

From Technological Adaptation to Professional Redefinition: Transformation of University Teachers' Roles and Educational Empowerment in the Context of Human–AI Synergy

Xianjin Yang^a, Shuqian Xia^b, Xinqiao Liu^c, Zhen Zhang^c, Lei Huang^b, Lisong Wang^d

^a Tianjin University, Tianjin 300350, China

^b Academic Affairs Office, Tianjin University, Tianjin 300350, China

^c School of Education, Tianjin University, Tianjin 300350, China

^d School of Foreign Languages, Tianjin University, Tianjin 300350, China

© Higher Education Press 2026

Abstract Against the backdrop of human–artificial intelligence (AI) synergy reshaping higher education, university teachers are required to transition from traditional knowledge-transmission professionalism to a new form of educational professionalism for the digital intelligence era. This transformation entails a fundamental shift beyond mere tool adaptation, redefining teachers as value leaders, learning designers, human–AI collaboration organizers, and teaching researchers. Drawing on literature analysis and empirical evidence, this study analyzes the reshaping of the higher education ecosystem through five key dimensions: talent cultivation, knowledge supply, instructional focus, knowledge production, and assessment. It further proposes systemic empowerment paths encompassing top-level design, digital intelligence infrastructure, tiered training systems, and reformed evaluation mechanisms. Ultimately, the study concludes that teacher transformation is not merely a matter of technical adaptation; rather, the core lies in cultivating educational professionalism for the digital intelligence era and converting technological advantages into genuine educational quality so that human–AI collaboration can drive deep learning, holistic development, and responsible innovation in higher education.

Keywords human–AI synergy, higher education, teacher transformation, role redefinition, digital intelligence, educational professionalism

1 Introduction

Artificial intelligence (AI) is accelerating its shift from an auxiliary tool to a core component embedded in knowledge production, curriculum instruction, learning assessment, and educational governance. In 2026, the Ministry of Education of the People's Republic of China and four other ministries (Ministry of Education of the People's Republic of China et al., 2026) jointly issued the *Action Plan for AI Plus Education*, proposing to promote the integration of AI into all elements, processes, and scenarios of education.

Consequently, higher education has entered a new stage in which technological capabilities and approaches to educating students are being restructured simultaneously (Ministry of Education of the People's Republic of China et al., 2026). In response to this transformation, how should teachers' roles change? How can teachers' "teaching" and "educating" empower students with student development at the center? These are the defining tasks of our time.

As human–AI synergy becomes a new normal in higher education, discussing the transformation of teachers' roles first requires clarifying a central proposition: The key to teacher transformation is not simply adding the skill of knowing how to use AI to the existing skill set of teachers who previously did not know how to use AI. Rather, it is a shift from traditional knowledge-transmission professionalism towards educational professionalism in the digital intelligence era. Educational professionalism in the digital intelligence era refers to teachers' capacity to take fostering virtue and cultivating people as the fundamental

Received July 9, 2026; revised August 26, 2026; accepted September 3, 2026

Shuqian Xia (✉)

E-mail: shuqianxia@tju.edu.cn

criterion, translate talent-development goals into authentic and challenging learning tasks, appropriately allocate responsibilities among teachers, students, and intelligent systems, continuously improve teaching based on evidence of learning, and make professional judgments about the boundaries, risks, and ethical responsibilities associated with technology use. *AI competency framework for teachers* (Miao & Cukurova, 2024) identifies human-centered mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional learning as five interrelated competency dimensions, demonstrating that teacher competence cannot be reduced to tool operation. The better AI becomes at providing answers, the more teachers need to help students formulate good questions, distinguish truth from falsehood, develop value judgments, and apply knowledge to complex problems. The irreplaceable value of teachers lies not in how much knowledge they teach but in whether they can safeguard the essence of education through human-AI collaboration. This article systematically discusses a pathway through which teacher professionalism can advance in the era of human-AI collaboration from three perspectives: the transformation of the higher-education ecosystem, the reshaping of teachers' roles, and the restructuring of teacher development systems.

2 Human-AI Collaboration Is Reshaping the Higher-Education Ecosystem

In the evolution of China's educational paradigm, education has progressed from emphasizing moral cultivation and being driven by aristocratic privilege to learning in the digital intelligence era. Each transformation has been driven by social needs and supported by technological progress. The development of education and teaching therefore requires us to accurately recognize and respond to these changes.

2.1 | Talent Development Is Shifting from Knowledge Mastery to Future-Oriented Comprehensive Competence

In the past, education primarily focused on knowledge acquisition. In the era of digital intelligence, knowledge is open and accessible, while technological and industrial transformations have fundamentally changed the competencies demanded of talent. Universities should establish and practice a "from the future to the future" approach, which is guided by the need to "develop new quality productive forces," a concept emphasizing innovation-driven growth, high efficiency, and the integration of advanced technologies like AI and green

energy into the economy. They should anticipate future requirements for talent competencies, accurately identify future needs for academic disciplines and professional fields, and improve the adaptability of the talent supply. Through systematic research and analysis, a future talent profile has been proposed comprising six key elements:

- (1) Shouldering the mission of the times with responsibility;
- (2) Breaking through cognitive boundaries through innovation;
- (3) Pooling collaborative wisdom through mutual support;
- (4) Navigating digital tides through data and digital capabilities;
- (5) Striving for excellence through continuous improvement;
- (6) Leading sustained innovation through transformative change.

In 2025, Tianjin University released the *Future Excellent Talent Development Plan* (also known as *Tianjin University Plan 3.0 for New Engineering Education*), shifting the training objective from solving known problems to exploring the unknown. This plan promotes systematic reform through integrated interdisciplinary training, intelligent teaching practices, standardized engineering education, and internationalized engineering education, and proposes a teacher-student-AI symbiotic teaching model. This transformation directly deconstructs the traditional professionalism of teachers as "knowledge authorities," thus requiring teachers to move from teaching what is known to designing inquiry into open-ended, unresolved problems. Their professionalism is manifested in whether they can translate the future talent profile into concrete curricular challenges in the present.

2.2 | Knowledge Provision Is Shifting from Teacher-Centered Delivery to Multi-Actor Collaboration

Driven by AI, learning spaces are becoming more open, learning activities are increasingly ubiquitous, learning resources are highly interactive, and learning environments are shifting from static visual presentation toward dynamic audiovisual experiences. AI can provide explanations, examples, codes, and feedback at any time; course content is no longer primarily transmitted unidirectionally by teachers. The teaching relationship is expanding from a binary teacher-student structure to a ternary teacher-student-AI structure. However, the ternary structure does not mean that the three parties bear equal responsibilities; rather, teachers are responsible for goal setting, task design, process guidance, and quality assurance; students are responsible for active inquiry and verification of results; and AI

systems are responsible for resource generation, process support, and repetitive feedback. Future universities should establish open and shared models of education based on human–AI collaboration, integrate teaching processes, technological applications, and humanistic care, and create an educational environment characterized by openness, diversity, and integration.

2.3 | Focus of Teaching Is Shifting from Presenting Content to Organizing Deep Learning

When students can quickly obtain seemingly complete answers, classrooms and assignments centered on knowledge reproduction and standard answers can no longer adequately cultivate higher-order capabilities. Existing research provides illuminating evidence of both positive and negative effects of AI on teaching and learning. Harvard University conducted a randomized crossover trial involving 194 undergraduate students enrolled in a physics course. In an AI-tutoring group, where an AI tutor was carefully designed according to principles of learning science, the median learning gain was more than twice that of the classroom human tutor; the median task completion time was 49 minutes, compared with 60 minutes for classroom instruction (Kestin et al., 2025). By contrast, a field experiment involving nearly 1,000 secondary-school students learning mathematics found that although ChatGPT without learning guardrails increased students' practice performance by 48%, these students scored 17% lower than the control group in independent examinations once AI was removed. This negative effect largely disappeared when teachers added designed prompts, common error guidance, and problem-solving scaffolds (Bastani et al., 2025). Although these findings appear to be contradictory, together they demonstrate that whether AI promotes learning depends on instructional design rather than whether students have access to the tool.

Therefore, teaching needs to incorporate more authentic contexts, open-ended questions, interdisciplinary tasks, and iterative outputs, requiring students to articulate their reasoning, compare alternative approaches, remedy errors, and finally reflect on decisions. The ultimate goal of technology empowerment is not to finish more quickly but to use structured intelligent support to improve personalized learning, allocating more time for discussion, practice, creativity, and face-to-face guidance.

2.4 | Knowledge Production Is Shifting from Accumulation within Disciplines to Human–AI Co-Intelligence and Interdisciplinary Integration

AI for Science, as the fifth paradigm of scientific

research, centers on data intelligence and achieves exponential gains in research efficiency through human–AI collaboration and autonomous discovery. AI enables researchers to break through knowledge silos and drive interdisciplinary expansion, thus promoting integration across the “Science–Technology–Engineering” chain and creating a new ecosystem of human–AI co-intelligence. Changes in research paradigms also feed back into curricula design: Frontier research questions transform into teaching materials more quickly, and authentic data as well as research tools enter undergraduate and graduate learning earlier. Students thus shift from recipients of knowledge to co-producers of knowledge.

2.5 | Assessment Is Shifting from Outcome Determination to Process Evidence and Comprehensive Judgment

With the assistance of AI and blockchain technologies, assessment systems are evolving from standardized examinations toward digital learning portfolios. Assessment must pay greater attention to the processes of question formation, source selection, prompt iteration, comparison of alternatives, evidence verification, oral explanation, and reflective revision. Universities should establish assessment components that confirm students' independent capabilities, while also designing open tasks that allow students to use AI appropriately to test their judgment and responsibility. For example, digital technologies can help teachers aggregate learning trajectories, identify common difficulties, and provide timely feedback. However, measurable data cannot be equated with learning quality, nor can algorithmic scoring replace educational judgment.

3 Reshaping Teachers' Roles Through Educational Professionalism in the Digital Intelligence Era

The transformation of higher education brings unprecedented development opportunities to university teachers, yet it also presents unprecedented risks and challenges. In terms of opportunities, AI has greatly unleashed teachers' productive capacity and enabled them to engage in creative work. Nevertheless, we must clearly recognize that teachers' status as knowledge authorities is being challenged, their educational agency faces the risk of erosion, and some teachers lack sufficient AI literacy and the capacity to respond to educational transformation. Based on the conception of educational professionalism described above, teachers' roles need to be redefined. Teachers need to combine

the technological capabilities of AI with human intelligence and wisdom, thus becoming value leaders, learning designers, human-AI collaboration organizers, and teaching researchers and innovators. Each transformation points toward an enhancement of professionalism rather than mere technological adaptation.

3.1 | From Knowledge Authority to Value Leaders

Teachers should uphold professional ethics and conduct as the primary criterion and integrate value formation, knowledge transmission, and competency development into curriculum objectives, content selection, classroom interaction, and assessment feedback. When addressing complex issues, teachers should guide students to understand the relationships between technology and society, between innovation and responsibility, and between efficiency and equity. At the same time, teachers should identify students' confusion and differences through authentic interpersonal interaction, and provide trust and encouragement while setting necessary boundaries. The more this era prioritizes efficiency, the more education must preserve human warmth; the more technology mimics human expression, the more teachers need to establish genuine value leadership through character, scholarship, and practice.

3.2 | From Content Lecturers to Learning Designers

The core of teachers' work should move beyond explaining content clearly to making learning genuinely happen. Teachers are learning designers who awaken thinking. They should develop teaching resources precisely, design differentiated learning pathways, and stimulate higher-order thinking through inspiring questions. They should continuously reflect on teaching practice and use dynamic feedback to tailor instruction, thus enabling every student to construct knowledge in depth and achieve meaningful growth through appropriate guidance.

3.3 | From Tool Users to Human-AI Collaboration Organizers

Teachers' AI literacy should not be measured by how many tools they master or how many resources they generate. Instead, it should be assessed by whether they can choose technologies according to educational purposes, verify outputs, allocate responsibility, and control risks. In 2026, Tianjin University released the *Action Plan for AI Plus Education Reform and Innovation* and the *Code of Conduct for Faculty and Students in AI Applications*, forming a "1 + X + N" intelligent teaching and research platform which covers multiple

disciplines and a ternary integrated model of teacher leadership, student agency, and intelligent-agent empowerment. These documents also specify encouraged and prohibited behaviors in education and teaching, independent learning, scientific research, and administrative management and require users to identify the AI tools used, scopes of usage, and intended purposes ([Science and Technology Daily, 2026](#)).

3.4 | From Experience-Based Teachers to Teaching Researchers and Innovators

Teachers need to transform authentic problems arising in course implementation into teaching research. They need to collect evidence, conduct comparisons, and continuously improve around topics such as how students formulate questions, how they verify AI outputs, and which forms of collaboration promote deep learning. They should also leverage their research strengths to transform frontier research in the discipline, research methods, and innovative resources into educational resources, thereby improving course quality through the mutual advancement of teaching and research.

4 Supporting Teacher Professional Transformation Through Changes in Development Approaches

Looking into the future, faculty development systems must be reconstructed through systemic thinking, using digital intelligence technologies to enable precise development and evaluation, while also using institutional innovation to stimulate intrinsic motivation and academic self-awareness. Teachers should be able to reposition their role amid the wave of digital intelligence transformation and complete the transition from traditional knowledge-transmission professionalism to educational professionalism, thereby strengthening the talent foundation for high-quality educational development.

4.1 | Strengthen Top-Level Design

Anchoring a vision of professional ethics as the "soul," digital intelligence as the "wings," and competence as the "bedrock" for faculty development in the digital intelligence era, institutions should incorporate competencies in human-AI collaboration, digital ethics, and interdisciplinary integration into a top-level framework. University faculty development centers should play valuable roles in coordinating the formulation of competency standards, evaluation indicators, and

resource allocation plans to ensure all stages are organically connected and work toward common goals.

4.2 | Build a Digital Intelligence Infrastructure

Universities should construct digital intelligence platforms for faculty development that integrate functions such as multisource collection of teaching-behavior data, dynamic competency-profile diagnosis, and personalized learning-path recommendations. Data silos separating academic affairs, training, research, and other systems should be broken down. AI-enabled accompanying analysis can then provide an accurate profile for each teacher, supporting differentiated development and formative evaluation, thus making data-driven development the new normal.

4.3 | Establish a Systematic Training System

Guided by new-era teacher competency standards, and supported by multisource competency profiles generated through digital intelligence platforms, institutions should build a multilevel, progressive training system: New faculty members should focus on ethical standards and handling AI tools; core teachers should focus on AI-enabled curriculum-based teaching research; distinguished teachers should deepen interdisciplinary and human-AI collaborative innovation; and leading teachers should focus on developing digital intelligence standards and deliver systemic leadership. An online and offline dual-track approach should be adopted to connect the “training–competition–assessment–demonstration” chain and stimulate teachers’ intrinsic motivation for research. The key is to guide teachers to examine AI outputs from a pedagogical perspective and elevate technical training so that it becomes the cultivation of educational research literacy.

4.4 | Optimize Development and Improvement Mechanisms

Universities should construct a full-chain institutional system of “position establishment–professional-title evaluation–talent programs,” which centers on the equivalent evaluation of teaching scholarship achievements in the digital intelligence era.

Teaching-oriented positions should be established to address entry requirements, while dedicated channels for teaching-oriented professors should be opened to address promotion pathways, thus granting digital intelligence teaching and research achievements equal weight as scientific research. Teaching-oriented faculty development programs should be established to ensure sustainability. A joint-meeting mechanism

should be used to create an agile organizational ecosystem based on cross-departmental collaboration, thereby enabling institutions to operate efficiently through digital intelligence empowerment.

5 Conclusions

Education is a future-oriented cause, and the anchor of future education will always be the development of human. Facing the new normal of human-AI collaboration, we should embrace the efficiency revolution brought by AI while fully remaining aware that university teachers need to devote more of their primary efforts to value leadership, learning design, relational support, innovative practice, and ethical governance. The measure of teacher transformation is not “how much AI is used” but “whether AI can be leveraged to promote deeper learning, holistic development, and more responsible innovation.” Universities should adhere to the principle of “from the future to the future,” use talent-development goals to guide technological application, use educational professionalism in the digital intelligence era to lead role transformation, and provide sustained support through changes in teacher development approaches. Only when technological capabilities are transformed into educational capabilities and the advantages of technology are converted into educational quality can human-AI collaboration truly become a new driving force for building a high-quality higher education system.

Acknowledgments No funding was received to assist with the preparation of this manuscript.

Declaration on the Use of AI The authors confirm that no artificial intelligence tools or large language models were used in the conception, design, analysis, or writing of this manuscript. All content, arguments, data interpretations, and conclusions presented herein are the sole intellectual products of the authors, who assume full responsibility for the accuracy, originality, and integrity of the work. No AI-related disclosure is required beyond this declaration.

Author Contributions Xianjin Yang contributed to the conceptualization and provided supervision of this work, Shuqian Xia prepared the original draft. Xinqiao Liu, Zhen Zhang, Lei Huang, and Lisong Wang contributed to the review and editing of this manuscript. All authors have approved the final manuscript and agree to be accountable for all aspects of this work.

Conflicts of Interest The authors declare that they have no conflict of interest.

Data Availability Statements The authors confirm that all data analyzed are included in this published article.

References

- Bastani, H., Bastani, O., Sungu, A., Ge, H., Kabakcı, Ö., & Mariman, R. (2025). Generative AI without guardrails can harm learning: Evidence from high school mathematics. *Proceedings of the National Academy of Sciences*, 122(26), e2422633122.
- Kestin, G., Miller, K., Klales, A., Milbourne, T., & Ponti, G. (2025). AI tutoring outperforms in-class active learning: An RCT introducing a novel research-based design in an authentic educational setting. *Scientific Reports*, 15(1), 17458.
- Miao F. C., & Cukurova, M. (2024). *AI competency framework for teachers*. UNESCO.
- Ministry of Education of the People’s Republic of China, National Development and Reform Commission of the People’s Republic of China, Ministry of Industry and Information Technology of the People’s Republic of China, Ministry of Science and Technology of the People’s Republic of China, & National Data Administration of the People’s Republic of China. (2026, April 2). *Action Plan for AI Plus Education*. Available from Ministry of Education of the People’s Republic of China website. (in Chinese).
- Science and Technology Daily. (2026, June 11). *Tianjin University releases measures related to artificial intelligence education*. Available from Science and Technology Daily website. (in Chinese).