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Original Paper

Pathways for Enhancing Faculty Members' Practical Teaching Competence at Application-Oriented Universities through Artificial Intelligence

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Abstract

Artificial intelligence (AI) is changing higher education at a remarkable pace, and it has created new conditions for strengthening the practical teaching competence of young faculty members. Taking Hankou University as the case and drawing on the literature as well as publicly available institutional information, this study examines why AI-enabled practical teaching is valuable for young teachers and where the main barriers lie. Four stand out: misconceptions about professional roles, insufficient digital competence, inadequate institutional incentives, and superficial industry–education collaboration. The study then builds a multidimensional framework for AI-enabled professional development in practical teaching, organized around three interconnected pathways—cultivating digital literacy, transforming teaching paradigms through the integration of virtual and physical environments, and redesigning evaluation systems with data intelligence. How these pathways reinforce the faculty capacity needed for the dynamic adjustment of academic programs at local application-oriented universities amid industrial upgrading is also discussed. The aim is to provide a theoretical reference and practical insights for the high-quality, substantively driven development of comparable application-oriented undergraduate institutions.

Keywords

artificial intelligence, practical teaching competence, digital transformation of education, dynamic adjustment of academic programs

Industrial upgrading keeps changing the skills that occupations demand. For local application-oriented universities, this has two direct consequences: practical teaching content must be renewed as academic programs are adjusted, and young teachers must build stronger, industry-related practical expertise.

Policy has pointed in the same direction—in 2023, The President stated that "the digitalization of education is an important breakthrough for opening up new avenues of educational development" (President, 2023). Emerging technologies, generative AI in particular, are now transforming educational paradigms and creating real opportunities to raise faculty members' practical teaching competence. Hankou University offers a useful case. As a private application-oriented undergraduate institution, it operates 141 laboratories and 231 practical training bases, a physical foundation on which AI-enabled practical teaching can build (Hankou University, 2024); and with more than 800 full-time faculty members, the university's capacity to cultivate application-oriented talent depends considerably on how well its young teachers handle practical instruction. It is therefore worthwhile, in both theoretical and practical terms, to investigate the value, the existing challenges, and the potential pathways of enhancing this competence through AI—an inquiry that bears directly on institutional digital transformation and on the quality of talent development.

1. The Rationale for AI-Enabled Development of Young Faculty Members' Practical Teaching Competence

1.1 Restructuring Competence through Technology Integration and Transforming Practical Teaching Paradigms

(1) Data-driven instructional decision-making. Instructional judgment has traditionally rested on intuition and personal experience, and learning analytics theory seeks to complement it: systematically collected and interpreted educational data, the theory argues, can give instructional decisions an objective basis. In practice, intelligent teaching systems now capture multimodal information—student clickstream data, interaction frequency, mastery of knowledge-graph concepts, cognitive load—and assemble it into digital learner profiles (Yu, 2018). A young teacher reading such a profile can diagnose learning needs from real-time evidence rather than guesswork, and can adjust instructional strategies accordingly. The shift, in short, is from "imprecise inference based on intuition" to "targeted intervention based on evidence," and it makes instructional decision-making noticeably more rigorous and more predictive.

(2) Adaptive and precise classroom management. Good classroom management, according to teaching presence theory, depends on two things: teachers must remain continuously aware of the instructional situation, and they must be able to respond promptly. Intelligent monitoring platforms support both. Through visual dashboards, they break the teaching process into observable components—preparation, implementation, feedback—and display key indicators of student engagement, cognitive activity, and interaction quality in real time. When classroom dynamics begin to diverge from the intended learning objectives, a young teacher can see it on the dashboard and intervene, adjusting the pace of instruction before the drift widens. A closed loop of "monitoring–diagnosis–adjustment" thus takes shape, with direct benefits for classroom effectiveness and for the quality of the learning outcomes that emerge from instruction.

(3) Evidence-informed instructional reflection. In evidence-based education, professional practice is expected to draw on the best available evidence rather than on impression alone. Applied to teaching, this principle becomes concrete once AI enters the classroom: digital records of classroom teaching can now be generated automatically, integrating structured evidence that ranges from time-series representations of teaching behaviors to semantic analyses of teacher–student dialogue and value-added data on student achievement. Confronted with records of this kind, young teachers can pinpoint specific weaknesses—in question design, in feedback quality, in technology integration—that subjective recollection would likely miss. Reflection thereby moves from subjective accounts onto objective analysis and, repeated over time, establishes a spiral model of professional growth: "practice–Evidence –improvement."

(4) High-fidelity simulation is changing what practical teaching can do. AI, together with virtual reality (VR), augmented reality (AR), and digital twin technologies, creates simulated environments realistic enough to lift the conventional constraints of time, space, resources, and safety (Huang, Liu, D., & Liu, X., 2022). Engineering disciplines illustrate the point well: intelligent systems simulate complex engineering situations in which students acquire operational skills and learn to connect theoretical knowledge with practice. The New Liberal Arts benefit in a comparable way, as intelligent simulation platforms reproduce realistic professional scenarios and raise instructional effectiveness. For young faculty members, the implication goes beyond new tools. Technology-driven innovation of this kind reshapes their core competencies and can substantially strengthen their ability to integrate the various elements of practical teaching.

1.2 Responding to Digital Transformation and Expanding Opportunities for Professional Growth

How deep and how effective the digital transformation of higher education can become depends directly on young faculty members' digital competence—and that transformation is, by now, an inevitable trend (Gu, 2020). Hankou University has accumulated a solid foundation for it: seven provincial-level first-class undergraduate program development sites, 24 provincial-level first-class undergraduate courses, three provincial-level teaching teams, and 158 provincial- or ministerial-level teaching and research projects, among them projects under the Ministry of Education's collaborative education initiative. Within this environment, AI hands young teachers concrete instruments—big-data analytics, immersive virtual technologies, intelligent instructional tools—with which to optimize practical teaching, and in doing so it provides substantial technological support for their professional development.

The educational ecosystem is evolving, and with it the role of young faculty members: being knowledge transmitters alone is no longer enough, as they are becoming facilitators of learning and intellectual engagement. Once AI is integrated deeply into teaching practice, several things become easier. Digital resource repositories for practical teaching can be developed efficiently. Instruction can be targeted more precisely. Students' individualized developmental needs can be answered promptly, and students can be guided to use the repositories for independent learning and exploration. Capacities

of this kind allow young teachers to keep pace with rapid educational digitalization. They also matter for program development: improved practical teaching competence helps translate the dynamic adjustment of academic programs from revisions of talent-development plans into changes in actual teaching practice.

2. Challenges in Developing Young Faculty Members' Practical Teaching Competence

2.1 Misalignment of Professional Role Perceptions and Imbalanced Competence Profiles

Expectations of young faculty members have expanded rapidly as intelligent technologies penetrate education, and they now reach well beyond subject-matter expertise. Strong disciplinary knowledge is only the starting point; teachers are simultaneously expected to act as course designers, learning facilitators, technology users, and mentors for student development. Each of these roles demands its own skills, and the combination can be burdensome—generating substantial competence-related anxiety and dispersing faculty members' time and energy.

A structural imbalance runs through the practical teaching of young faculty: theoretical knowledge tends to be strong, practical experience limited. The reason is partly biographical. Many young teachers enter university teaching directly after completing their own education, so their disciplinary expertise is solid but their exposure to authentic workplaces, enterprises included, is minimal. The figures at Hankou University reflect this pattern. Of its 832 faculty members, only 163 hold "dual-qualified, dual-competent" status—less than 20%—and young faculty with extensive industry experience are rarer still. Rapid advances in AI sharpen the imbalance further, because young faculty members are now expected to master conventional practical teaching skills and, on top of that, to apply intelligent technologies in practical instruction. Carrying both demands at once, some teachers inevitably worry about their own competence.

There is, moreover, a ceiling on how far technology use has gone in higher education. For the most part, information technology remains confined to relatively basic applications—online course resources, multimedia presentations. More advanced tools such as intelligent sensors and wearable technologies are unfamiliar territory for many young faculty members, who lack operational proficiency in them. Two consequences follow: the integration of intelligent technologies into practical teaching stays limited, and the broader institutional environment for cultivating digital literacy remains insufficiently developed.

2.2 Barriers to Technology Integration and Risks of Instructional Disruption

Classroom formats are changing faster than many teachers' habits. Blended online–offline instruction and flipped classrooms, which extend learning beyond the physical boundaries of conventional teaching spaces, have become increasingly common, and they create challenges in course design and classroom management that young faculty members have not faced before. The technology-rich classroom also redistributes authority: students can obtain course information through multiple channels, so the teacher is no longer the single gateway to knowledge. Under these conditions,

maintaining student attention and motivating deeper learning become considerably harder tasks in practical teaching.

Teaching alongside AI places new technical demands on young faculty members, who are expected to use a range of intelligent platforms proficiently. Reality often falls short. Limited experience in handling complex instructional situations prevents some teachers from adapting their methods promptly and flexibly; instead, they oscillate between two extremes—teacher-dominated lecturing and a largely hands-off approach—without effectively managing the teaching process. Resource constraints compound the problem. Hankou University has established 141 on-campus laboratories and training rooms together with 231 off-campus internship and training bases, yet gaps remain in intelligent upgrading and in the development of virtual simulation resources, leaving young faculty members without sufficient support for intelligent practical teaching.

New ethical risks accompany the educational application of AI, and they deserve equal attention. Student data privacy, algorithmic bias, and excessive dependence on technology are not abstract concerns; each of them places greater demands on young faculty members' ethical awareness and on their understanding of the relevant legal frameworks.

2.3 Inadequate Institutional Incentives and Superficial Industry–Education Collaboration

On paper, universities attach considerable importance to teaching innovation. In practice, prevailing systems of faculty evaluation and academic promotion continue to prioritize research over teaching, and this gap between rhetoric and incentives shapes young teachers' choices. Adapting to intelligent technologies requires them to invest substantial time and effort in redesigning courses and developing innovative content—an investment characterized by considerable risk, a long time horizon, and uncertain returns. Research outputs, by contrast, offer comparatively immediate and measurable credentials for promotion. It is hardly surprising, then, that many young faculty members concentrate their energy on research, while investments in practical teaching remain weakly recognized and incentives to develop practical teaching competence are significantly weakened.

Several routes could strengthen young faculty members' practical teaching competence directly: industry placements, participation in university–enterprise collaborative projects, and the development of practical teaching resources. All three share the same disadvantage, however—they are time-consuming and difficult to quantify, so existing evaluation systems tend to under-recognize them.

The cooperation side has its own problems. Much university–enterprise cooperation remains superficial, its practical platforms underdeveloped and its technological collaboration fragile (Zhang & Wang, 2025). Cooperation agreements between private universities and enterprises are common, yet depth and long-term planning are frequently missing from them; ambiguities over intellectual property ownership and the absence of benefit-sharing mechanisms further limit the sustained opportunities available for faculty members to gain practical experience. Hankou University's record is comparatively strong—it has established partnerships with several enterprises and accumulated considerable experience in collaborative talent development, integrated innovation, and student internships and practical

training—but even here, mechanisms for industry–education collaboration that deeply integrate AI with practical teaching require further improvement. The stakes are concrete: as industrial upgrading alters occupational skill requirements, inadequate university–enterprise coordination can cause program adjustments to become disconnected from updates to practical teaching content.

3. Pathways for Enhancing Young Faculty Members' Practical Teaching Competence through AI

3.1 Internalizing Intelligent Technologies and Cultivating Digital Literacy

Everything else in this pathway rests on one prerequisite: conventional educational mindsets must change. To that end, universities should regularly organize specialized AI training sessions and academic seminars through which young faculty members acquire a systematic understanding of technological developments and their potential applications in practical teaching. The School of Management at Hankou University offers an example, having held themed events such as "A New Chapter in Digital Human Resource Management: Sharing Practical Explorations of Curriculum Reform in the AI Era" (School of Management, Hankou University, 2025). What such activities do best is let teachers see for themselves: concrete examples of successful teaching practices, combined with hands-on opportunities, allow young faculty members to experience the benefits of intelligent technologies firsthand, so that resistance to technological change gradually gives way to a student-development-centered philosophy. Within that philosophy, AI is understood as a tool supporting students' active knowledge construction and personalized development—not merely a medium for delivering information.

Systematic training is where digital literacy begins. Young teachers rarely pick it up incidentally; they need structured opportunities to learn how intelligent teaching tools actually operate and to become genuinely proficient at collecting and analyzing data. Equipment plays a supporting role here. Smart sensing devices and wearable technologies, once introduced into practical sessions, record how students perform in hands-on activities, and those records give teachers a basis for individualized guidance and for adjusting instructional plans when needs shift. There is also a social route to literacy. Working alongside specialists in computer science and engineering on joint research exposes early-career teachers to technical principles and application contexts far removed from their own disciplines, and that exposure tends to show up later in richer practical teaching content and formats. None of this is a one-time effort. Following advances in AI and neighboring fields, and participating in academic exchanges at home and abroad, is what keeps literacy and proficiency from going stale. Finally, alignment with local industrial upgrading can be designed in from the start: faculty development programs that absorb changes in enterprise skill requirements and in program training plans can run "needs identification–competence development–instructional renewal" as one coordinated process rather than three separate tasks.

3.2 Transforming Teaching Paradigms through Virtual–Physical Integration and Human–AI Collaboration

(1) Money spent on virtual simulation is money spent on the two weaknesses named above: limited practical experience and restricted access to teaching resources. Universities that increase investment in virtual simulation-based laboratory teaching projects give practical instruction a far richer stock of digital resources to work with. The pedagogical payoff comes through realism. With VR and AR, highly realistic professional scenarios can be built, and inside them early-career teachers rehearse practical teaching activities until the instructional experience sticks. Each discipline finds its own use. In engineering programs, digital twin technologies make it possible to construct virtual factories corresponding to real production lines; process design, equipment operation, and fault diagnosis can all be rehearsed there as teaching activities. In New Liberal Arts programs, including human resource management and business administration within the School of Management, intelligent simulation systems instead recreate professional situations close to actual work, and the effect is a tighter bond between theory and practice together with more effective teaching. A final rule concerns currency: where programs are being adjusted in response to industrial upgrading, simulation scenarios and practical teaching cases have to be refreshed as occupational skills change, or instructional content will drift away from the direction of program development.

(2) Blended practical teaching works on a simple division of labor: whatever students can learn alone goes online; whatever they cannot stays in the classroom. The online part is handled by AI-enabled platforms, which supply preparatory materials, virtual simulation exercises, and online assessments before class; working through these, students acquire foundational knowledge and basic operational skills independently. Class time, relieved of that burden, can concentrate on higher-order capabilities such as complex problem-solving, teamwork, and innovative design. The teacher’s job changes accordingly. Rather than delivering basics, teachers monitor the learning analytics that online teaching platforms generate, follow student progress, identify difficulties in real time, and reserve focused guidance for the in-person practical sessions where it counts. Efficiency in practical teaching is the first dividend. A second, quieter one is that early-career teachers grow fluent in using information technology for instruction simply by running this model.

(3) Human and machine each keep what they do best. That is the principle, and young teachers apply it by assessing, critically and in advance, what AI can and cannot do while retaining their own leading role in teaching. Before class, there is real analytical work to delegate: drawing on data relating to students from different disciplines and at different levels of study, AI’s simulation and prediction functions can model the likely outcomes of alternative instructional plans, anticipate classroom dynamics, and suggest how strategies might be planned or refined. Delegation stops there, however. Recommendations generated by AI still require evaluation and adaptation through the teacher’s professional expertise, not least because the technology remains weak at recognizing individual differences and psychological factors. The balance just described—AI contributing its strengths,

teachers keeping professional judgment—is what allows technology and education to integrate at depth rather than merely coexist.

3.3 Redesigning Evaluation Systems through Data Intelligence

Evaluation, the third pathway, starts with a simple premise: no single vantage point can judge teaching competence fairly. Student, peer, and expert assessments each catch something the others miss, so a three-part mechanism integrating all three is the sensible design, and AI can render such evaluation far more immediate, data-driven, and intelligent than manual procedures allow. Smart teaching platforms keep a continuous, synchronous record of how early-career teachers actually teach. Innovation in instructional design, effectiveness of classroom interactions, frequency and quality of individualized feedback to students: all of these become data rather than impressions. So do the surprises, since unexpected classroom incidents can be documented and organized into structured case repositories that feed timely instructional recommendations and coaching support back to teachers. Time turns these records into something richer. Integrating and analyzing multidimensional longitudinal data lets AI generate dynamic, comprehensive digital profiles of individual teachers' professional development, in which strengths and blind spots in teaching approaches stand out plainly.

A profile earns its keep only when it triggers action. Automated recommendation supplies that action: areas identified for improvement are matched with micro-credential courses, repositories of exemplary teaching cases, and suitable mentors, so that competence development runs as a continuously improving, self-directed feedback process (Zhu & Hu, 2022). The beneficiaries who need this arrangement most are precisely those entering the profession, for whom data-driven, targeted development can lower the cognitive demands of the early career stage and accelerate growth.

Technical measures without institutional backing tend to fade, which is why reform of faculty evaluation systems belongs in this pathway. Developmental assessment and incentives have to be aligned, and the alignment shows up first in promotion reviews and performance appraisals, where practical teaching competence and teaching reform deserve greater weight than they currently receive. Indicators should name the work explicitly: participation in instructional innovation, development of virtual simulation experiments, supervision of students' practical activities. Outstanding performance in practical teaching, once acknowledged through dedicated reward mechanisms, gives teachers an intrinsic reason to keep investing. The downstream effects are cumulative. More effort goes into practical teaching competence; teaching and research settle into a mutually reinforcing relationship; the faculty support behind students' holistic development grows stronger. One more alignment completes the picture. When participation in enterprise job-role research, revisions to academic program training plans, and updates to practical courses all count in developmental evaluations, faculty competence development moves in step with the dynamic adjustment of academic programs.

4. Conclusion

AI, to put the matter plainly, is simultaneously an unprecedented opportunity and a new challenge for the practical teaching competence of young university teachers. Hankou University embodies both. Its foundation in faculty development, practical teaching facilities, and digital course resources is sound; the depth of AI integration into practical teaching is not yet there. Educational digital transformation sets the scene for what comes next, and it assigns tasks to two parties. Young teachers should meet technological change proactively, update their pedagogical approaches, strengthen their digital competence, and search for meaningful combinations of AI with practice-based instruction. Universities should improve institutional support mechanisms, establish intelligent and personalized faculty development systems, deepen industry–education collaboration, and create platforms that convert professional learning into practical teaching competence. The two sets of measures meet in the middle: young teachers acquire an environment that supports their professional growth, and local application-oriented universities acquire the faculty base required for dynamically adjusting academic programs during industrial upgrading and for keeping program development aligned with industry needs.

Further expansion of these pathways can be expected as AI advances and the digital transformation of education deepens. For Hankou University, three habits seem worth keeping: drawing on the institutional flexibility associated with private higher education, remaining attentive to technological developments, and refining faculty development approaches as circumstances change. If practical teaching competence keeps improving, the cultivation of highly qualified, innovative, application-oriented graduates gains a firmer faculty foundation, and national strategic priorities are, through that foundation, better served.

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