

TEACHER PROFESSIONAL DEVELOPMENT IN CHINA IN THE AGE OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

Artificial intelligence is reshaping teachers' professional work and the knowledge required for responsible teaching. In China, this change is unfolding alongside national policies on educational digitalization, teacher digital competence, and AI integration. Using a structured integrative review of academic research, Chinese policy documents, international frameworks, and published institutional cases, this article examines AI-era teacher professional development from an educational administration perspective. The synthesis indicates that effective development cannot be reduced to short-term tool training. Teachers need integrated AI literacy, subject-specific pedagogical and assessment judgment, ethical responsibility, critical verification, and professional agency. Chinese evidence also shows that readiness varies across roles and contexts and that professional learning is more meaningful when supported by organizational conditions, collaborative practice, and performance-based evidence. The article therefore proposes the ADAPT-AI Framework: Align educational purpose and policy; Diagnose teacher readiness; Activate collaborative, practice-based learning; Protect ethics, data, and agency; and Track evidence for continuous improvement. The framework translates national policy into locally responsive professional learning while reducing compliance-oriented implementation. It offers a practical architecture for Chinese schools, vocational colleges, and universities seeking to develop teachers who can use AI critically, pedagogically, and responsibly.

Keywords: Teacher Professional Development, Artificial Intelligence, AI Literacy, Educational Administration

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INTRODUCTION

Artificial intelligence (AI) has become part of routine educational work through generative AI, intelligent tutoring, automated feedback, adaptive learning, and resource production. These tools may reduce repetitive work and support differentiation, but they can also generate fabricated information, reproduce bias, expose personal data, and complicate judgments about student authorship and assessment validity (Yan et al., 2024). UNESCO (2023) therefore emphasizes human-centered use in which educational value, safety, inclusion, and human responsibility guide adoption.

The professional challenge is broader than learning to operate particular tools. Teachers must judge when AI is educationally appropriate, verify outputs, redesign learning and assessment, and decide when human interaction should remain primary. These decisions require subject knowledge, pedagogical expertise, ethical awareness, and institutional support. Recent reviews show that research has emphasized AI applications more than the sustained professional development needed to prepare teachers for responsible use (Tan et al., 2025).

China provides an important policy context. The Digital Literacy of Teachers standard defines competence through digital awareness, knowledge and skills, application, social responsibility, and professional development (Ministry of Education of the People's Republic of China [MOE], 2022). The 2024–2035 national education plan links a high-quality teaching workforce with educational digitalization (Communist Party of China Central Committee & State Council, 2025), while the 2026 AI + Education Action Plan calls for differentiated AI-literacy training, competency standards, and integration of AI across teaching and governance (Ministry of Education et al., 2026).

These policies create both opportunity and administrative responsibility. Large-scale training can widen access, yet participation alone does not demonstrate professional capability. This article therefore treats AI-era teacher development as an educational administration problem, focusing on required competencies, organizational conditions, and the translation of national policy into locally meaningful practice. Its central argument is that professional development should strengthen defensible educational judgment rather than merely increase technology use.

METHODOLOGY: STRUCTURED INTEGRATIVE REVIEW AND CONCEPTUAL SYNTHESIS

This study uses a structured integrative review, an appropriate design for synthesizing an emerging interdisciplinary topic spanning teacher professional learning, AI literacy, educational technology, ethics, and policy (Snyder, 2019). No primary participants were recruited; empirical grounding comes from published studies and documented institutional or policy cases.

The search was updated through September 2026 using ERIC, major publisher platforms, and official repositories of the Chinese Ministry of Education, the State Council, UNESCO, and selected Chinese universities. Search terms combined “teacher professional development” or “teacher professional learning” with “artificial intelligence,” “generative AI,” “AI literacy,” “TPACK,” “teacher agency,” “China,” “vocational college,” “school,” and “university.” Sources from 2018 onward were prioritized, while Desimone (2009) and Mishra and Koehler (2006) were retained as foundational works.

Sources were included when they addressed teacher capability, professional learning, organizational support, ethics, governance, teacher agency, or implementation in Chinese education; studies limited to student AI use, technical model performance, or product description were excluded. The final corpus comprised 24 sources: 16 academic studies and 8 policy, framework, or institutional documents. Evidence was coded into five recurring domains—educational purpose and policy, readiness, collaborative learning, ethical and data safeguards, and evidence-based evaluation—which were compared across international and Chinese evidence and synthesized into ADAPT-AI.

CONCEPTS AND THEORETICAL FOUNDATIONS

Teacher Professional Development as Continuous and Situated Learning

Teacher professional development includes formal and informal processes through which teachers deepen knowledge, improve practice, and contribute to collective capacity. Desimone (2009) identifies content focus, active learning, coherence, duration, and collective participation as recurring features of effective development. These principles are particularly relevant to AI because teachers need opportunities to evaluate outputs, redesign authentic tasks, observe consequences, and discuss professional reasoning rather than merely attend technical demonstrations.

Professional learning is also shaped by organizational conditions. Training may have little impact when teachers lack time, leadership support, appropriate tools, or peer collaboration. Technology-mediated development can widen access, but contextual relevance, facilitation, follow-up, and professional relationships remain essential (Hennessy et al., 2022; Philipsen et al., 2019). AI-era development should therefore be technology-enabled but organizationally supported.

AI Literacy, TPACK, and Intelligent Professional Knowledge

AI literacy extends beyond operational proficiency. It involves understanding and applying AI, critically evaluating outputs, and addressing ethical issues (Ng et al., 2021). For teachers, this means understanding basic AI concepts and uncertainty, recognizing system limitations and bias, verifying outputs against reliable disciplinary sources, and guiding students toward responsible use.

The technological pedagogical content knowledge (TPACK) framework shows that effective technology integration depends on relationships among technology, pedagogy, and subject matter rather than technical knowledge alone (Mishra & Koehler, 2006). Celik's (2023) Intelligent-TPACK extends this logic to ethical assessment of AI-supported decisions. Chinese K–12 evidence further links TPACK, school support, agency, and autonomy with teachers' intentions to design AI-assisted learning (Wang et al., 2024). AI competence should therefore be demonstrated through contextual decisions, not familiarity with tools alone.

Human-Centered Professionalism and Ethical Responsibility

UNESCO's AI Competency Framework for Teachers combines a human-centered mindset, AI ethics, foundations and applications, AI pedagogy, and AI for professional learning (Miao & Cukurova, 2024). It places teacher agency and accountability at the center of technological change: teachers remain responsible for curricular accuracy, fair assessment, student welfare, and classroom relationships even when AI contributes suggestions.

Ethical responsibility should be embedded within professional learning rather than treated as a separate compliance topic. Privacy, copyright, transparency, accessibility, bias, age appropriateness, and human oversight directly affect professional judgment (Akgun & Greenhow, 2022; UNESCO, 2023; Yan et al., 2024). Technical fluency without the ability to judge reliability, fairness, or educational appropriateness is insufficient professional competence.

REVIEW AND SYNTHESIS OF ACADEMIC LITERATURE

What Teachers Need to Learn in the AI Era

The literature identifies four interdependent development needs. First, teachers require critical AI literacy: enough understanding of training, generation, uncertainty, and bias to recognize why fluent output can still be wrong and to verify claims against authoritative sources (Yan et al., 2024). Second, teachers need pedagogical design capability that connects AI use with learning objectives, disciplinary standards, learner differences, and cognitive demand. AI can generate examples or support low-stakes practice, but it can also remove productive struggle or encourage superficial completion. Professional learning should therefore move beyond demonstrations toward subject-specific design and evaluation of student learning (Tan et al., 2025).

Third, generative AI requires stronger assessment literacy because conventional written work, code, images, and take-home tasks may no longer provide clear evidence of authorship or learning. Responses may include process documentation, oral explanation, iterative drafts, authentic performance, supervised components, and explicit disclosure of AI assistance. The goal is transparent alignment among learning outcomes, permitted assistance, and judgments of student achievement.

Fourth, teachers need professional self-development habits. AI can support brainstorming, resource adaptation, and reflection, but durable capability requires teachers to compare AI suggestions with research evidence, local knowledge, student needs, and peer expertise rather than equating confidence with competence (Shenoy & Saarela, 2026; Tan et al., 2025).

How Teachers Develop These Capabilities

Effective AI professional development should be active, sustained, collaborative, and close to practice. Teachers should work with authentic curricular materials and approved tools, examine successful and failed outputs, test designs on a limited scale, review evidence, and revise practice. Technology can support access and coaching, but facilitation and professional relationships remain important (Hennessy et al., 2022).

Differentiation is equally important because teachers vary by discipline, career stage, access, confidence, and role. Chinese higher education research links digital competence with self-efficacy and facilitating conditions (Wang & Chu, 2023). Professional development therefore needs common foundations plus role- and subject-specific pathways rather than one introductory session for all teachers.

Persistent Tensions and Gaps

Three tensions recur: efficiency can weaken professional reasoning, personalization can conflict with privacy and equity, and technological change can outpace evidence and institutional review. These tensions require judgment about when to use AI, require human review, or reject it. Institutions should therefore evaluate professional reasoning, lesson and assessment quality, learner experience, workload, and safety rather than participation counts alone.

ANALYSIS FROM AN EDUCATIONAL ADMINISTRATION PERSPECTIVE

From Training Provision to Organizational Capability

Teacher professional development becomes an educational administration issue because AI affects curriculum, assessment, personnel development, procurement, data governance, quality assurance, and institutional risk. Leaders should begin with educational purpose, define which uses are appropriate or require review, and align professional learning with those governance decisions.

Responsibility should be distributed but explicit. Senior leaders set direction, resources, and accountability; academic leaders connect AI to curriculum and assessment; development units organize learning; and information, legal, and data-protection staff address security, copyright, and procurement. Teachers retain professional judgment, while students and families provide perspectives on fairness, privacy, and learning.

Teacher Agency, Workload, and Quality Assurance

Institutions often overestimate training while underestimating workplace conditions. Teachers need protected time, approved systems, technical help, coaching, and permission to experiment within clear boundaries. They should also be able to question or decline tools with weak educational value. Chinese evidence linking support, agency, and autonomy to AI-assisted learning design reinforces this responsibility (Wang et al., 2024). Leaders should also examine net workload because AI can create new verification, documentation, and data-protection tasks.

Quality assurance should connect professional learning to capability and practice. Useful indicators include AI-literacy tasks, lesson and assessment artifacts, peer review, classroom

evidence, student feedback, workload, equity, and documented incidents. Attendance certificates demonstrate access, not competence; evaluation should guide decisions about what to sustain, revise, scale, or discontinue.

APPLICATION TO THE CHINESE EDUCATIONAL CONTEXT

National Policy and Institutional Translation

China has strong system-level foundations for AI-era teacher development. The Digital Literacy of Teachers standard integrates awareness, knowledge and skills, application, social responsibility, and professional development (MOE, 2022). The 2024–2035 education plan emphasizes a high-quality teaching workforce (Communist Party of China Central Committee & State Council, 2025); the 2025 digitalization opinion highlights intelligent transformation and educator competence (MOE, 2025); and the 2026 AI + Education Action Plan requires AI-literacy standards, differentiated training, and contextualized assessment (Ministry of Education et al., 2026).

The administrative challenge is to translate national direction without reducing policy to compliance. Top-down reform can constrain teacher agency when local sense-making, school support, and professional discretion are weak. In a study of 353 Chinese high-school English teachers, Wang (2022) found positive reform beliefs but constrained agency shaped by administrative support, colleague collaboration, and tension between high-stakes examinations and holistic education. For AI development, common safety expectations should therefore coexist with teacher-led experimentation, subject adaptation, and evaluation based on demonstrated capability rather than attendance.

Empirical and Institutional Illustrations in China

Published Chinese evidence provides preliminary grounding. MOE reported that AI-related teacher-capacity pilots across 103 cities had reached 2.97 million teachers by 2024 and provided online courses to 188,000 rural teachers (MOE, 2024). These indicators demonstrate scale but not sustained changes in teacher judgment or student learning. More targeted evidence comes from Li et al. (2025), who surveyed 795 teachers from 86 vocational colleges in Hunan Province and found differentiated AI-literacy effects by training, role, discipline, professional title, and support policies, supporting readiness diagnosis rather than uniform training.

Tongji University offers an institutional illustration of practice-based development. From November 2024 to June 2025, nearly 1,100 teachers participated in expert lectures, cross-disciplinary workshops, and course-level innovation tasks; selected cases were added to a university teaching repository (Tongji University Teacher Teaching Development Center, 2025). Although these are institutional self-reports rather than independent impact measures, the case illustrates collaborative learning and artifact production. Kim's (2024) focus groups with 30 Chinese K–12 teachers similarly identified inconsistent curriculum guidance, commercial-tool dominance, limited ethical guidance, and negative attitudes as barriers to teacher–AI collaboration.

Differentiated Priorities across Educational Sectors

In primary and secondary education, development should emphasize age-appropriate use, verification, child and data protection, assessment integrity, and family communication. Principals need parallel preparation because procurement, workload, approved tools, and risk management are leadership decisions; teaching-research groups can translate national guidance into subject-specific lesson inquiry.

Vocational colleges and vocational universities require attention to occupational change. Teachers need to understand how AI is reshaping industry practice while preserving foundational skills, safety, and educational quality. The Hunan evidence makes uniform training difficult to justify (Li et al., 2025). Enterprise collaboration can update technological knowledge, but institutions should retain authority over curriculum, assessment, data, and learner development.

In application-oriented and research universities, development should be discipline-specific and address assessment, research integrity, supervision, and scholarly communication. Because staff readiness and infrastructure vary, expectations for individual improvement must be matched by facilitating conditions (Wang & Chu, 2023). Equity therefore requires national access combined with institutional support responsive to regional, disciplinary, and career-stage differences.

THE ADAPT-AI FRAMEWORK FOR TEACHER PROFESSIONAL DEVELOPMENT

Based on the synthesis above, the ADAPT-AI Framework links educational purpose, differentiated learning, organizational support, ethical safeguards, and continuous improvement through five interconnected elements.

A — Align Educational Purpose and Policy

Institutions should translate national AI mandates into clear local purposes, acceptable-use boundaries, assessment expectations, data safeguards, and human oversight. Alignment should avoid AI-adoption quotas: common safety standards may be mandatory, but pedagogical use should be justified by curriculum and learner needs (UNESCO, 2023; MOE, 2025; Ministry of Education et al., 2026).

D — Diagnose Teacher Readiness and Differentiate Pathways

Professional development should begin with evidence of AI literacy, TPACK, disciplinary needs, and access conditions. Diagnosis should guide tiered pathways for foundational literacy, subject-specific integration, advanced design, mentoring, and leadership, reflecting observed variation across teachers and institutions (Li et al., 2025; Wang & Chu, 2023).

A — Activate Collaborative, Practice-Based Learning

Teachers should develop AI capability through authentic, collaborative work in teaching-research groups, lesson study, mentoring, and curriculum teams. Teacher-led groups can identify instructional problems, test limited AI-supported responses, review risks, examine learner evidence, and revise designs, protecting professional agency while supporting active and sustained learning (Desimone, 2009; Hennessy et al., 2022).

P — Protect Ethics, Data, and Professional Agency

AI-related learning should integrate verification, bias awareness, privacy, accessibility, copyright, transparency, and human oversight. Institutions need reporting channels for unsafe outputs and should protect teachers' right to question or reject tools that do not serve educational purposes, preventing compliance pressure from turning AI use into a symbolic requirement (Celik, 2023; Miao & Cukurova, 2024).

T — Track Evidence and Improve Continuously

Evaluation should replace participation counts with evidence of capability and consequence. Teacher-designed artifacts, critical evaluation of AI outputs, classroom implementation, student feedback, workload, equity, and safety should guide decisions to continue, modify, scale, or discontinue practices. Regular review supports organizational learning as technologies and regulations change.

Administrative Guidelines for Implementation

Institutions can operationalize ADAPT-AI through an annual cycle: establish governance and diagnose readiness; provide differentiated foundations and collaborative design; support small, reversible trials with coaching and risk review; and evaluate evidence before scaling. In systems where training hours and certificates are easily counted, capability evidence should carry greater weight than attendance. High-stakes assessment environments also require evidence that AI preserves cognitive demand and assessment validity. Every teacher needs AI literacy, but not every lesson needs AI; responsible practice includes critical refusal as well as effective use.

LIMITATIONS AND FUTURE VALIDATION

This study provides structured conceptual synthesis and secondary empirical grounding, not prospective validation of ADAPT-AI. Institutional reports may rely on self-report or implementation counts, and the cited Chinese studies are geographically and sectorally bounded. Future research should test the framework through multi-site longitudinal implementation using teacher-performance measures, classroom artifacts, student-learning evidence, workload, equity, and safety indicators.

CONCLUSION

Artificial intelligence is changing the knowledge, judgment, and organizational conditions required for professional teaching. China's standards and large-scale initiatives provide a strong foundation, but access and participation are only starting points. The reviewed evidence shows variation in teacher readiness and highlights the importance of organizational support, collaborative practice, ethical guidance, and locally responsive implementation. Teachers therefore need integrated AI literacy, subject-specific pedagogy, assessment judgment, critical verification, and professional agency.

From an educational administration perspective, teacher development should be treated as an organizational capability rather than a sequence of isolated courses. ADAPT-AI translates this responsibility into five actions: Align, Diagnose, Activate, Protect, and Track. Its purpose is not maximum AI adoption but a teaching profession able to decide when, why, and how AI can improve education—and when human judgment, relationships, and professional responsibility should take precedence.

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