

The Current Situation, Challenges, and Improvement Pathways of Digital Teaching Capabilities of Middle School Teachers in the New Era

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[**Abstract**] Against the backdrop of the in-depth promotion of digital education strategies, middle school education, as a crucial link in the national education system, is undergoing profound transformations driven by digitalization. The digital teaching capabilities of middle school teachers have become one of the core indicators for measuring teachers' professional competence, directly influencing the effectiveness of digital education implementation, the improvement of classroom teaching quality, and the cultivation of students' core competencies. This paper combines the current reality of middle school education, defines the core connotation and constituent dimensions of middle school teachers' digital teaching capabilities, analyzes the current status and prominent difficulties of these capabilities, explores the key factors affecting their improvement, and ultimately proposes targeted improvement paths. It provides theoretical reference and practical guidance for promoting the enhancement of middle school teachers' digital literacy and facilitating the deep integration of digital education with middle school education.

[**Key words**] middle school teachers; digital teaching ability; digital education; teaching integration; professional development

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1 Introduction

With the rapid iteration of new-generation information technologies such as artificial intelligence, big data, and the Internet of Things, digital education has become the core direction of global education reform and an important content of China's Education Modernization 2035 Plan. Middle school is a crucial period for students to transition from basic learning to advanced learning, and it is also an important stage for cultivating students' information literacy, innovative thinking, and lifelong learning ability. As the core implementers of educational teaching practice, middle school teachers' digital teaching ability directly determines the depth and breadth of the integration of information technology and subject teaching, affecting the quality of the implementation of digital transformation in education.

2 Core connotation and constituent dimensions of middle school teachers' digital teaching ability

The digital teaching capability of middle school teachers is not merely a single technical operational skill, but rather a comprehensive capability system. It refers to the integrated ability of teachers to utilize digital technology, resources, and methods to conduct teaching design, implementation, evaluation, and reflection, aiming to achieve teaching optimization and comprehensive student development, in the context of the digital era, while taking into account the educational teaching patterns of middle schools and the physical and psychological development

characteristics of students. Aligned with industry standards and the practical teaching situations in middle schools, its core constituent dimensions primarily encompass the following four aspects.

2.1 Digital teaching philosophy and awareness

Digital teaching philosophy and awareness serve as the prerequisite and foundation for middle school teachers' digital teaching capabilities, determining their initiative and enthusiasm in conducting digital teaching. Its core connotation includes: teachers' level of cognition towards educational digitalization, with a clear understanding of the significant importance of digital technology to middle school teaching reform and student development; possessing the awareness to actively utilize digital technology to optimize teaching processes and innovate teaching models, abandoning traditional singular teaching thinking; establishing a student – centered digital teaching philosophy, focusing on utilizing digital technology to meet students' personalized learning needs, and cultivating students' information literacy and innovation ability; and possessing a sense of responsibility in digital teaching, being capable of guiding students to correctly use digital tools, standardize online behavior, and establish cybersecurity awareness.

2.2 Digital teaching technology and operational skills

Digital teaching technology and operational skills serve as the core support for middle school teachers to conduct digital teaching, and are crucial for transforming digital concepts into teaching practices. They primarily encompass: proficiency in operating basic digital tools, such as multimedia courseware creation software, video editing software, and online teaching platforms; ability to use digital teaching equipment, including the operation and maintenance of hardware devices like interactive whiteboards, projectors, tablet computers, and smart blackboards; capability to acquire and process digital resources, enabling access to high-quality digital resources from channels such as the national smart education platform for primary and middle schools and subject-specific websites, and the ability to filter, edit, integrate, and innovate based on teaching needs; and furthermore, basic cybersecurity knowledge and problem – solving skills are also required, enabling teachers to address technical malfunctions that arise during the digital teaching process and ensure the smooth conduct of teaching activities.

2.3 Digital teaching design and implementation ability

Digital teaching design and implementation ability are the core manifestation of middle school teachers' digital teaching capabilities and the key to achieving the deep integration of digital technology and subject teaching. It mainly includes: the ability to design scientific and reasonable digital teaching plans based on the teaching objectives, teaching content, and student characteristics of various subjects in middle school, and to clarify the application scenarios and roles of digital technology in teaching; the ability to use digital tools and resources to optimize teaching processes, such as breaking through key and difficult teaching points through interactive courseware, utilizing online quiz tools to carry out classroom interaction, and enriching teaching scenarios with virtual simulation technology; the ability to construct digital teaching models, such as flipped classrooms, blended learning, project-based learning, etc. , breaking the spatial and temporal constraints of traditional classrooms and stimulating students' interest and initiative in learning; and the ability to manage digital classrooms, using digital tools to monitor students' learning status, adjust teaching strategies in a timely manner, and ensure classroom teaching order and effectiveness.

2.4 Digital teaching evaluation and reflection ability

Digital teaching evaluation and reflection ability constitute a crucial component of middle school teachers' digital teaching capabilities and serve as a significant means for teachers to continuously enhance their digital teaching proficiency. This primarily encompasses: the ability to utilize digital evaluation tools to conduct comprehensive and objective assessments of students' learning processes and outcomes, integrating both process-based and summative evaluations; the capacity to gather student feedback through digital tools, analyze students'

learning characteristics and existing issues, and provide a basis for personalized teaching; the capability to reflect on one's own digital teaching practices, summarize experiences and shortcomings in digital teaching, and continuously optimize teaching plans and strategies; and the willingness to actively participate in digital teaching discussions and exchanges, drawing on the digital teaching experiences of exemplary teachers to elevate one's own digital teaching capabilities.

3 Current situation and prominent challenges of middle school teachers' digital teaching ability in the new era

In recent years, with the advancement of the digital education strategy and the implementation of initiatives to enhance the digital literacy of primary and middle school teachers, the digital teaching capabilities of middle school teachers in China have seen significant improvement. However, from an overall perspective, issues such as regional imbalance and uneven capabilities persist in the digital teaching abilities of middle school teachers. Based on research and practical observations, the prominent challenges are primarily manifested in the following aspects.

3.1 Lagging digital teaching philosophy

Despite the deep promotion of digital education, some middle school teachers still have a lagging digital teaching philosophy and a biased understanding of digital teaching. On the one hand, some middle-aged and elderly teachers are deeply influenced by traditional teaching concepts, accustomed to traditional teaching modes, and believe that digital technology is only an auxiliary tool that can be dispensed with. They lack the awareness of actively using digital technology to optimize teaching, and even have resistance towards digital teaching, believing that it will increase the teaching burden. On the other hand, some teachers have an overly one-sided understanding of digital teaching, equating it simply with multimedia teaching, thinking that using PPT and playing videos in the classroom is digital teaching. They ignore the innovation of digital technology in teaching modes and methods, failing to achieve deep integration of digital technology with subject teaching. In addition, some teachers lack a sense of responsibility in digital teaching, providing insufficient guidance to students on the use of digital tools, and failing to effectively cultivate students' awareness of network security and information literacy.

3.2 Insufficient digital technology operation ability

Digital technology operation ability is the foundation for conducting digital teaching, but currently, some middle school teachers still have significant deficiencies in this area, making it difficult for them to adapt to the needs of digital teaching. Firstly, basic operation abilities are uneven. Some middle-aged and elderly teachers are not proficient in basic skills such as multimedia courseware production and online teaching platform operation, and they may even be unable to independently complete simple preparations for digital teaching. While some young teachers have mastered basic digital tool operations, they lack the ability to use subject-specific digital tools. Secondly, the ability to process and innovate digital resources is weak. Most teachers are able to access high-quality digital resources, but they lack the ability to filter, edit, and integrate resources. This makes it difficult for them to organically combine digital resources with subject teaching content. Instead, they simply copy and use existing resources, unable to achieve personalized adaptation of resources. Thirdly, the ability to respond to technical failures is insufficient. During digital teaching, when encountering equipment failures, network issues, or other situations, they are unable to quickly and effectively resolve them, affecting the smooth progress of teaching activities.

3.3 Insufficient depth of integration in digital teaching

The core of digital teaching lies in achieving deep integration between digital technology and subject teaching. However, the current digital teaching practices of most middle school teachers are still in the shallow integration stage, resulting in poor teaching effectiveness. Firstly, teaching design lacks innovation. Most teachers' digital

teaching designs simply convert traditional teaching content into digital forms, failing to combine subject characteristics and student needs to design innovative digital teaching plans, thus failing to fully leverage the advantages of digital technology. Secondly, teaching modes are relatively monotonous. Most teachers still primarily rely on the “teacher lecture + multimedia presentation” mode, lacking exploration and application of new digital teaching modes such as flipped classrooms and blended learning. This fails to effectively stimulate students’ learning initiative and participation. Thirdly, there is insufficient adaptability between digital technology and teaching content. Some teachers blindly pursue digital forms, neglecting the core of teaching content, leading to a disconnect between digital technology and teaching content. This not only fails to enhance teaching effectiveness but also distracts students’ attention.

3.4 Weak ability in digital teaching evaluation and reflection

Digital teaching evaluation and reflection are crucial avenues for teachers to enhance their digital teaching capabilities. However, currently, the digital teaching evaluation and reflection skills of some middle school teachers remain relatively weak. Firstly, the evaluation methods are relatively monotonous. Most teachers still primarily rely on summative evaluation, lacking attention to the learning process of students. They fail to utilize digital evaluation tools to conduct formative evaluation, which prevents a comprehensive and objective reflection of students’ learning situations. Secondly, the ability to analyze and apply evaluation data is insufficient. Although some teachers are capable of collecting students’ learning data, they lack the ability to analyze and interpret the data. This inability to identify students’ learning issues and teaching shortcomings from the data hinders the implementation of personalized teaching. Thirdly, teaching reflection is not deep enough. Most teachers’ digital teaching reflection merely involves a simple summary of technology usage in the teaching process. They fail to conduct in-depth reflection on teaching concepts, teaching design, teaching implementation, and other aspects. This lack of exploration and summarization of digital teaching patterns leads to slow improvement in digital teaching capabilities.

4 Analysis of influencing factors for enhancing digital teaching capabilities of middle school teachers in the new era

The enhancement of digital teaching capabilities among middle school teachers is influenced by various factors. Considering the current reality of digital education development, these factors can be primarily categorized into subjective and objective aspects. These two aspects interact and influence each other, jointly constraining the improvement of teachers’ digital teaching capabilities.

4.1 Subjective factors

Subjective factors are the inherent core elements that influence the enhancement of middle school teachers’ digital teaching capabilities, primarily encompassing teachers’ learning motivation, learning ability, and professional ethics. Firstly, learning motivation. Some teachers lack the initiative to enhance their digital teaching capabilities, content with the current situation, believing that their teaching abilities can meet teaching needs, and failing to recognize the significant importance of digital teaching capabilities for their professional development and student growth, thus lacking the motivation to actively learn digital technologies and teaching methods. Secondly, learning ability. There are differences in learning abilities among teachers. Middle-aged and elderly teachers have relatively weaker learning abilities, accepting digital technologies and teaching methods at a slower pace, making it difficult for them to quickly grasp digital teaching skills; while some young teachers, despite having strong learning abilities, lack systematic learning methods and practical experience, resulting in slow improvement in their digital teaching capabilities. Thirdly, professional ethics. Some teachers’ professional ethics need improvement, lacking innovation consciousness and an exploratory spirit. In digital teaching practice, they are accustomed to copying and applying others’ teaching experiences, lacking exploration and summarization of digital teaching principles, making

it difficult for them to develop their own unique digital teaching characteristics.

4.2 Objective factors

Objective factors are external safeguard factors that affect the improvement of digital teaching capabilities of middle school teachers, mainly including digital infrastructure, teaching resources, training systems, and school management. Firstly, the digital infrastructure is imperfect. Some middle schools, especially rural ones, have outdated digital teaching equipment, insufficient quantity, and poor network coverage, which cannot meet the needs of teachers to carry out digital teaching. At the same time, some schools lack specialized digital teaching technical support personnel, and teachers encounter technical problems in the process of digital teaching that cannot be solved in a timely manner. Secondly, digital teaching resources are insufficient and poorly adapted. Although resource platforms such as the National Smart Education Platform for Primary and Middle Schools provide a large amount of digital resources, some resources are poorly adapted to the teaching objectives and content of various subjects in middle schools, lacking pertinence and practicality. At the same time, some schools lack high-quality school-based digital resources, which cannot meet teachers' personalized teaching needs. Thirdly, the digital teaching training system is imperfect. Current digital teaching training is mainly focused on centralized training, and the training content lacks pertinence, failing to provide personalized training based on the needs of teachers of different disciplines and teaching experience. The training methods are relatively single, mainly focusing on theoretical explanations, while lacking practical operations and case discussions, resulting in poor training effectiveness. Fourthly, the school management mechanism is not sound. Some schools lack a comprehensive digital teaching incentive mechanism, which lacks effective guidance for teachers' enthusiasm and initiative in carrying out digital teaching. At the same time, some schools' evaluation mechanism for digital teaching is imperfect, failing to incorporate digital teaching capabilities into the core content of teachers' performance evaluation and professional title assessment, resulting in insufficient motivation for teachers to improve their digital teaching capabilities.

5 Paths to enhancing the digital teaching capabilities of middle school teachers in the new era

Improving the digital teaching capabilities of middle school teachers is a systematic project that requires combining teachers' subjective needs with objective conditions. It involves starting from multiple aspects such as concept guidance, ability cultivation, resource guarantee, and management optimization, to build a comprehensive and multi-level improvement system, promoting the comprehensive and balanced development of middle school teachers' digital teaching capabilities.

5.1 Establish a scientific concept of digital teaching

Concept is the precursor of action. To enhance the digital teaching capabilities of middle school teachers, we must first strengthen the guidance of concepts and help teachers establish a scientific concept of digital teaching. Firstly, we should strengthen publicity and guidance, popularizing the policy requirements and significant importance of educational digitalization to teachers through special lectures, teaching seminars, experience exchanges, and other forms, so that teachers can recognize that digital teaching is an inevitable trend of middle school education reform in the new era and an important way to improve teaching quality and cultivate students' core competencies, thereby enhancing their initiative and consciousness in enhancing their digital teaching capabilities. Secondly, we should promote the renewal of concepts, guiding teachers to abandon traditional teaching concepts and establish a student-centered digital teaching concept, focusing on using digital technology to meet students' personalized learning needs, cultivate students' information literacy and innovation ability. At the same time, we should guide teachers to correctly understand the relationship between digital technology and subject

teaching, clarifying that digital technology is a tool for optimizing teaching processes and innovating teaching modes, rather than a simple display. Thirdly, we should strengthen the cultivation of responsibility awareness, guiding teachers to recognize their important role in cultivating students' information literacy, focusing on guiding students to correctly use digital tools, standardize network behavior, establish network security awareness, and achieve the organic combination of teaching and educating.

5.2 Enhance teachers' core competence in digital teaching

A comprehensive training system serves as a crucial guarantee for enhancing the digital teaching capabilities of middle school teachers. It is imperative to tailor the training system to teachers' specific needs, constructing a targeted and practical digital teaching training system. Firstly, optimize the training content by designing layered and categorized training content based on the teaching characteristics of various subjects in middle schools and the actual needs of teachers. For middle-aged and elderly teachers, focus on training in basic digital tool operations and digital equipment usage to help them grasp fundamental digital teaching skills. For young teachers, emphasize training in digital teaching design, teaching integration, and resource innovation to enhance their digital teaching innovation capabilities. For teachers of different disciplines, prioritize training in discipline-specific digital tools and digital teaching models to improve the relevance and practicality of the training. Secondly, innovate training methods by shifting away from the traditional centralized theoretical training model and adopting a diversified training approach of "theoretical explanation + practical operation + case discussion + online learning", allowing teachers to master digital teaching skills through practice. Simultaneously, establish a "master teacher guidance" mechanism, inviting teachers with outstanding digital teaching capabilities to conduct demonstration classes and special lectures, share digital teaching experiences, and leverage the exemplary and guiding role of master teachers. Thirdly, strengthen training support by increasing financial investment in digital teaching training, improving training facilities and resources, and assembling a professional team of training instructors. Additionally, establish a training assessment mechanism that links training effectiveness to teachers' performance evaluations and professional title assessments, ensuring that training is implemented effectively.

5.3 Promote the deep integration of digitalization and subject teaching

The improvement of digital teaching capabilities cannot be achieved without practical training. It is necessary to guide teachers to actively engage in digital teaching practice and promote the deep integration of digital technology and subject teaching. Firstly, build a practical platform. Schools can provide teachers with a platform for digital teaching practice through activities such as digital teaching demonstration classes, teaching competitions, and research projects, allowing teachers to accumulate experience and enhance their abilities through practice. Secondly, guide teachers to innovate their teaching designs. Encourage teachers to design innovative digital teaching plans based on the characteristics of the subject and the needs of students, explore new digital teaching modes such as flipped classrooms, blended learning, and project-based learning, break the spatial and temporal constraints of traditional classrooms, and stimulate students' interest and initiative in learning. Thirdly, strengthen teaching discussion and exchange. Establish a mechanism for teachers to discuss digital teaching, regularly organize teachers to carry out activities such as digital teaching experience exchange and case analysis, allowing teachers to learn from each other and jointly improve their digital teaching capabilities. At the same time, encourage teachers to participate in off-campus digital teaching exchange activities to learn advanced digital teaching experiences and methods.

6 Conclusion

In the context of the new era, enhancing the digital teaching capabilities of middle school teachers requires strengthening conceptual guidance and establishing a scientific digital teaching philosophy; improving the training system to enhance teachers' core digital teaching abilities; optimizing resource support to provide strong backing for

digital teaching; innovating teaching practices to promote the deep integration of digitalization and subject teaching; optimizing management mechanisms to stimulate teachers' motivation to enhance their digital teaching skills; and narrowing development gaps to promote balanced development of teachers' digital teaching capabilities. Only through joint efforts from multiple aspects can we promote the comprehensive improvement of middle school teachers' digital teaching capabilities, achieve the deep integration of digital technology and middle school teaching, and cultivate high-quality talents who are adaptable to the digital era.

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