of Teaching Reform of Undergraduate Practical Courses for the Primary Education Major. Research on University Logistics, 2024, (05): 78-81.
[7] Pan Qiang, Ye Tong. Promoting the Digital Transformation of Education to Drive High-Quality Educational Development. Journal of Higher Education, 2023, 9(34): 82-85.
[8] Yang Lihong, Yang Min. Reflections on the Development Direction of Practical Teaching for the Primary Education Major at Dali University. Journal of Dali University, 2021, 6(07): 110-115.
[9] Yang Songning. Construction of the "Dual Mentor System" Model for Practical Teaching under the "Collaborative Education" Mechanism: Taking the Primary Education Major of Daqing Normal

University as an Example. Journal of Heilongjiang Teacher Development College, 2020, 39(09): 24-27.
[10] Zhong Hua, An Shiying. Dual Construction of the Practical Teaching Model for Cultivating Teaching Ability: Based on the Realistic Background of Primary Education Major Certification. University Education, 2020, (08): 1-4.