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Teacher Role Reshaping in Digital Transformation of Education: Innovation of Teaching Model Based on Artificial Intelligence

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Abstract. In the context of the global educational digital - transformation trend, artificial intelligence (AI) is significantly redefining the traditional role of teachers. Teachers are shifting from mere knowledge disseminators to learning facilitators, instructional designers, and data - informed decision - makers. This paper explores how AI - enabled technological advancements, such as intelligent tutoring systems, adaptive learning platforms, and smart classroom technologies, contribute to personalized instruction and strengthen dynamic teaching interactions. It emphasizes the imperative for educators to cultivate digital competencies, encompassing technology integration, data analysis, and AI literacy, to effectively utilize intelligent tools and establish interdisciplinary digital - knowledge domains. The study further underscores the critical role of educator adaptability in human-AI collaborative learning environments, facilitating more precise instructional interventions and enhancing student engagement. Finally, it underscores the requirement for coordinated endeavors in technology development, pedagogical innovation, and policy support to foster the in - depth integration of AI in education and attain sustainable, high - quality educational results.

Keywords: Digital transformation of education, AI, Reshaping the role of teachers, Innovative teaching model

1. Introduction

The global education system is undergoing profound transformation and innovation in today's rapidly evolving digital age. The accelerated development and application of technologies like artificial intelligence (AI) and big data have revolutionized traditional knowledge dissemination methods and fundamentally reshaped classroom teaching structures [1]. Artificial intelligence is integrated into all facets of education, encompassing curriculum formulation, project execution, and the architecture of learning evaluation frameworks. Smart recommendation algorithms, adaptive learning platforms, and intelligent evaluation devices are shifting instruction from teacher-centered models to learner-focused approaches [2]. For instance, AI-powered adaptive learning systems provide personalized guidance tailored to students' learning styles and progress, while visualized teaching tools enhance classroom interactions and boost instructional efficiency. These innovations

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not only deliver more targeted learning experiences but also demand higher professional standards from educators in both skill development and self-awareness.

In this context, the conventional role of the educator is confronted with unprecedented challenges. Historically, within traditional pedagogical frameworks, instructors functioned chiefly as conveyors of information, drawing upon their own experiential knowledge to guide instruction. However, the persistence of inflexible curricula and standardized teaching methodologies has proven inadequate in addressing the individualized learning requirements of today' s students. With artificial intelligence integration, educational approaches are evolving toward intelligent and personalized systems. Teachers must transition from being mere knowledge dispensers to becoming learning facilitators. Critical issues facing the education sector now include maintaining teachers' leadership in AI-assisted learning environments, balancing technological innovation with humanistic care, and enhancing educators' digital literacy and technical competencies. These challenges demand urgent solutions in the current educational landscape.

Reshaping teachers' roles has become crucial in digital transformation in education. Educators are no longer limited to one-way knowledge delivery. Nevertheless, it is imperative to prioritize students' learning experiences, integrate advanced intelligent technologies to diversify instructional strategies, and foster intrinsic motivation for autonomous learning among students. Moreover, teachers must evolve into technology integrators proficient in using innovative assessment systems, virtual simulation tools, adaptive platforms, and AI technologies. By analyzing educational big data to evaluate student performance, they can adjust teaching strategies to enhance precision. As artificial intelligence continues to improve, traditional teaching approaches are being replaced by new pedagogical methods, demanding that teachers develop their innovative and practical capabilities further.

This article examines the redefinition of teachers' roles amid the digital transformation of education, analyzes the ways in which artificial intelligence facilitates the diversification of educators' functions, and offers both theoretical frameworks and practical strategies for practitioners. The findings serve as a valuable reference for advancing educational transformation and reform.

2. The evolution of teachers' roles in the context of the digital transformation of education

2.1. Traditional teacher role and digital challenge

In traditional teaching models, educators focus on three core responsibilities: knowledge delivery, classroom management, and student assessment. Teachers act as authoritative knowledge providers who rely on technical expertise and experience to instruct students using standardized curricula and fixed teaching methods. This instructor-driven methodology prioritizes structured dissemination of knowledge via prescriptive frameworks, frequently resulting in constrained learner agency and reduced opportunities for interactive participation. Evaluations predominantly depend on homework submissions and exams [3]. However, with the rapid advancement of educational digitalization, traditional teaching models are encountering multiple challenges [4]:

(1) The transformation of the knowledge transmission mode. Teachers are no longer the only source for students to acquire professional knowledge. How to re-establish the value of teachers in the information age has become an important issue.

(2) The classroom management model is changing. Teachers should strengthen interaction in traditional teaching and monitor digital teaching, such as smart classrooms and online teaching, which puts higher requirements for teachers' teaching management ability.

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(3) Upgrading the teaching evaluation method. To analyze students' learning trajectories and personalized needs, teachers should master reasonable new evaluation methods.

(4) The need to reshape professional competence. Facing the needs of classroom teaching in the information age, some teachers still have technical literacy and innovative teaching design shortcomings.

2.2. Key drivers of teacher role development

In the context of digital transformation in education, the development trend of teachers ' roles is strongly promoted by many different factors. Ongoing technological advancements, the adoption of learner-centered pedagogical frameworks, interdisciplinary convergence, and a heightened focus on individualized learner growth collectively drive the evolution of teachers' professional roles.

(1) With the continuous advancement of technology, AI systems now assist teachers in providing assignment feedback and delivering personalized learning content. Big data analytics enable educators to accurately track students' learning behaviors, allowing for optimized teaching methods. 5G technology enhances real-time interaction in remote learning, enabling borderless educational experiences. These technological innovations transform teachers from mere knowledge dispensers into data-driven integrators and educators who use information to shape their teaching approaches.

(2) A student-centered educational philosophy that drives teachers to improve their teaching methods, guided by students' interests, abilities and needs, and supported by AI and data analytics tools to provide accurate and comprehensive guidance.

(3) The integration of interdisciplinary approaches and the emphasis on personalized learning. The emergence of educational models such as STEM (Science, Technology, Engineering, Mathematics) and MINT (Mathematics, Informatics, Technology, Nature) enables teachers to implement cross-disciplinary instruction. The focus on individualized development requires educators to tailor their teaching methods, utilizing intelligent technologies to design lesson plans that meet students' diverse learning needs.

2.3. AI Empowers the role reshaping of teachers

Artificial intelligence is continually reshaping the educational landscape, prompting educators to evolve from conventional knowledge disseminators into learning facilitators, instructional architects, and data-driven decision makers.

(1) Smart education platforms have real-time delivery capabilities for teaching resources. AI-powered smart tutors can answer students 'questions and resolve doubts, allowing teachers to focus on guiding critical thinking, fostering independent learning skills, and nurturing self-directed learning abilities. For instance, intelligent recommendation systems can suggest personalized learning materials based on students' academic performance and preferences. Teachers help students comprehend and apply this knowledge while steering them toward deeper learning activities.

(2) Teachers are transitioning from classroom managers to instructional designers. They should leverage AI technology to develop more flexible and efficient teaching plans. For instance, new pedagogical models like smart classrooms and blended learning require teachers to create personalized lesson designs based on data analysis. Educators must master the use of AI tools for intelligent system adjustments in content delivery, ensuring instruction better aligns with students' individual needs.

(3) Teachers are transitioning from classroom leaders to instructional designers. Educators should leverage AI technology to develop more flexible and efficient lesson plans. For instance, the "Smart

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Classroom + Blended Learning" model requires teachers to create personalized curriculum designs based on data analysis and statistical insights. Teachers need to master using AI tools to adapt teaching content, thereby better aligning instruction with students' individual needs.

(4) Teachers are evolving from individual educators to data-driven decision-makers. Intelligent assessment systems analyze students 'learning data and generate precise reports, enabling teachers to understand each student's academic progress and develop more targeted teaching plans. For instance, educators can use AI technology to evaluate classroom participation, homework completion rates, and knowledge mastery levels, allowing them to adjust course content accordingly. Data-driven instructional decisions enhance the precision of teaching activities conducted by educators.

3. Innovation of teaching mode based on artificial intelligence

AI into educational frameworks is accelerating, presenting novel opportunities to revolutionize pedagogical approaches. AI assists educators in managing classroom operations and optimizes instructional processes, enhancing educational quality and driving advancements like personalized learning.

3.1. Application scenarios of artificial intelligence in teaching

The application of artificial intelligence in education includes intelligent recommendation, personalized learning path planning, intelligent homework evaluation, learning feedback system, virtual teachers, intelligent teaching assistants and so on.

(1) Intelligent recommendation and personalized learning path planning. AI technology analyzes students 'learning behaviors and interests through big data analysis, providing customized study paths while intelligently recommending courses, exercises, and reading materials to boost learning efficiency. This also reduces teachers' workload in lesson preparation, allowing them to focus more on personalized tutoring and interactive communication with students.

(2) Intelligent assignment evaluation and learning feedback system. Traditional homework assessment often relies on manual grading, whereas teachers can utilize AI technologies to achieve smart assignment evaluation. The intelligent assignment grading system employs natural language understanding technology for processing, enabling rapid quality assessments of student assignments while providing relevant feedback suggestions.

(3) Virtual teachers and AI teaching assistants have become essential tools in modern online education. Virtual teachers deliver intelligent instruction through integrated speech recognition systems and natural language processing technologies. At the same time, AI teaching assistants provide round-the-clock, real-time support to address students' common questions, significantly enhancing educational outcomes.

3.2. Innovation of teaching mode driven by AI technology

Driven by advancements in AI, conventional pedagogical models are evolving toward greater intelligence, personalization, and interactivity. The following are several typical AI application scenarios that promote independent innovation of teaching mode:

(1) AI-powered Smart Classroom. The AI-driven learning platform intelligently recommends personalized resources including educational videos, practice materials, and case studies based on students' academic history, interests, and foundational knowledge. It provides real-time progress

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tracking, enabling teachers to monitor student development accurately. This system enhances instructional efficiency while ensuring the achievement of desired educational outcomes.

(2) Adaptive Learning Systems. Teachers can utilize adaptive learning systems to monitor students 'progress in real-time, automatically adjusting teaching difficulty levels to accommodate individual differences. These systems provide additional practice materials and educational resources, tailoring learning schedules to address students' weak areas. Dynamic adjustments effectively enhance learning efficiency while meeting diverse educational needs.

(3) Smart Classrooms and Blended Learning. A smart classroom integrates technologies like artificial intelligence, big data, and IoT into educational environments. It provides real-time monitoring of student behaviors such as focus and engagement, while delivering timely feedback to teachers to adjust teaching methods. Blended learning combines the strengths of online learning and offline interaction. AI supports this model through intelligent course monitoring, automated group discussions, and AI-driven interactive topics.

3.3. Optimization of teachers' teaching decisions supported by AI

Artificial intelligence can improve teaching methods, help teachers optimise teaching decisions, and promote intelligent reform and innovation of teaching evaluation.

(1) Educators can enhance teaching precision by leveraging AI analytics to analyze learning data. Teachers can use AI to analyse students' learning trajectories, classroom performance, and assignment feedback, thereby accurately identifying their academic needs. For example, through AI-based learning analytics, teachers can quickly assess the progress of specific classes or individual students, address problems, and alter the content of the course accordingly. Additionally, AI provides predictive insights—such as anticipating potential challenges students might face in particular subject areas—which helps educators prepare lessons in advance.

(2) Advancing intelligent reforms in teaching evaluation. Traditional assessment methods primarily rely on exam scores, whereas digital-enabled innovative evaluation systems provide multi-dimensional feedback. AI analyzes students' classroom interactions, learning experiences, and online test results to generate detailed learning profiles. These data assess academic performance and guide teachers in refining their instructional approaches.

4. Paths and strategies for the remodeling of teachers' roles

Artificial intelligence has profoundly influenced teachers' teaching management methods and career development paths in the context of digital transformation in education. Teachers must have stronger innovation, analysis, and research abilities to adapt to this change.

4.1. Teacher ability improvement and adaptive development

Transformation of teachers 'roles requires enhancing technical proficiency, adaptability, AI literacy, and data analysis capabilities [4]. With the widespread application of AI technologies, while teachers should skillfully utilize smart assessment systems, personalized learning recommendation platforms, and simulation tools in intelligent classrooms, they must also possess fundamental AI literacy and understand AI principles. Additionally, educators need programming skills and data analysis abilities in order to utilize natural language processing (NLP) technology to automate the grading of assignments, this will allow for precise analysis and the fulfillment of students' personalized educational needs. By utilizing AI course analytics systems, teachers can monitor teaching

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interactions, optimize instructional content and pacing dynamically, and deliver personalized education.

4.2. Effective integration of educational resources and teaching tools

The transformation of teaching roles requires educators to master AI platforms and intelligent classroom tools, thereby continuously improving educational quality [5]. Teachers should choose appropriate AI-based systems that are supported by smart tutoring platforms, such as grading tools that are AI-based, and virtual reality systems that enhance teaching effectiveness. Furthermore, AI can be integrated into curriculum design by analyzing teaching data, enabling teachers to optimize instructional approaches, dynamically manage learning progress, and refine pedagogical methods according to students' knowledge acquisition patterns.

4.3. Develop an automated teacher interdisciplinary teaching knowledge agent

In the digital intelligence era, knowledge dissemination is growing exponentially faster, while the frequency of knowledge updates and iterations continues to accelerate, making uncertainty in information increasingly prominent. This uncertainty poses a significant challenge to traditional knowledge systems, overwhelming people when confronted with vast amounts of constantly evolving information. To address this, establishing a deterministic cognitive framework and mastering methods for self-constructed systematic knowledge has become crucial for learning in an ever-changing knowledge landscape [6]. The development of automated interdisciplinary teaching knowledge agents aims to meet this urgent need by empowering students with precise learning strategies, enabling effective knowledge management, and supporting teachers' roles as knowledge facilitators in cross-disciplinary instruction.

4.4. Build a virtual and real integrated teacher interdisciplinary teaching knowledge space

In the wave of educational transformation during the digital-intelligent era, an interdisciplinary teaching knowledge space integrating virtual and real worlds has emerged. This innovative model organically combines cross-disciplinary teaching resources from both realms, creating an open, interactive, and intelligent learning environment. Human consciousness no longer remains confined to the dynamic world of lived experience; instead, people's sense of existence must constantly shift between virtual and real worlds. This necessitates that human education confronts continuous upgrading and iterative evolution of virtual environments [7]. Virtual simulation, augmented reality, and digital twin can seamlessly integrate physical and digital spaces. Simulating real-world scenarios and enhancing interactivity create a multidimensional learning field that mirrors reality while transcending it [8]. These knowledge environments offer learners a wealth of educational resources and a variety of pedagogical approaches, promoting interdisciplinary integration and nurturing both creative cognition and applied competencies. In this progressively multifaceted learning ecosystem, virtual personas and immersive contexts will dissolve temporal boundaries, seamlessly connecting the historical, current, and future dimensions of education. Time itself becomes a significant dimension when integrated with spatial dimensions [9]. The digital infrastructure of virtual-real symbiosis injects new momentum into pedagogical reform. The restructured spatiotemporal scenarios expand the boundaries of educational principles, while the heterogeneous network of heterogeneous elements creates a new ecosystem for pedagogical iteration. Together, these developments outline multiple reflections of pedagogical evolution in our

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changing times [10]. Ultimately, this cross-disciplinary teaching knowledge space will empower educators to redefine their roles as collaborative partners.

5. Conclusion

In the context of educational digital transformation, artificial intelligence technology is profoundly reshaping teachers 'roles and teaching models. Educators are evolving from traditional knowledge transmitters to learning designers and data leaders. In AI-powered educational environments, personalized recommendations, adaptive systems, and intelligent assessments enable tailored instruction, enhancing student learning outcomes and teaching precision. Concurrently, innovative instructional methodologies such as intelligent classrooms and AI-driven teaching are further enhancing interactive learning environments, thereby advancing educational outcomes. Nevertheless, the comprehensive integration of artificial intelligence within the educational sector remains impeded by several challenges, notably the imperative to elevate educators' AI competency, the formulation of robust ethical frameworks, and the ongoing development of pertinent policies and regulatory standards.

The core direction for future educational exploration lies in fully leveraging AI's advantages to seamlessly integrate technology and pedagogy, empowering teachers to provide more efficient personalized support. Only through coordinated efforts in technological innovation, educational philosophy reform, and policy management can the goals of intelligent education and high-quality education be fully realized.

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