Under the Background of Educational Digitization: The New Connotation and Enhancement Path of Research-Based Teaching Ability of Young University Teachers

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Abstract: *Under the background of educational digitization, young university teachers' research-based teaching abilities face new challenges and opportunities. Currently, young university teachers generally face issues such as weak awareness of research-based teaching, insufficient information-based teaching abilities, and a lack of institutional support mechanisms and training systems. Based on this, this paper redefines the three new connotations of research-based teaching abilities in the context of educational digitization, including digital research-based teaching design ability, data-driven process guidance ability, and information-based research and teaching integration ability. To enhance the research-based teaching abilities of young teachers, this paper proposes the development of a deep integration model of "technology-teaching-academics," a support system of "blended professional development + community empowerment," an action strategy of "practice-reflection-iteration," and the establishment of a school support mechanism based on the "system-resources-ethics" triad, in order to promote the transformation of the teaching paradigm from "transmission" to "research," achieving a deep collaboration between talent cultivation and educational digitization.*

Keywords: *Educational digitization; young university teachers; research-based teaching ability; enhancement path*

Introduction

Under the global trend of educational digital transformation, AI technologies such as intelligent lesson preparation systems, classroom analysis tools, and big data learning diagnostics are increasingly being applied in teaching [1-3]. As the new driving force of educational informatization in universities, the research-based teaching abilities of young teachers, such as problem-oriented teaching design, critical thinking cultivation, and the ability to integrate research achievements into teaching, directly determine the quality of talent cultivation and the depth of educational digital transformation. However, traditional teacher development models are facing severe challenges: on the one hand, the diversification of students' knowledge acquisition channels has shifted the role of teachers from "knowledge transmitters" to "learning guides"; on the other hand, information technology in teaching often remains at the level of tool-based application, failing to effectively stimulate students' higher-order thinking and research abilities. The digital age in education requires not only diverse teaching methods but also the ability to help teachers accurately grasp student learning conditions, design personalized inquiry paths, and promote the transformation of teaching paradigms from "transmission" to "research" [4-5]. Therefore, under the background of educational digitization, there is an urgent need to redefine the new connotations of research-based teaching abilities and systematically build paths for their enhancement.

1. Current Status of Research-Based Teaching Ability of Young University Teachers under the Background of Educational Digitization

Under the background of educational digitization, the research-based teaching abilities of young university teachers still face numerous issues, such as insufficient teaching innovation ability,

unreasonable knowledge structure, and lack of data-driven capabilities [5-8].

1.1 Lack of Research-Based Teaching Awareness and Ability

Young teachers lack teaching innovation ability. The lack of teaching innovation is a common phenomenon among young teachers, mainly manifested in three aspects: First, the knowledge system is outdated; many teachers still use outdated course content systems and have not incorporated frontier trends and interdisciplinary knowledge into their teaching in a timely manner. Second, the teaching methods are limited, with an over-reliance on traditional lecture-based teaching, and a lack of innovative applications of information-based teaching methods. Third, classroom organization and management are rigid, unable to create a research-oriented learning environment that stimulates thinking and encourages exploration. This lag results in classrooms becoming "one-man shows" where students passively accept knowledge and lack opportunities for active knowledge construction.

Young teachers have an unreasonable knowledge structure. The knowledge structure of teachers should include four aspects: subject-specific knowledge, educational science knowledge, humanities and social sciences background, and teaching experience. Currently, many young teachers face a lack of educational science knowledge, especially in educational theory and psychology, as their pre-service training involves minimal coverage of these areas. As a result, they struggle to form a systematic teaching knowledge framework. Simultaneously, due to a lack of practical teaching experience, young teachers accumulate insufficient teaching experience, making it difficult for them to flexibly respond to the complex and changing classroom situations during teaching design and implementation.

The structure of young teachers' teaching abilities is unbalanced. Young teachers often focus the majority of their energy on organizing language and transmitting knowledge, neglecting in-depth mastery of key points in the subject matter and the dynamic organization and control of the classroom. In most classrooms, the majority of students have limited opportunities to speak, or only a few students are given the chance to speak. This imbalance reflects the neglect of student subjectivity by young teachers, as they fail to shift the focus of teaching from "what the teacher teaches" to "how students learn."

Additionally, young teachers have an unbalanced teaching value orientation. In Chinese universities, there is an imbalance in balancing the three functions of talent cultivation, scientific research, and social service. Under the current evaluation system, the tendency of "emphasizing research over teaching" is becoming increasingly serious. Some teachers focus more on academic pursuits and neglect teaching, directing their main energy toward research projects that can yield short-term benefits, which results in teaching becoming "a task to be completed." This utilitarian approach severely weakens the intrinsic motivation for teaching innovation and hinders the formation and development of research-based teaching abilities.

1.2 Significant Shortcomings in Teaching Digitalization Ability

The wave of informatization has had a revolutionary impact on higher education, but the teaching digitalization abilities of young teachers have yet to keep pace with technological development. Although most teachers have mastered basic multimedia operation skills, there is still a noticeable deficiency in the deep application of information technology to transform teaching models. For example, the vast majority of teachers are unable to systematically integrate online resources, virtual simulations, intelligent educational tools, etc., into the entire process of research-based teaching, and most remain at the fragmented application level. This superficial application of technology has resulted in information technology not truly becoming an empowering tool to support students' autonomous inquiry.

Young teachers lack data-driven teaching ability. In the context of the widespread adoption of smart classrooms and blended teaching, teachers can use learning analytics to obtain real-time data on students' cognitive characteristics, learning progress, and difficulties, thereby providing personalized learning guidance. However, in reality, young teachers generally lack educational data literacy, making it difficult to effectively collect, analyze, and apply the vast amounts of data generated during teaching. This lack of ability means that teaching decisions still mainly rely on subjective experience, and data-driven teaching optimization cannot be realized.

Young teachers' awareness of information ethics education is weak. Research-based teaching often involves the use of online resources, digital copyright management, research data management, etc.,

requiring teachers to have the ability to guide students in conducting compliant digital research. However, current teaching often overlooks the cultivation of students' awareness of academic norms and information ethics, and some young teachers themselves also suffer from insufficient digital academic literacy. This deficiency not only affects the rigor of academic research but also potentially leads to a lack of research ethics awareness among students.

Moreover, there is a significant "ability gap" among young teachers in the application of emerging intelligent technologies in teaching. Faced with frontier technologies such as generative AI and artificial intelligence, many teachers lack technological understanding and find it difficult to translate these into applicable teaching strategies. This delay in technological adaptation has resulted in the failure to fully carry out the research-based teaching reforms that informatization should have brought.

1.3 The Urgent Need to Improve the Support Mechanism and Training System

The teacher evaluation mechanism is an institutional barrier restricting the development of research-based teaching abilities. Currently, universities generally exhibit a "research-oriented, teaching-neglecting" evaluation tendency. In key areas such as title promotions and awards, research achievements dominate, while teaching input and quality become soft indicators. This evaluation orientation leads teachers to focus their limited energy mainly on research, with significant neglect of teaching. Moreover, the existing teaching evaluation primarily relies on superficial indicators such as teaching hours and student ratings, lacking scientific assessment of deep competencies like research-based teaching design abilities and academic contributions in teaching.

The teacher training system also exacerbates the difficulty in enhancing research-based teaching abilities. The current training system faces three main issues: First, there is a mismatch between content supply and demand. Training mainly focuses on the dissemination of educational theories, while teachers' urgent needs for practical skills such as information-based teaching design and research-based learning organization are insufficiently addressed. Second, the appeal of training formats is low. Young teachers show little interest in traditional formats such as academic reports and centralized learning, preferring interactive learning formats such as master workshops and specialized training sessions. Third, there is insufficient continuity. Most training is fragmented, lacking long-term follow-up and guidance. Teacher training programs generally suffer from "insufficient evaluation, feedback, and tracking," resulting in a lack of effective implementation of training outcomes.

The lack of an organizational support mechanism also limits the improvement of research-based teaching abilities. Most universities have not established specialized teacher development institutions, or, if such institutions exist, their functions are diluted, failing to provide professional teaching support services. At the department level, the functions of basic teaching organizations such as teaching and research offices are weakened, resulting in a delay in the construction of teaching academic communities. There is a lack of institutional support for exchanges of teaching experiences and academic dialogues among teachers, which prevents the inheritance of excellent teaching traditions and leads to fragmented teaching innovation, with each teacher working in isolation.

2. New Connotations of Research-Based Teaching Ability of Young Teachers under the Background of Educational Digitization

The deep integration of information technology is reshaping the teaching and learning models in higher education, raising new and higher-level demands for the research-based teaching abilities of young teachers. The traditional framework for research-based teaching ability is no longer sufficient to meet the needs of digital learning environments and data-driven decision-making. Under the background of educational digitization, the research-based teaching abilities of young teachers should encompass the following three new connotations [9-10].

2.1 Digital Research-Based Teaching Design Ability

Digital research-based teaching design ability refers to the ability of young teachers to systematically use digital technologies, platforms, resources, and emerging technologies (such as AI, VR/AR, etc.) to innovatively design research-based teaching activities, tasks, and learning environments that focus on real-world problems or inquiry projects. These activities aim to stimulate deep student engagement, critical thinking, collaboration, innovation, and knowledge construction. This is not merely about creating PowerPoint presentations or searching for online resources, but rather

emphasizes the reconstruction of teaching paradigms empowered by technology.

2.1.1 Technological Empowerment in Context Creation

Using virtual simulations, online databases, open-source tools, etc., to design highly simulated or real complex learning situations that visualize abstract concepts, providing students with an immersive starting point for exploration and stimulating research interest.

2.1.2 Data-Driven Goal Setting

Using learning analytics tools to set detailed and personalized research learning objectives and expected outcomes, based on student group characteristics and learning goals.

2.1.3 Resource Integration and Path Planning

Proficient in searching, selecting, and integrating digital resources such as professional databases and multimedia material libraries, and designing clear and flexible digital inquiry paths to support students' autonomous exploration.

2.1.4 Innovative Assessment Methods

Designing diversified, process-oriented assessment plans that integrate digital technologies, such as AI-assisted immediate feedback, focusing on the development of inquiry processes and collaboration skills.

2.1.5 Reconstruction of Teaching Paradigms

Emphasizing the shift from "content delivery" to "learning design" and from "teacher-centered" to "student-centered," using technology to achieve fundamental changes in teaching structures, such as blended learning and flipped classroom models.

2.2 Data-Driven Process Guidance Ability

Data-driven process guidance ability refers to the ability of young teachers to collect, integrate, analyze, and interpret multidimensional learning data generated during research-based teaching in real time and dynamically, such as behavioral data, cognitive data, and outcome data. Based on this data, teachers can provide timely, precise, and personalized learning interventions, strategy adjustments, and feedback guidance to dynamically optimize the inquiry process and improve learning outcomes. This marks a shift from experience-based guidance to data-driven, refined guidance.

2.2.1 Multi-Source Data Collection Ability

Proficiently using platforms such as Rain Classroom, Xuexitong, and other online learning platforms to collect learning records, interaction records, and student self-assessment and peer-assessment data, comprehensively capturing the learning process.

2.2.2 Data Integration and Interpretation Ability

Possessing basic data literacy and the ability to use teaching platforms such as Rain Classroom and Xuexitong to integrate fragmented data into meaningful patterns, such as participation trends, and understanding both individual and group learning statuses and potential needs.

2.2.3 Precision Intervention Strategy

Providing differentiated support based on data analysis results, such as pushing personalized resources, offering targeted tutoring, and designing extension challenges according to students' learning conditions.

2.2.4 Dynamic Process Optimization

Viewing data feedback as a key component of a closed-loop system, continuously iterating and optimizing inquiry task designs, resource provision, and interaction methods to ensure that research-based learning remains in an efficient state.

2.3 Information-Based Teaching and Research Integration Ability

Information-based teaching and research integration ability refers to the ability of young teachers to consciously and systematically integrate information technology into their teaching and research activities. This involves using digital tools and platforms to carry out data-driven teaching reflection,

teaching practice innovation, and interdisciplinary collaborative research, and effectively transforming and promoting research outcomes into teaching practice. Ultimately, it aims to achieve the integration of teaching practice and teaching research, with mutual promotion, mutual advancement, and continuous improvement.

2.3.1 Digital Evidence-Based Reflection

Using digital evidence such as classroom recordings, screen recordings, learning analytics data, and student online feedback to conduct deep and objective teaching reflection, eliminating subjective impressions, and precisely identifying problems and highlights in teaching practice.

2.3.2 Data-Driven Action Research

Using information technology tools, such as online questionnaires and platforms, to design, implement, and analyze classroom-based action research or design research, exploring the effectiveness of specific teaching strategies, especially information-based strategies, in promoting student research-based learning.

2.3.3 Digitalization of Results and Promotion

Proficiently using digital tools, such as online course platforms, to efficiently organize, publish, and share teaching research outcomes, such as teaching design cases, research reports, teaching reflections, micro-course videos, and digital resource packs, to promote the widespread dissemination and practical application of results.

2.3.4 Mutual Enhancement of Practice and Research

Directly and rapidly applying teaching practice research outcomes, especially research findings obtained through information-based methods, to improve teaching design and guidance strategies, forming a positive feedback loop of "practice-research-improvement-repractice." This emphasizes that teaching and research are no longer activities separate from teaching but are embedded in the teaching practice itself.

3. Pathways for Enhancing Research-Based Teaching Ability Empowered by Information Technology

3.1 Constructing a "Technology-Teaching-Academics" Deep Integration Model for Ability Development

The enhancement of young teachers' research-based teaching abilities urgently requires the construction of a "technology-teaching-academics" integrated ability development model. In this model, information technology serves as the empowering engine, requiring teachers not only to master various intelligent teaching tools, such as Xuexitong platforms, AI-assisted design, and virtual simulations, but also to proactively use information technology to identify teaching problems and collect learning behavior data. Teaching is the core task, and the application of information technology must serve to enhance teaching design, such as personalized learning paths based on data; optimize the teaching process, such as real-time feedback and dynamic adjustments; deepen teaching interaction, such as collaborative inquiry across time and space; and ultimately cultivate students' higher-order thinking abilities and problem-solving skills. Academics provide the internal drive and elevation, requiring teachers to have a sharp problem awareness, viewing teaching practice itself as a research subject. Teachers must systematically investigate the teaching and learning laws empowered by information technology using educational research methods, refining practical experiences into verifiable and promotable academic teaching results. The key to the "technology-teaching-academics" model lies in breaking down the barriers between the three elements, ensuring that information technology tools serve teaching practice needs, teaching practices generate research questions and data, and research results feedback into information technology applications and teaching optimization, forming a spiraling, ascending closed-loop development ecosystem.

3.2 Creating a "Blended Professional Development + Community Empowerment" Support System

Traditional centralized training cannot meet the sustained, personalized, and practical needs of research-based teaching ability development in the context of informatization. It is necessary to create a dual support system that integrates "blended professional development" with an online-offline approach

and "community empowerment" with multi-party collaboration.

3.2.1 Blended Professional Development

Blended learning serves as the foundation, where online platforms provide flexible, on-demand access to high-quality resource libraries, such as model teacher case libraries, tool operation guides, and research methodologies, supporting asynchronous learning and knowledge acquisition. Offline sessions focus on deep workshopping, contextual simulations, and practical exercises, primarily addressing specific challenges related to integrating technology into teaching design, hands-on training in research methodologies, and collaborative problem-solving of complex issues.

3.2.2 Community Empowerment as the Core Motivation

Community empowerment involves the creation of multi-level practical communities, primarily including:

Intra-school/Cross-school Teaching and Research Communities: Based on virtual teaching research rooms, project groups, etc., focusing on specific technology applications or teaching research topics, conducting regular collective lesson planning, lesson discussions, data analysis, and peer reviews of results.

Mentor-guided Growth Communities: Led by experienced teaching experts or research-oriented teachers, providing personalized guidance through mentoring relationships and workshop leadership.

Industry-University-Research Collaborative Platforms: Linking universities, educational technology companies, and research institutions, introducing cutting-edge technology, practical insights, and theoretical support.

Through continuous practical reflection, experience sharing, collaborative inquiry, and emotional support, communities provide young teachers with a powerful social learning network and a sense of belonging, effectively overcoming the loneliness and bottlenecks of individual exploration.

3.3 Innovating the "Practice-Reflection-Iteration" Action Strategy

The enhancement of research-based teaching ability is essentially a continuous improvement process based on practice. It is necessary to innovate and strengthen the "practice-reflection-iteration" closed-loop action strategy, embedding ability development into daily teaching practice. Practice is the cornerstone; teachers should be encouraged to experiment with information-based research teaching strategies in real classrooms, such as designing and implementing inquiry-based teaching activities like project-based learning and problem-based learning. They should make full use of technology to create contexts, track processes, and assess outcomes. Reflection is the key link; teachers should be guided to engage in reflection that goes beyond experience, using data recorded by teaching platforms, such as teaching logs and learning data analysis reports, to conduct systematic reflection. Reflection should focus on the effectiveness of information technology application, the successes and shortcomings of teaching design and implementation, and the generation and verification of research questions. Iteration is the pathway for improvement; based on deep reflection, teachers should make targeted adjustments and optimizations to teaching design, information technology tool selection, research methods, etc., initiating a new round of practice validation. The information-based environment provides strong technical support for the "practice-reflection-iteration" action strategy.

3.4 Building a "System-Resources-Ethics" Integrated Support Mechanism

The sustainable improvement of young teachers' research-based teaching ability relies on a solid support mechanism. It is necessary to build an integrated support system of "system-resources-ethics" to create a favorable ecological environment.

3.4.1 Systematic Support is Fundamental

Information-based research teaching ability should be explicitly included in teachers' job responsibilities, recruitment assessments, and title promotion evaluation systems. Special evaluation indicators should be established, such as teaching innovation achievements, academic teaching papers, and effective teaching cases enabled by technology. A teaching innovation tolerance and incentive mechanism should be set up, encouraging exploration, embracing failure, and rewarding effective results. The workload recognition system should be improved, acknowledging teachers' time and effort invested in technology learning, teaching research, and community activities. A system for recognizing

and promoting academic teaching achievements should be established to enhance their academic status.

3.4.2 Resource Support is the Foundation

Stable, user-friendly, and advanced information-based teaching infrastructure should be provided, such as high-speed networks, smart classrooms, teaching platforms, and data analysis tools. Special funds should be allocated to support teachers in participating in high-quality training and conducting teaching research projects. A strong teaching development center should be established, with a professional team proficient in pedagogy, technology, and research methods to provide consultation, training, and technical support. A shared high-quality digital teaching resource library and case library should be built.

3.4.3 Ethical Support is the Bottom Line and Responsibility

Ethical norms for the collection, storage, analysis, and application of educational data should be formulated and strictly enforced, ensuring student privacy and avoiding data misuse. The "human-centered" principle of technology application should be advocated, emphasizing that technology serves student development rather than replacing teacher-student interaction. Academic ethics should be upheld in research, ensuring rational research design and accurate data. The fairness of technology application should be emphasized to avoid exacerbating the digital divide and educational inequality.

The combined functioning of the "system-resources-ethics" integrated support system provides safe, strong, and sustainable support for young teachers to focus on exploring information-based research teaching.

Conclusion

Under the background of educational digitization, young teachers generally face issues such as a lack of research-based teaching awareness and ability, insufficient information-based teaching skills, and incomplete support mechanisms and training systems.

In the context of educational digitization, the core of young teachers' research-based teaching ability is reflected in digital teaching design, data-driven process guidance, and the integration of information-based teaching and research, emphasizing the shift of information technology from a tool-based application to the reconstruction of teaching paradigms.

The pathway for enhancing the research-based teaching ability of young teachers under the background of educational digitization requires breaking down ability barriers through the "technology-teaching-academics" three-dimensional integration model; relying on "blended professional development + teaching and research communities" to provide continuous support; using the "practice-reflection-iteration" action strategy to drive the endogenous development of abilities and achieve the normalization of teaching innovation; and establishing a "system-resources-ethics" integrated support system. This system should include incorporating information-based teaching ability into evaluation and promotion systems, providing intelligent infrastructure and professional development platforms, and regulating data usage to ensure educational equity, creating a collaborative ecosystem for ability enhancement.

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