

AI-Empowered Pathways for Cultivating Taxation Professionals: A Systems Approach

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Abstract: This paper explores the transformative potential of artificial intelligence (AI) in reshaping taxation education through a "technology-ethics-institution" trinity framework. It identifies critical challenges in current tax education, including curriculum obsolescence, risks of technological rationality, institutional fragmentation, and faculty capacity gaps. To address these, three-dimensional strategies are proposed: (1) **Curriculum Reconstruction** introduces modular "AI+" courses such as Tax Big Data Analytics and AI Tax Planning, emphasizing Python programming and SQL database skills; (2) **Pedagogical Innovation** leverages deep reinforcement learning for intelligent case analysis, transforming instructors into cognitive coaches while balancing technology reliance and critical thinking; (3) **Institutional Optimization** establishes national AI education standards, a smart tax education certification center, and a hybrid assessment model combining process-oriented evaluation with AI-based competency diagnostics. The study highlights the need to balance technical proficiency with humanistic values through a three-dimensional competency matrix integrating AI literacy, tax expertise, and innovative thinking. Future research directions include long-term ethical impacts of AI education, metaverse applications in tax training, and cross-national comparisons with initiatives like the EU's Digital Tax Talent Program.

Keywords: Artificial Intelligence; Taxation Education; Smart Taxation; Talent Cultivation Pathways.

1. Introduction

In the digital economy era, AI is reshaping industries at an exponential pace. China's digital economy reached 90 trillion RMB in 2025, accounting for 47.3% of GDP [1]. Tax administration, a cornerstone of national governance, has undergone profound AI-driven transformations: the Golden Tax IV System now enables fully digitalized tax collection, while smart tax service halls cover 83% of cities and counties nationwide. This technological shift demands a new competency framework for taxation professionals, rendering traditional skills focused on accounting and compliance obsolete. However, educational systems lag significantly: only 27% of Chinese universities offering taxation programs include AI-related modules, with interdisciplinary faculty accounting for less than 15% [2]. This mismatch results in graduates facing "competency vacuums" in smart tax scenarios, unable to interpret algorithmic logic or apply AI tools to complex tax challenges.

Existing literature has explored AI's integration into education, constructing theoretical frameworks and practical models. Yang et al. (2025) developed a competency model for smart tax professionals using Delphi methodology, emphasizing data literacy, algorithmic understanding, and interdisciplinary integration [3]. Luo et al. (2025) proposed three evolutionary stages for AI adoption in tax education: technical adaptation, process reengineering, and cultural reconstruction [4]. Huang et al. (2025) revealed the dual effects of intelligent teaching systems, showing a 41% improvement in data analysis skills but a 23% decline in critical thinking due to over-reliance on automation [5]. These studies highlight the need to balance technological efficiency with cognitive development.

However, gaps remain in addressing systemic issues such as educational equity, data privacy, and standardized cross-

regional frameworks. This paper transcends technical perspectives by analyzing AI's impact on tax education through philosophical, institutional, and ethical lenses. By constructing a trinity framework, it proposes systemic solutions covering resource allocation mechanisms, algorithmic transparency regulations, and cross-sector governance platforms.

2. AI-Driven Pathways for Taxation Education

2.1. Curriculum System Reconstruction

In order to meet the compound demand for tax professionals in the era of artificial intelligence, the "artificial intelligence +" course module is added, and the course setting should follow the progressive training path of "basic theory - technology application - scene practice", and build a hierarchical and progressive curriculum system. The system takes consolidating students' technical foundation as the starting point, gradually guides students to master the application ability of artificial intelligence technology in the field of taxation, and finally improves students' comprehensive application level through practical scene training. The course "Tax Big Data Analysis" can be set up, which systematically teaches data collection, cleaning, storage and visualization technology, focusing on cultivating students' core skills in Python programming and SQL database operation. The course covers data preprocessing techniques, the application of data visualization tools (such as Tableau and PowerBI), and the basic structure and analysis methods of tax data. Through the teaching method combining theory and practice, students are equipped with the basic ability to deal with tax data. The course "AI Tax Planning" is offered, in which GPT-4 and other large language models are used to simulate enterprise tax decision-making scenarios,

and students are required to design intelligent tax planning schemes combined with business logic. By simulating the corporate tax environment, the course guides students to use artificial intelligence tools to optimize the tax planning process and improve the scientific and efficient tax decision-making. Finally, the teaching mode of "project system + micro certification" is adopted, and students need to complete comprehensive projects such as tax risk identification and cross-border tax planning. Generate personalized learning reports through AI ability assessment platforms (such as Huawei Cloud ModelArts), track students' learning progress and ability improvement in real time, and ensure the accuracy and pertinence of teaching effects.

2.2. Teaching Model Innovation

The intelligent teaching system uses deep reinforcement learning technology to develop a tax case analysis engine, which can automatically label the legal points, data characteristics and planning space in the cases. With the support of intelligent teaching system, the role of teachers has changed from traditional knowledge imparted to cognitive coach. The teacher's focus shifts to developing students' critical thinking and creative decision-making skills. For example, in the teaching of tax planning, teachers no longer only explain theoretical knowledge, but guide students to analyze AI-generated tax planning solutions and explore their compliance boundaries and commercial viability. This approach not only improves students' analytical skills, but also enhances their ability to solve practical problems. However, care should also be taken to prevent students from becoming overly dependent on the system, so as not to lead to decision-making inertia. Teachers need to properly guide the teaching process to ensure that students maintain the ability to think and judge independently while utilizing technology.

3. Analysis of the Dilemma of Taxation Education Enabled by Artificial Intelligence

3.1. Technical Rational Risk

The complexity and lack of explainability of the tax AI model make it easy for students to form blind superstitions to the algorithm in the learning process. By breaking down complex tax issues into standardized modules, intelligent systems improve learning efficiency, but may weaken students' ability to think systematically. In the learning process, students tend to fall into a one-sided understanding of a single module, while ignoring the logical correlation and systematic thinking of the overall problem [6]. This fragmented learning style can result in students having difficulty dealing with complex tax scenarios in their practical work. In the teaching process, there is a risk of leakage of the tax data of the enterprises involved. This bias may affect the fairness of tax education and even cause ethical disputes in actual tax administration. Therefore, in the process of algorithm design and application, ethical review must be strengthened to ensure the fairness and non-discrimination of algorithms.

3.2. Institutional Synergy Barrier

The national "New Generation of Artificial Intelligence Development Plan" clearly proposes to strengthen the construction of "new engineering", but the intelligent

education reform of tax science majors lacks specific implementation rules. The disconnection between the macro guidance of the policy and the actual operation makes universities face many difficulties in promoting intelligent tax education. In addition, the existing degree awarding standards do not specify the index of artificial intelligence ability, resulting in a disconnect between the training program and the certification system, affecting the systematization and standardization of intelligent tax education. It is difficult for the unified examination method to comprehensively evaluate the comprehensive ability in the intelligent tax scenario. For example, the closed-book exam of the tax big data analysis course can only cover about 30% of the training objectives, which cannot fully reflect the actual ability and comprehensive quality of students. In addition, there are differences between the enterprise evaluation standards and the school assessment system in the school-enterprise cooperation, and the lack of a unified framework for ability certification, which makes the ability assessment of students in the job market lack of consistency.

3.3. Teacher Ability Bottleneck

According to the survey, 83% of teachers specializing in taxation lack systematic training in artificial intelligence technology, and there is an obvious knowledge blind spot when explaining the principles of algorithms. The aging of this knowledge structure directly affects the teaching quality and the learning effect of students. In addition, the use of intelligent teaching system by some teachers stays at the surface function and fails to give full play to its educational value, resulting in limited teaching innovation. Intelligent education reform requires teachers to invest a lot of time and energy, but the existing performance appraisal mechanism of colleges and universities is insufficient to support such innovation. Teachers face difficulties in resource integration in interdisciplinary cooperation, which affects the further promotion of teaching reform. For example, in the cooperation with computer science, statistics and other disciplines, tax teachers often lack technical support and resource coordination ability, which makes it difficult to effectively carry out interdisciplinary teaching projects.

4. The Optimization Strategy of Taxation Education in the Intelligent age

4.1. Construct "Humanistic Intelligence" Education Ecology

In the intelligent era, tax education should not only impart technical knowledge, but also pay attention to humanistic care and ethics education, and cultivate students' technical ethics consciousness and social responsibility. In the intelligent tax education, a comprehensive meta-ability training system should be built to enhance students' comprehensive literacy and adaptability. Establish a three-dimensional ability matrix of "AI literacy - tax expertise - innovative thinking" (see Table 1), and cultivate students' systematic thinking and critical thinking through Project-Based Learning (PBL). Specific measures include: offering courses such as "Foundation of Artificial Intelligence" and "Introduction to Machine Learning" to cultivate students' basic understanding and application ability of artificial intelligence technology; Courses such as "Tax Regulations and Policies" and

"International Taxation" are adopted to consolidate students' tax professional knowledge. Innovative thinking training modules, such as "Tax innovation Case Analysis" and "Intelligent tax solution design", are integrated into the curriculum to encourage students to apply innovative thinking in practical projects. The "failure education" mechanism is introduced in the practical training course of intelligent tax handling. By deliberately setting up system failures or

simulating unexpected situations in complex tax scenarios, students develop their emergency handling and problem solving skills. For example, in a simulated tax filing process, setting up a network failure or data loss scenario requires students to solve the problem and complete the task within a specified time. This teaching method not only improves students' practical ability, but also cultivates their ability to cope calmly in the face of emergencies.

Table 1. 3D capability matrix

Dimension,	Specific Content	Training Objectives
AI literacy	Artificial intelligence fundamentals, introduction to machine learning, data science and analytics	Master the basic principles and application methods of artificial intelligence technology, with data processing and analysis capabilities
Tax expertise	Tax laws and policies, international taxation, tax risk management	Familiar with domestic and foreign tax policies and regulations, with tax planning and risk management capabilities
Innovative thinking	Tax innovation case analysis, smart tax solution design, interdisciplinary project practice	Develop innovative thinking and systems thinking, and be able to propose innovative solutions in complex tax scenarios

4.2. Improve the Institutional Guarantee Mechanism

In order to promote the standardization and standardization of taxation professional education, the standard of artificial Intelligence Education for taxation professional should be formulated. The standards need to specify quantitative indicators for curriculum, teacher availability and training conditions to ensure that educational content keeps pace with technological development. For example, the curriculum should cover core modules such as the foundation of artificial intelligence, tax big data analysis, and intelligent tax planning, the teaching staff should require teachers to have relevant technical certification, and the training conditions should include intelligent tax laboratories and virtual simulation training platforms. Set up a national "Smart Tax Education Certification Center" to dynamically evaluate and certify the training programs of colleges and universities. The certification center should develop a detailed evaluation index system, covering the curriculum system, teachers, training conditions and other aspects, and regularly issue evaluation reports to ensure the continuous improvement of the quality of higher education. Implement the "process evaluation + intelligent assessment" model, use natural language processing technology to analyze students' case analysis reports, and automatically generate ability diagnosis reports. Process evaluation focuses on students' performance in the learning process, including class participation, project practice, etc. The intelligent assessment uses automated tools to assess students' comprehensive abilities, such as case analysis ability for the tax Big Data analysis course. This evaluation model not only improves the objectivity and accuracy of the evaluation, but also provides personalized learning suggestions for students to promote the overall improvement of their ability.

4.3. Establish Teacher Development Support System

In the taxation education in the intelligent era, the improvement of teachers' ability is the key link to ensure the quality of education. Through systematic training and support mechanism, improve teachers' technical literacy and teaching innovation ability. Build a teacher training base with enterprises, and carry out AI technology workshops and case studies. Through school-enterprise cooperation, we will

provide practical opportunities and technical support for teachers to help them master the application of artificial intelligence technology in tax education. Promote knowledge sharing and teaching innovation among teachers of different disciplines through regular academic exchanges and joint research projects. In order to stimulate the enthusiasm of teachers to participate in the reform of intelligent tax education, it is necessary to innovate the incentive mechanism and provide multi-dimensional support and recognition. In the evaluation of professional titles, consideration should be added to the achievements of intelligent education reform, and the innovative practice, curriculum development and technology application of teachers in intelligent tax education should be clearly included in the evaluation indicators. Through the establishment of a special teaching reform fund, we will provide financial support for teachers and encourage them to carry out cutting-edge research and practical exploration of smart tax education. Regularly carry out the "Smart teaching Star" selection activities, and commend and reward teachers who have achieved remarkable results in smart tax education. Through the establishment of awards and honors, teachers can enhance their professional achievement and sense of belonging, and further promote the comprehensive development of smart tax education. For example, the selection activities can include teaching innovation case display, intelligent tax course design competition, etc., to comprehensively display teachers' innovation achievements in intelligent education.

5. Conclusion and Prospects

By constructing a three-dimensional path of "curriculum reconstruction - model innovation - system guarantee", this study systematically proposed a comprehensive solution of AI-enabled taxation education. This framework not only covers the comprehensive optimization of educational content, teaching methods and institutional environment, but also provides a solid theoretical foundation and practical guide for the sustainable development of taxation education in the intelligent era. Through the reconstruction of the curriculum system, it is proposed to add "artificial intelligence +" course module and interdisciplinary integration mechanism, aiming at cultivating students' comprehensive ability and innovative thinking. The innovation of teaching mode can improve the teaching effect

and students' practical ability through the application of intelligent teaching system and the practical teaching of virtual and real integration. The improvement of the system guarantee mechanism starts from the innovation of policy tools and the reconstruction of the evaluation system to ensure the sustainability and standardization of the education reform. Future research should focus on: (1) the long-term impact of intelligent education on tax ethics cognition; (2) Development of application scenarios of meta-universe technology in tax practice training; (3) Cross-country comparative research, drawing on the advanced experience of the EU's "Digital Tax Talent Program". With the continuous evolution of technology, tax education needs to maintain dynamic adjustment, seek a balance between technical rationality and humanistic value, and cultivate compound tax talents to meet

the needs of the intelligent era.

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