

Current Situation and Optimization Suggestions of Smart Education Public Services in the Context of New-Quality Productive Forces

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Abstract: As the times demand, new quality productive forces have emerged, and educational informatization is in full swing. Smart education, which has emerged from the digital era, has become a new engine for the development of education in China. Optimizing the public service of smart education can not only comprehensively enhance the quality of education but also conform to the requirements of new quality productive forces and promote the virtuous cycle of the three elements: science and technology, education, and talents. Despite certain achievements, such services still face issues including homogenized supply, formalistic technology application, uneven resource allocation, and imperfect guarantee systems. Based on new-quality productive forces' core connotation and requirements (high technology, high efficiency, high quality, inclusiveness), this paper uses literature research to sort out their current status and problems, and proposes targeted optimization paths from supply model, technology integration, resource allocation, and guarantee system, providing practical references for promoting high-quality development of smart education public services and adapting educational digitalization to new-quality productive forces.

Keywords: New-quality productive forces; Smart education public services; Optimization paths; Educational digitalization

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1. Research background

China has recently set a clear policy agenda to speed up the cultivation of new-quality productive forces. Platforms and tools associated with smart education, most notably the National Smart Education Platform for Primary and Secondary Schools, have been rolled out and widely adopted in different regions. The range of available services, which covers online learning materials and digital instructional aids, has kept growing. In practical terms, these services have offered essential support for fostering greater equity in education and for lifting overall teaching and learning quality on the ground. That said, this rapid growth has not been without its weaknesses. Current smart education public services still suffer from notable gaps, and because of these gaps, the system cannot yet fully satisfy the demands generated by the advancement of new-quality productive forces. At the same time, the very rise of new-quality productive forces brings with it fresh opportunities and sharper direction for improving and upgrading smart education public services. To push forward the coordinated progress of new-quality productive forces and smart education public services, and to address the visible

shortcomings in today's service system, has become an unavoidable necessity if the education field is to complete its digital transformation. It is precisely this practical need that motivated me to carry out the present study ^[1].

2. Theoretical basis

They emphasize the core role of factors such as technology, data and knowledge in production, covering emerging technologies such as artificial intelligence, big data, the Internet of Things and blockchain, as well as the concepts of green economy and sustainable development. Their roles are mainly reflected in the following aspects: Improving production efficiency: New technologies and intelligent means can significantly increase production efficiency, reduce costs, and enhance the competitiveness of enterprises. Promoting industrial upgrading: They facilitate the transformation of traditional industries towards high-end and intelligent development, foster emerging industries, and optimize the economic structure. Enhancing international competitiveness: Countries that master new quality productive forces gain advantages in the global economy, which helps raise their international status. Improving residents' quality of life: Intelligent and digital technologies improve the level of public services, enhance residents' quality of life, and drive social progress. Speaking of smart education public services, they use digital technology to offer online educational resources, teaching aids, and resource sharing to the public, teachers, and students alike ^[2].

3. Current situation and problems of smart education public services from the perspective of new-quality productive forces

From the essence of educational reform, the deep integration of digital intelligence technology is not merely an update of tools, but a holistic impact on the existing educational value orientation, institutional arrangements, technological forms, and the status of educational subjects. The new challenges faced by digital-intelligent education are mainly concentrated in four dimensions: Value dimension: manifested as the tension between technical rationality (such as efficiency supremacy and data centrism) and educational values such as the people-oriented educational philosophy and educational equity; Institutional dimension: manifested as the mismatch between the existing educational management systems and evaluation mechanisms and the platform-based, intelligent governance models; Technological dimension: manifested as the reshaping of the operational mode of education by algorithmic rules, data governance, platform power, etc.; Subject dimension: manifested as new opportunities and risks faced by the roles of teachers and students, power structures, and the development of subjectivity ^[3,4].

3.1. The global digital divide still exists and is even prominent in some countries and regions

Let's be real, there's still a huge digital divide across the world, and in some places, it's only getting worse. The reason? Well, different groups of people, from different economic backgrounds and age groups, just don't have the same access to digital resources. And honestly, this gap also shows how uneven educational resources are, whether you're talking about different countries or different parts of the same country.

Take the latest OECD survey data, for example. Young people between 16 and 24 are 16% more likely to use the Internet than older folks aged 55 to 74. Similarly, people with more education are 15% more likely to go online than those with less ^[4]. Then there's the ITU's report, *Measuring Digital Development: Facts and Figures 2024*, which came out in May 2025. It says 83% of urban people around the world can get online, but less than half (only 48%) of rural residents can. Globally, 51% of people can use 5G now, but here's the kicker: 84% of people in high-income countries have access to it, while in low-income countries, that number drops to a mere 4%. That's a massive gap, if you ask me.

What's more, even within the same country, the amount of money and effort put into digital education reforms varies a lot from region to region, and that just makes the divide worse. Italy, for instance, wants to set up 3,000 digital hubs all over the country, but only 1200 of those are planned for the south, where digital resources are already super scarce. In

China, Changning District in Shanghai has built digital infrastructure at both the district and school levels, so everyone there can share those resources, it helps with education management, teaching, and even teacher training. But if you compare that to less developed western provinces like Yunnan, Xizang, and Gansu? The difference in investment is night and day.

3.2. The capacity for educational data governance still needs to be improved

As digital tech keeps making its way into education, more and more every day, honestly, educational information systems around the world are running into all sorts of trouble when it comes to protecting data security. The educational data we're dealing with now? It's gotten way bigger in scale, way more varied, and a whole lot more complex than it used to be. And the ways we use that data? They're not just one or two things anymore, super diverse. All of this has thrown a wrench in the traditional ways we govern data, if we're being real. Think about all the sensitive stuff that comes out of schools and universities: personal IDs, contact info, grades, even logs of how students behave. Most of that's stored in the cloud these days, and when it's being sent over networks? It's at risk of getting stolen or misused. That's not just a small problem, it could end up violating people's privacy, plain and simple. The bad stuff that happens when educational data gets stolen or misused? It's not just about losing money, though that's definitely a hit. It can also lead to all kinds of messy legal fights. But maybe even worse? It can mess with people's mental health and emotional well-being, something that doesn't always get talked about enough. Right now, only about 16% of countries have actually passed laws that specifically protect data privacy in education. Another 29% have put out related policies, but those are mostly focused in Europe and North America. A lot of countries, honestly, are struggling to find that balance between protecting people's privacy, doing the right thing digitally, and keeping some kind of value order when they're making their data security systems and laws.

And when it comes to the tech side of protection? Some countries are still using pretty outdated stuff, like old data encryption algorithms and identity verification methods. Those just can't hold up against the new kinds of network viruses popping up all the time. All of this goes to show that, around the world, we still have a long way to go to get our educational data governance capabilities and systems right, there's so much room to make them better and more polished.

4. Optimization paths of smart education public services from the perspective of new-quality productive forces

4.1. Strengthening policy support and improving top-level design

Although China has launched its digital strategy, there remains room for improvement in its systematicity, precision, and resource coordination. The Chinese government should strengthen policy guidance and fiscal support, fully incorporate digital education into national new-type infrastructure construction plans, and increase targeted policy support and sustained financial investment for remote and rural areas. In 2024, the Office of Educational Technology of the U.S. Department of Education released the Action Proposal to Narrow the Digital Access, Design, and Use Divides: 2024 National Educational Technology Plan, which provides specific solutions, practical cases, and operational guidelines for three types of digital divides, the digital design divide, the digital use divide, and the digital access divide. It also emphasizes the necessity of building a multi-stakeholder participation system to enhance the fairness and accessibility of educational technology applications^[3,4]. China should accelerate the formulation and implementation of a more operational national action plan covering similar dimensions to ensure universal service delivery that reaches the "last mile".

4.2. Deepening technology integration

Since new-quality productive forces are all about high tech and efficiency, digital tech has become fully integrated into smart education, like, not just surface-level stuff. Let me be real: this isn't just buying some computers or installing a few software programs in classrooms. It's about upgrading the entire educational environment, top to bottom. First off, the basics need a lot of work. In those less developed areas and counties, the digital infrastructure is usually pretty outdated

and needs a big upgrade. The platforms would run smoother, the whole system needs to be more reliable, so teachers and students can actually use it without constant glitches or crashes. And it's not just about better hardware and platforms, either. Teachers need real training, not just a quick demo on how to turn on a device. They need to boost their overall digital skills, and learn how to weave technology into their daily teaching naturally, like it's second nature. Data is another biggie here. With big data and AI, we can figure out where students are struggling, what resources they actually respond to, and what they need most. Instead of giving every student the exact same materials, one size fits all, where we can use the system to recommend specific content that matches their learning pace. That way, technology isn't just some fancy add-on in the classroom; it's a real tool that actually makes learning more efficient.

4.3. Rationalizing the distribution of educational resources

Although China has massive digital resources, the sharing mechanism for high-quality resources remains imperfect. The Chinese government should strengthen the digital resource allocation and dissemination mechanisms of public service platforms such as schools, libraries, and communities, and promote Open Educational Resources (OER). In regions with limited technical conditions, a hybrid resource supply strategy can be adopted in accordance with local conditions to narrow the achievement and opportunity gaps between teachers and students in underfunded schools and reduce their pressure to access digital resources^[3]. While continuing to increase financial support, it is recommended that China introduce a "flexible expansion mechanism for digital infrastructure", which is uniformly constructed by provincial education administrative departments. Application Programming Interfaces (APIs) should be opened to county-level education bureaus, township central schools, and qualified local educational technology enterprises, and localized digital teaching micro-applications should be collected, selected, and incubated through scenario-based crowdsourcing.

4.4. Improving the guarantee system

China's existing education evaluation system has not yet normalized or systematized the assessment of teachers' and students' digital literacy. The Ministry of Education of China should draw on advanced international evaluation systems, such as the Empowering Learners for the Age of AI: An AI Literacy Framework for Primary and Secondary Education (Review Draft) co-developed by the OECD and the European Commission in May 2025, to strive to build a scientific, systematic, dynamic and localized evaluation system for teachers' and students' digital literacy^[4]. Financially, relying only on government budgets just doesn't work long-term. A better way is to mix up where the money comes from. Public investment is still important to lay the groundwork, but we also need to actively encourage private businesses and social capital to join in. That kind of participation can bring in the energy and resources we really need for building up infrastructure. But here's the thing: technology is only as good as the people using it. The human side of this whole transformation is what really matters. We've got to focus on training interdisciplinary talents, people who know their way around both teaching methods and digital innovation. Finally, we can't do without a dynamic monitoring system. And this isn't just about top-down checks from higher-ups. What we really need are feedback loops, ways for the people actually using these systems, which includes teachers, students, parents, to have their voices heard. If we can quickly fix the issues they bring up and tweak platform performance based on how it's actually being used, we can make sure these services stay practical, standardized, and truly helpful.

4.5. Strengthening data security and ethical standards

It is essential to adopt high-intensity encryption technology and rigorous access management mechanisms to prevent the leakage of sensitive data in the process of network transmission and local storage. Apart from data safety protection, the normative application of artificial intelligence technology also deserves sufficient attention. Relevant institutions should guarantee the fairness of algorithm operation and avoid implicit differential treatment toward specific student groups. Meanwhile, it is necessary to formulate clear ethical norms for the application of artificial intelligence in teaching scenarios, so as to guard against potential problems such as students' excessive reliance on intelligent tools and personal

privacy exposure risks.

5. Conclusion

Against the backdrop of the steady advancement of new-quality productive forces and the continuous progress of educational digitalization, the improvement and adjustment of smart education public services have become an essential task to be fulfilled in the process of educational development. The inherent technological advantages and development concepts of new-quality productive forces can effectively drive the continuous improvement and upgrading of smart education public services, provide solid technical conditions for industrial development, and clarify the practical direction for its construction.

In the future construction of smart education public services, efforts should not be merely limited to basic work such as building online platforms and simply uploading teaching resources. It is necessary to proceed from actual educational demands, take into account the learning needs of different regions and groups, and integrate the practical requirements of equity and inclusiveness, targeted services, technological application and institutional guarantee into daily construction work. It is vital to abandon rigid traditional service concepts and outdated operation modes, and gradually narrow the educational information gap between urban and rural areas, as well as between developed and underdeveloped regions.

Digital technology really needs to be deeply integrated into daily classroom teaching and resource sharing. I mean, we can use technical methods to boost the overall quality of teaching, let those high-quality educational resources reach more areas, and actually protect educational equity in a practical way. Also, we should keep improving all aspects of smart education public services, so that they can keep up with the overall development of new-quality productive forces. That way, we can steadily push forward the implementation of educational digitalization, and lay a solid educational foundation for the high-quality development of domestic education and the upgrading of the social industrial structure.

To be honest, China's digital transformation in education is no easy task, it's complex, systematic, and large-scale. The current coordination mechanisms across departments and fields are obviously not enough; we definitely need to find ways to improve and refine them.

On top of fully learning from international frameworks for digital literacy, the Ministry of Education should work out clear development goals, phased implementation plans, and diverse evaluation systems. And these should be tailored to the characteristics of China's education system, like the "baton" role of the national college entrance examination, you know? Only in this way can we systematically improve the digital literacy of both teachers and students.

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References

- [1] Shen F, Zhang Q, Wen Z, et al., 2026, Educational Digital Transformation: Origin, Content and Approaches. *Education and Equipment Research*, 2026(2): 76–80.

- [2] Liu F, Liu Y, 2026, New Dimensions of Educational Theory Reform in the Digital Intelligence Era. *China Educational Technology*, 2026(1): 54–59 + 68.
- [3] Li X, Yin X, 2026, Promoting the Development of New-Quality Higher Education through the Cultivation of New-Quality Talents. *The Science Education Article Collects*, 2026(3): 11–14.
- [4] Ding S, Zheng H, Wang Z, 2025, Digital Intelligence and the Equalization of Basic Public Educational Services: Effects and Mechanisms. *Education & Economy*, 41(6): 53–65 + 85.

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