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Research on the Boundaries of University Teachers' Responsibilities and the Substitution Effect in the Context of Artificial Intelligence

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***A*bstract:** At present, artificial intelligence (AI) technologies are deeply integrated into all scenarios of teaching, research, and student development in higher education. Intelligent teaching systems, research data processing tools, and AI platforms for student management are gradually becoming important aids to educational activities. This transformation disrupts the traditional framework of university teachers' responsibilities: fundamental tasks in knowledge transmission are diverted, repetitive work in research is replaced, and some managerial functions in student development are covered. Consequently, the boundaries of teachers' responsibilities are increasingly blurred, and the substitution effect has led to role anxiety and confusion about professional positioning. Clarifying the specific impact of AI on teachers' responsibilities, identifying the replaceable and irreplaceable domains, and exploring effective paths for fulfilling responsibilities are key to resolving teachers' role-identity crisis, promoting the implementation of "human–AI collaborative" education models, and ensuring the high-quality digital development of higher education.

Keywords: Artificial intelligence; University teachers; Responsibility boundaries

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1. Preliminary impact of artificial intelligence on teachers' responsibilities in higher education

1.1. Structural adjustment of responsibilities

Artificial intelligence (AI) technologies are gradually releasing university teachers from repetitive and standardized work. Intelligent grading tools have replaced manual grading of basic exercises, and intelligent academic literature retrieval systems have simplified the process and difficulty of literature screening. As a result, teachers' workload in basic knowledge explanation during teaching and data organization during research assistance has significantly declined. Meanwhile, the proportion of innovative and guiding tasks—such as cultivating critical thinking, providing interdisciplinary knowledge integration guidance, and designing innovative research topics—has increased markedly. This has shifted the overall content of teachers'

responsibilities toward high value-added educational tasks, forming a new structure characterized by the "diversion of basic work and concentration on core work."

1.2. Collaborative transformation of work modes

The traditional one-way, teacher-dominated work model in educational settings is being gradually dismantled. Collaborative work between teachers and AI tools has become the new trend. In teaching, teachers rely on intelligent teaching platforms to collect and analyze student learning data and adjust their pace and strategies dynamically. In research, teachers employ data modeling and analysis tools to process experimental data, shortening processing cycles and improving research efficiency. In student development, teachers use intelligent student management systems that integrate academic and behavioral data to pinpoint students' personalized needs in their growth process. This "human–AI collaborative" work mode no longer regards teachers as the sole core, but rather as the lead actors in a new role-fulfillment model where AI provides critical assistance [1].

1.3. Systemic impact on responsibility cognition

Some university teachers experience role anxiety due to AI's substitution of traditional responsibilities, fearing that their long-standing roles as "knowledge transmitters" or "research assistants" may be weakened by technology, leading to confusion about their core value in educational activities. At the same time, given the rapid iteration of AI technologies, most teachers lack a clear understanding of the boundaries and limitations of AI applications. In practice, this easily leads to two extreme mindsets: either over-reliance on AI-generated results, weakening their own judgment, or rejection of new working modes due to unfamiliarity with technology. Both mentalities negatively impact teachers' initiative and direction in fulfilling their responsibilities.

2. Substitution effects of artificial intelligence on university teachers' responsibilities

2.1. Characteristics and scope of substitutable responsibilities

The responsibilities of university teachers that can be replaced by AI generally share three core features: repetitiveness, data-dependence, and rule-based clarity. These manifest differently in teaching, research, and student development contexts. Teaching: Delivery of basic knowledge points, standardized exam design, and grading are easily substituted. Intelligent teaching systems can systematically convey textbook content, while automated grading tools can score objective questions based on fixed standards. Research: Tasks such as basic data cleaning, preliminary statistical analysis of experimental data, and formatting academic outputs can be taken over by AI. Data-processing tools can integrate data according to preset rules, and formatting systems can automatically standardize references and layouts. Student development: Routine tasks like attendance tracking, academic warning notifications, and basic psychological assessments are suitable for technological intervention. Intelligent management systems can record attendance in real time, while basic assessment tools can generate initial evaluations of students' psychological status based on fixed dimensions [2].

2.2. Irreplaceable responsibilities and core values

The irreplaceable core of university teachers' responsibilities lies in their humanistic, innovative, and complex roles, which embody the essential educational values that AI cannot surpass. Teaching: Teachers are responsible for cultivating critical thinking, guiding interdisciplinary knowledge integration, and tailoring learning methods to individual needs. By encouraging dialectical analysis and helping students construct deeper knowledge

systems, they foster independent learning abilities. Research: Teachers lead in the innovative design of research topics, the construction of theoretical frameworks, and ethical oversight. They also evaluate the academic and social value of research outcomes, ensuring compliance with scholarly norms and societal needs. Student development: Teachers provide value guidance, emotional resonance, psychological support, and character development. Through deep teacher–student interactions, they convey humanistic care and offer personalized support for students' growth.

2.3. Differentiated substitution effects

The substitution effects of AI on teachers' responsibilities vary depending on disciplinary attributes and educational goals. By discipline: In science and engineering, responsibilities like data processing and simulation are more easily replaced, while in humanities, responsibilities involving critical thinking and value interpretation—requiring subjective judgment and emotional engagement—are less substitutable. By educational goals: In practice-oriented programs focused on skills training, teachers' basic skill-delivery roles are more easily replaced. In innovation-oriented programs, teachers' roles in guiding creativity and inspiring thought are more irreplaceable. This leads to a differentiated pattern of "technological substitution for standardized tasks, and teacher focus on core educational values."

3. Practical challenges in fulfilling teachers' responsibilities under AI disruption

3.1. Misalignment between teachers' AI literacy and responsibility needs

Most university teachers have not yet developed systematic competence in AI applications, making it difficult to meet the demands of restructured responsibilities. Operationally, teachers' use of AI teaching platforms and research tools often remains at a basic level, limiting optimization of teaching strategies and research efficiency.

Cognitively, many teachers lack a deep understanding of AI principles and application boundaries, hindering their ability to judge the validity of AI outputs. This passivity in error correction or result validation reduces their leadership role in "human–AI collaboration," affecting the quality and effectiveness of their work.

3.2. Disconnection between role identity and responsibility reconstruction

Traditional notions of the "omnipotent teacher" conflict with the new demands of responsibility reconstruction in the AI era. Some teachers resist the shift from being "knowledge monopolists" and "comprehensive managers" to becoming "AI collaborators" and "core guides." They may lack confidence in cross-disciplinary teaching design or student innovation project supervision, leading to capability anxiety. Meanwhile, universities have not yet built comprehensive support systems for teacher role transformation: neither targeted psychological counseling to alleviate anxiety, nor systematic training platforms to help teachers adapt. This exacerbates professional confusion and reduces motivation to embrace new responsibilities [3].

3.3. Misalignment between evaluation systems and new role positioning

Current university teacher evaluation systems still prioritize traditional quantitative indicators such as teaching hours, research publications, and the number of managed students. These fail to reflect teachers' new roles in the AI era. There is a lack of scientific evaluation standards for performance in areas like AI-assisted teaching effectiveness, student innovation development, and quality of humanistic education. As a result, teachers lack motivation to focus on core responsibilities. Many continue to devote effort to traditional tasks that AI can replace, creating a mismatch of "new responsibilities ignored, old tasks overemphasized," which hampers

responsibility reconstruction.

4. Response pathways for fulfilling teachers' responsibilities amid AI challenges

4.1. Teacher-level: Building a dual enhancement system of "AI literacy + professional competence"

Teachers must proactively adapt to role transformation by advancing both AI literacy and professional expertise.

AI literacy: Teachers should systematically learn advanced applications of AI teaching platforms and research tools, going beyond basic operations to understand underlying principles and application boundaries. By reading AI-in-education literature and joining inter-university teaching exchanges, teachers can improve their ability to evaluate and correct AI outputs, avoiding both dependency and rejection. They should also actively explore scenarios where AI tools integrate with daily teaching and research, using intelligent analysis to optimize pedagogy and clarify research directions, while strengthening their leadership role in "human–AI collaboration."

Professional competence: Teachers should focus on irreplaceable responsibilities by engaging in cross-disciplinary teaching and research, integrating knowledge, and designing innovative learning experiences. By tracking academic frontiers and guiding student innovation projects, they can enhance their ability to design creative research topics and assess academic/social value. In student development, learning psychological education theories and strengthening communication with students can deepen humanistic care and personalized guidance.

4.2. University-level: Improving teacher development and evaluation mechanisms

Universities should establish comprehensive support systems to ensure teachers can effectively fulfill their redefined responsibilities.

Practical platforms: Build integrated AI–education platforms that unify teaching, research, and student management tools, with centralized resources, manuals, and technical support to lower entry barriers for teachers. Regular AI training workshops and expert-led seminars should encourage best-practice sharing.

Evaluation systems: Adjust traditional evaluation weights by reducing emphasis on replaceable metrics (teaching hours, publication counts) and increasing emphasis on core-value indicators (AI collaboration outcomes, student innovation growth, humanistic education quality). A combined process–outcome evaluation system, including classroom observation, student feedback, and achievement analysis, should better capture teaching quality.

Support centers: Establish teacher transformation support centers staffed with psychological counselors and career advisors. These centers can address role anxiety with personalized counseling and help teachers align new responsibilities with personal strengths, fostering new role identity.

4.3. Policy level: Strengthening the guiding norms for the integration of AI and higher education

The government needs to have a policy framework at a macro level to provide direction and resource support for the transformation of teacher responsibilities. First, it should issue standard norms for the application of AI education in and universities, clarify the scope and boundaries of AI application in teaching, scientific research, and education scenarios, define the types of work that AI can participate in and the core responsibilities teachers that cannot be replaced, avoid excessive technological intervention in the core links of education, and ensure

the dominant position of teachers in educational activities; at the same time, formulate quality assessment for AI educational tools, standardize the process of technology research and development and application, and ensure the safety and applicability of tools. Second, it should set up a special fund for transformation of teacher responsibilities, which is specially used to support colleges and universities to carry out teacher AI literacy training, research and development of "human-machine collaboration" teaching and research models, and the promotion of excellent teachers' innovative cases of fulfilling their duties, encourage colleges and universities to develop targeted teacher capacity improvement projects according to their own discipline characteristics and educational, and reduce the pressure of transformation costs for colleges and universities and teachers. Third, it should promote the establishment of cooperative alliances among colleges and universities, AI enterprises, and research institutions, and build an "industry-teaching-research-use" integrated platform to enable teachers to participate in the research and testing process of AI educational tools and obtain cutting-edge practical scenarios of technology application.

5. Conclusion

This study shows that AI does not completely replace university teachers, but rather transforms responsibility boundaries from being "fixed and clear" to "dynamic and restructured." AI substitutes repetitive, standardized tasks, while teachers remain irreplaceable in value cultivation, innovation guidance, and humanistic care. Currently, challenges such as insufficient AI literacy, weak role adaptation, and misaligned evaluation systems hinder teachers' ability to fulfill new responsibilities. Addressing these challenges requires combined efforts in enhancing teacher competencies, improving university mechanisms, and guiding policy norms. Only by clarifying teachers' core positioning in "human–AI collaboration" can the value of AI be fully realized, promoting role transformation and ensuring high-quality digital development of higher education and talent cultivation.

Disclosure statement

The author declares no conflict of interest.

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