Practical Path of Artificial Intelligence Education in Primary and Secondary Schools in Chinese Counties

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Abstract. Against the backdrop of the global digital divide in education, promoting the balanced implementation of artificial intelligence (AI) education in basic education has become a crucial issue for promoting educational equity worldwide. This paper takes primary and secondary schools in Chinese counties as its research subject. Through survey research, it systematically reviews the phased achievements made in AI education, analyzes the common challenges faced in resource supply, teacher training, and teaching implementation, and proposes targeted solutions. The study finds that while AI courses have been initially popularized in Chinese county-level primary and secondary schools, problems such as uneven resource allocation, insufficient teacher resources, and the tendency for teaching to become merely a formality still exist. These are common dilemmas faced by resource-poor regions globally. Based on local Chinese practices, transferable experiences can be extracted, providing a reference for rural and remote areas in other developing countries, and contributing a Chinese solution to the equitable development of AI education in basic education worldwide.

Keywords: Artificial intelligence education; county-level primary and secondary schools; educational equity; digital divide; localization practices

1 Introduction

Against the backdrop of digital transformation in education, artificial intelligence education has become central to the systematic reform of basic education. Fostering students' artificial intelligence literacy, digital literacy, and innovative capacity has emerged as a shared consensus and strategic priority for nations worldwide to proactively address the new round of scientific and technological revolution as well as industrial transformation. Nevertheless, the global development of artificial intelligence education remains characterized by significant disparities across regions, urban and rural areas, and schools, with the educational digital divide becoming increasingly prominent. More than half of Chinese primary and secondary students attend county-level schools, and the quality of basic education in county regions directly determines the overall advancement of educational modernization. The exploration and practice of artificial intelligence education in these areas constitute a crucial strategy

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for narrowing the urban-rural educational gap in China, while offering a replicable and transferable model for resource-constrained regions across the globe. It thus contributes Chinese experience and wisdom to the pursuit of more equitable and high-quality basic education[1].

2 Major Progress and Achievements

Driven by national education informatization policies and the popularization of digital technologies, artificial intelligence education in primary and secondary schools in Chinese counties has moved from localized pilot projects to initial widespread adoption, achieving phased results in the following aspects:

2.1 The Policy System is Gradually Improving

The state has elevated AI education to a strategic level. In 2024, the Ministry of Education issued the Notice on Promoting the Popularization of Artificial Intelligence Education in Primary and Secondary Schools, which clarifies the overall requirements for strengthening AI education in primary and secondary schools. In 2025, the Ministry of Education released the White Paper on Artificial Intelligence Education, which systematically outlines how AI technologies can reshape the entire chain of basic education, vocational education, and higher education. In the same year, it also issued the General Education Guide for Artificial Intelligence in Primary and Secondary Schools (2025 Edition) and the Guide for the Use of Generative Artificial Intelligence among Primary and Secondary School Students (2025 Edition). These two guides serve as important measures to scientifically and standardly advance AI education across all school stages and further implement the cultivation of innovative talents equipped with artificial intelligence literacy [2] .

2.2 Establishment of Pilot Demonstration and Resource Sharing Platform

The pilot demonstrations have yielded significant results. In 2024, the first batch of 184 AI education bases for primary and secondary schools were established, and in 2025, the number increased to 325. Nationwide, 509 base schools have been established, fostering a healthy innovation ecosystem in the eastern, central, and western regions. The National Smart Education Platform for Primary and Secondary Schools offers six free learning modules, covering multiple versions of textbooks and courses, and a vast amount of learning resources. With over 100 million registered users and 40.54 billion page views, it has effectively achieved cross-regional sharing of AI education resources, addressing the shortage of high-quality resources in counties.

2.3 Curriculum Integration and Initial Infrastructure Improvement

The curriculum system has been initially integrated, and primary and secondary schools in the county have generally incorporated the basic content of artificial intelligence into the daily teaching of information technology [3] . Some counties have developed school-based courses in combination with the characteristics of rural industries, so that AI teaching is more in line with students' cognition and life experience. The hardware infrastructure is basically complete, and county schools have built standardized information teaching venues. Most central schools are equipped with basic intelligent teaching facilities , which can meet the daily basic practical teaching needs [4] .This has laid a solid foundation for the regular development of artificial intelligence education in county-level areas.

3 Facing Difficulties

Many challenges in practice due to geographical limitations and resource constraints.

3.1 Deficiencies in Curriculum Development and Infrastructure

Many county schools are still in the school-based and fragmented exploration stage of artificial intelligence courses, lacking a unified curriculum standard, resulting in varying levels of course content and difficulty in systematic connection [5] . Due to local financial constraints, many county schools have outdated and insufficient equipment . The maintenance of artificial intelligence equipment and the continuous guarantee of network and power supply require long-term investment, and some schools face the dilemma of "being able to afford to buy, but not able to afford to use, and not able to afford to maintain".

3.2 Shortcomings in the Professional Competence and Structure of Teachers

There is a serious lack of full-time teachers with artificial intelligence backgrounds in the county. Teaching work is mostly done by information technology teachers or teachers transferred from other disciplines [6] .Teachers generally suffer from insufficient professional knowledge and inadequate teaching competence. Existing teacher training is mostly in the form of short-term online training, which is not effective enough. At the same time, the county has difficulty attracting and retaining graduates of artificial intelligence-related majors, and there is a risk of a gap in the teaching staff due to the inability to attract and retain them.

3.3 The Problem of Formalistic Teaching Implementation Is Prominent

Some schools regard AI education as a "image project" and do not include it in their daily teaching plans. The teaching lacks awareness of interdisciplinary integration and

does not combine it with local rural scenarios, making it difficult to stimulate students' interest [7] . There is a lack of scientific evaluation system, with neither student AI literacy evaluation standards nor teacher teaching effectiveness assessment mechanisms, making it difficult to realize the educational value.This largely restricts the normalized implementation and connotative development of artificial intelligence education in rural areas.

4 Solutions

4.1 Innovate the Resource Supply and Allocation Model

And promote the "county-level overall planning and mobile sharing" mechanism. Integrate smart hardware in the county to establish a shared resource library and provide targeted support to weak schools. Set up a special fund for artificial intelligence education to focus on ensuring the renewal of consumables and the maintenance of equipment [8] . Actively develop and introduce localized teaching cases and open source resources that fit the production and life scenarios in rural areas to improve resource adaptability. Strengthen inter-school collaboration and regional linkage to promote the balanced allocation and efficient utilization of high-quality educational resources.

4.2 Construct a Hierarchical and Categorized Teacher Development System

Conduct special training for part-time teachers with a focus on practical skills; select backbone teachers to participate in systematic training programs in cooperation with universities, and cultivate county-level "seed teachers". Establish a normalized teaching and research mechanism of "urban-rural pairing and inter-school linkage", and achieve experience sharing through collective lesson preparation, observation and discussion of lessons [9] . Improve the incentive mechanism, incorporate artificial intelligence teaching ability into the teacher evaluation system, and set up special subsidies to attract professional talents.

4.3 Deepen Teaching Reform and Evaluation Guidance

Incorporate artificial intelligence education into school curriculum plans and annual assessments to ensure sufficient class time and regular teaching [10] . Promote project-based learning of "artificial intelligence + local scenarios + subject integration", accelerate the construction of a multi-dimensional evaluation system covering knowledge understanding, skills application and ethical cognition, and scientifically evaluate learning effectiveness by combining process recording and results display.Guiding teachers to optimize instructional implementation based on rural student conditions, so as to effectively enhance the relevance and effectiveness of artificial intelligence education.

5 Conclusion

Extensive practice at the county level in China has fully demonstrated that even regions with relatively weak educational resources are fully capable of delivering high-quality artificial intelligence education, and such initiatives are not necessarily constrained by resource limitations. The key lies in proceeding from local realities, accurately addressing the core needs of regional educational development, and innovating teaching models, implementation pathways and supporting mechanisms in light of local conditions, so as to develop a distinctive development path that suits local student and school contexts.Practice shows that scientific top-level design and localized implementation are the key to improving the quality and efficiency of artificial intelligence education.These experiences provide an important reference for tackling the unbalanced development of education between urban and rural areas and among regions. From a global perspective, such practices not only offer valuable and replicable experience for developing countries and resource-constrained regions to promote the implementation of artificial intelligence education, but also contribute a feasible, inclusive and sustainable Chinese solution to narrowing the global educational digital divide and advancing the equitable development of artificial intelligence education in basic education. This fully embodies China's wisdom and commitment to promoting educational equity in the intelligent era.

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