

# Exploration and Innovation in Medical Education Reform by Integrating Online and Offline Models

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**Abstract:** The fifth collective study session of the Political Bureau of the CPC Central Committee emphasized the importance of educational digitalization as a significant breakthrough for the country, enabling the opening of new opportunities for educational development and the creation of new advantages in this field. This article closely examines the challenges confronting traditional medical teaching against the backdrop of national policy. It delves into the integration of ideological and political education, the establishment of a medical teaching model combining both online and offline modes, the innovation of teaching resources and methods, and the enhancement of the job competency of medical school teachers. Furthermore, specific measures for the reform of medical teaching through the integration of online and offline models are proposed to achieve a collaborative education focusing on “knowledge, ability, and moral education.”

**Keywords:** Online and offline integration; Medical teaching reform; Collaborative education

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## 1. Introduction

The “National Medium and Long-term Education Reform and Development Plan (2010–2020)” emphasizes the revolutionary impact of information technology on education and underscores the need for serious consideration. In March 2021, the Ministry of Education issued a “Notice on Strengthening the Informatization of Education Management in the New Era,” advocating the use of data as a driving force and leveraging the new generation of information technology to elevate the digital, networked, and intelligent aspects of education management. In November of the same year, the Central Committee of the Communist Party of China and the State Council issued major strategic directives to promote the development of “Internet+ Education,” heralding China’s march toward the digital transformation of its education sector. Utilizing information technology to support the high-quality development of education aligns with the general trend, developmental needs, and direction of teaching reform.

Against the backdrop of building a healthy China, the provision of high-quality and personalized medical services necessitates the cultivation of high-quality medical human resources. Medical teaching, as the primary source of medical and health professionals, profoundly influences the training process and quality of these

talents, presenting both new opportunities and challenges. Presently, China's smart education infrastructure and equipment environment are well established. The proliferation of Massive Open Online Courses (MOOCs) in colleges and universities has surpassed 64,500, with student enrollment exceeding 1.088 billion, ranking China at the forefront globally in terms of construction and application scales. The digitalization of education has widened the access to high-quality educational resources. The advent of online teaching platforms such as MOOCs, virtual simulations, and Xuedutong has revolutionized traditional medical teaching methods, significantly enhancing the quality of medical theory courses.

However, traditional medical experimental teaching struggles to meet the practical, cutting-edge, and innovative demands of modern medicine due to constraints such as limited teaching resources and insufficient class hours. Effectively capturing the rules and directions of medical talent training and continually optimizing the training model based on the trend of online and offline integration to better align with societal needs has become a pivotal area of exploration in current medical teaching reform.

## **2. Problems faced by traditional medicine teaching**

### **2.1. Theory and practice disconnect**

In the traditional medical teaching model, theory often takes precedence over practice. Throughout the teaching process, there is a relentless emphasis on imparting professional theoretical knowledge, followed by confirmatory experiments. Students proceed through the experimental process systematically, verifying the correctness of experimental conclusions. Regrettably, the innovative and practical thinking abilities of students are neglected; they struggle to think independently, hindering the application of theoretical knowledge in practical scenarios. Moreover, newly hired teachers lacking clinical knowledge and experience resort to mechanical explanations of textbook content, offering limited insights into clinical cases and other crucial aspects. Consequently, students face a profound disparity between theoretical knowledge and practical application<sup>[1]</sup>, resulting in difficulties integrating theory with real-world problems. This impedes their ability to handle emergencies, transition smoothly into the profession, and adapt to the evolving landscape of modern medicine<sup>[2]</sup>.

### **2.2. Dominance of “teaching” over “learning”**

Medicine is an important discipline that demands rigor and thoughtfulness from students. However, its traditional teaching approach emphasizes “teaching” as the primary focus, relegating “learning” to a secondary role. In medical theory courses, lecturing predominates, supplemented by various teaching methods such as case-based and heuristic approaches, aiming for interactive classroom environments. Conversely, practice courses typically follow a single-experiment teaching model, wherein teachers explain theoretical principles via presentations, followed by hands-on activities and student-led reporting<sup>[3]</sup>. This teacher-centric approach restricts students' autonomy and fosters a passive “cramming” mentality, hindering their ability to digest complex subject matter<sup>[4]</sup>. Students often struggle to internalize knowledge and apply it effectively in clinical settings, lacking innovative and clinical thinking skills. Moreover, reliance on traditional teaching environments limits students' exposure to modern information technology and reduces opportunities for self-study, ultimately dampening their enthusiasm and initiative in learning<sup>[5]</sup>.

## **3. Background of the medical teaching reform of the online and offline integration model**

The online and offline integration teaching model employs the seamless fusion of online teaching platforms,

resources, and offline teaching methods to foster independent learning among students. In recent years, China has implemented policies to promote both online and offline teaching, offering valuable guidance for the reform of medical education. **Table 1** provides a summary of specific policies for online and offline teaching spanning from 2018 to 2023.

**Table 1.** Summary of some policies for online and offline teaching (2018–2023)

Time	Policies/Notices	Published by	Content
September 2018	“Opinions of the Ministry of Education on Accelerating the Construction of High-level Undergraduate Education and Comprehensively Improving Talent Training Capabilities”	Ministry of Education	Focusing on student development, build a teaching model that combines online and offline activities to promote the revolution in classroom teaching <sup>[6]</sup> .
September 2019	“Guiding Opinions on Promoting the Healthy Development of Online Education”	Eleven departments, including the Ministry of Education	Accelerate the in-depth integration of science and technology and education, promote the positive interaction between online education and offline education, the organic connection between on-campus education and off-campus education, cultivate new forms of educational services, and comprehensively enhance the ability of education to serve economic and social development <sup>[7]</sup> .
November 2019	Notice of the General Office of the Ministry of Education on carrying out the recognition of offline, online and offline hybrid, and social practice national first-class undergraduate courses in 2019”	General Office of the Ministry of Education	Conduct application and recommendation work for national-level offline first-class courses, national-level online and offline hybrid first-class courses, and national-level social practice first-class courses.
March 2021	“Notice of the Ministry of Education on Strengthening the Informatization of Education Management in the New Era”	Ministry of Education	With data as the driving force, use the new generation of information technology to enhance the digital, networked, and intelligent level of education management <sup>[8]</sup> .
February 2022	“Key Points of the Ministry of Education’s Work in 2022”	Ministry of Education	Implement educational digitalization strategic actions. Strengthen demand traction, deepen integration, innovation empowerment, and application drive, actively develop “Internet+ education,” and accelerate education’s digital transformation and intelligent upgrading <sup>[9]</sup> .
March 2023	“Key Points of Work of the Higher Education Department of the Ministry of Education in 2023”	Ministry of Education	Accelerate the digital transformation of higher education and create a new form of teaching.

In August 2019, Wu Yan, then-director of the Department of Higher Education at the Ministry of Education, emphasized the imperative to “truly enhance the quality of medical education,” with the objective of establishing top-tier medical courses <sup>[10]</sup>. Subsequently, *in October 2022*, the report of the 20th National Congress of the Communist Party of China underscored the need to “advance the digitalization of education and construct a learning society and nation, fostering lifelong learning for all individuals” <sup>[11]</sup>.

In August 2023, the successful convening of the Medical Education Forum further emphasized “digital empowerment to drive the high-quality development of medical education.” The forum extensively shared experiences in digital education and teaching, covering classroom-level digitalization, curriculum development, teaching and research practices, practical teaching methodologies, and evaluation techniques. These initiatives

have clarified the direction and significance of online and offline teaching within the current landscape of higher education, accelerating the pace of exploration and innovation in medical teaching reform.

#### **4. The necessity of medical teaching reform with an online and offline integration model**

The integration of online and offline teaching models has emerged as an inevitable trend in medical teaching reform, propelled by the rapid advancement of information technology and the digital economy. Compared to traditional medical teaching, the online and offline medical teaching model offers numerous advantages and enhanced operability. Medical courses, known for their complexity and demanding professionalism, often suffer from limited class hours, leading students to rely heavily on classroom materials and encounter a superficial understanding of theoretical knowledge. By integrating online and offline medical teaching, students can transcend the constraints of time and space, address gaps in learning more flexibly and effectively, personalize their learning experiences, and achieve the principle of “teaching students according to their aptitude”<sup>[12,13]</sup>.

Given the practical nature and abstract, logically intricate content of medical courses, instructors can leverage online and offline integrated teaching to facilitate better comprehension of theoretical knowledge among students. This approach diversifies learning channels, allowing students to swiftly grasp theoretical concepts while honing their clinical skills and fostering innovation capabilities. Particularly pertinent in today’s educational landscape dominated by post-2000s students, some of whom may find rigorous medical courses daunting and may be inclined to give up, integrated teaching bridges this gap by harnessing students’ affinity for online resources and seamlessly blending classroom instruction with Internet-based learning. This method not only enhances teaching efficiency by promoting teacher-student interaction but also cultivates students’ independent thinking and analytical skills<sup>[14]</sup>, igniting their enthusiasm for learning and instilling a sense of ownership over their education<sup>[15]</sup>.

Traditionally, medical education heavily relied on teachers for knowledge dissemination. However, given teachers’ constraints in terms of resources and time for lesson preparation and post-class activities, integrating online and offline teaching methods enables mutual benefit between students and teachers. Students gain access to diverse medical knowledge sources beyond their instructors, including online platforms and websites. Meanwhile, teachers can devote more time and resources to enriching teaching content and honing educational skills. They can also augment their knowledge and expertise through online platforms and hands-on clinical experience, fostering a comprehensive learning experience for students and enhancing teachers’ educational competencies<sup>[16]</sup>.

In recent years, the confluence of national policy support and the efficacy of hybrid teaching models has spurred increased research on online and offline medical teaching. A study analyzing research trends in medical education in China from January 2012 to June 2022 revealed a growing focus on teaching reform, flipped classrooms, and online and offline teaching models, among other topics. While teaching reform has historically been a prominent area of research, the emergence of online and offline teaching research since 2017 underscores its rising significance<sup>[17]</sup>. However, current approaches to medical teaching, both online and offline, tend to remain fragmented, with a lack of seamless integration between different teaching modalities<sup>[18]</sup>. Therefore, it is imperative to explore and innovate China’s medical teaching reform comprehensively, encompassing teaching methods, online education platforms, and teaching outcomes, within the framework of the online and offline integration model.

## **5. Measures for medical teaching reform using online and offline integration models**

### **5.1. Integrate ideological and political education and actively practice “curriculum ideological and political education”**

Modern medicine necessitates a robust foundation in professional medical theory, technical skills, and a profound understanding of medical ethics, professional ethics, and social responsibility. Regrettably, many medical students prioritize their professional coursework and lack practical knowledge on crucial issues such as doctor-patient trust and dispute resolution. Systematic ideological, political, and legal education is often overlooked, resulting in a weak awareness of humanistic care among patients. To tackle this challenge, medical teaching must prioritize the cultivation of individuals with moral integrity and implement “ideological and political courses” that delve deeply into the ideological and political education elements inherent in medical curricula. Moreover, education should be student-centric, output-driven, and focused on continuous improvement, value creation, knowledge dissemination, and skill cultivation. The medical theory teaching segment should incorporate medical student innovation and entrepreneurship, curriculum ideological and political education elements, and comprehensive and purposeful experiments in medical practice teaching. This holistic approach effectively cultivates medical students’ professional ethics, social responsibility, clinical competence, and innovative thinking, thereby stimulating their inner potential and learning motivation.

### **5.2. Build a medical teaching model that integrates online and offline components**

Drawing on the research of Wang *et al.* <sup>[19]</sup>, and based on the perspectives of teacher activities, student activities, and teaching environment, this paper proposes a three-stage model encompassing knowledge acquisition before online classes, knowledge application during offline classes, and knowledge construction after online classes. This model establishes a system that facilitates independent learning and integrates online and offline processes throughout the teaching journey. It includes diagnostic testing, communication and discussion, question answering, multiple teaching methodologies, summary evaluation, reflective learning, consolidation, and expansion <sup>[19]</sup>. Leveraging online platforms such as “Rain Classroom” and “Xuetang Cloud” enables synchronous interaction between online and offline medical teaching, facilitating the development of an “online + offline” integrated medical teaching model that operates before, during, and after class.

Firstly, prior to each class, essential knowledge, key concepts, pre-class previews, and related ideological and political elements are disseminated on platforms like “Xuetang Cloud,” empowering teachers to gauge and adapt to students’ learning progress in real-time. Secondly, interactive tools such as barrage, voting, and discussion on platforms like “Rain Classroom” enrich in-class participation, fostering effective teacher-student interaction. Lastly, post-class activities on platforms such as “Xuetang Cloud” offer homework assignments, reviews, and high-level course resources, enabling students to broaden their learning horizons and deepen their understanding of medical concepts.

### **5.3. Adhere to the principle of “consistency” and innovate teaching resources and methods**

The medical teaching reform within the online and offline integrated model must adhere to the “consistency” principle while striving for **high-level, innovative, and challenging education**. On one hand, the goals of medical theoretical and practical teaching should encompass the organic integration of knowledge, abilities, and qualities, leveraging opportunities in digital transformation to nurture advanced problem-solving skills and comprehensive abilities among medical students. On the other hand, teaching resources for medical courses, whether online or offline, must be forward-looking, scientifically grounded, and practically applicable. These resources should be regularly updated in line with cutting-edge subject trends and the evolving needs of modern

medicine and society. Moreover, emphasis should be placed on fostering students' awareness of innovation and entrepreneurship. Digital course teaching resources such as syllabi, lesson plans, courseware, micro-courses, MOOCs, experimental cases, exercise question banks, test question banks, and course summaries should be innovatively developed and made available on platforms such as "Xuetang Cloud," "Xuetang Online," and the "National Smart Education Higher Education" platforms. This ensures efficient integration with offline classroom teaching. Additionally, teaching methods for medical courses should be advanced and interactive, promoting the seamless integration of modern information technology and medical education. Case studies, lectures, demonstrations, interactive sessions, discussions, questioning, and practical exercises, both online and offline, should be employed to facilitate heuristic and guided teaching. The use of multimedia, Internet resources, physical teaching aids, "Rain Classroom," "Xuetang Cloud," and other integrated teaching tools can enhance teaching diversity, striking a balance between dynamic and static learning experiences.

#### **5.4. Improve the competency of medical school teachers**

Medical education demands a blend of scientific knowledge and practical skills, yet traditional classroom-based teaching often falls short in providing adequate resources and theoretical instruction time. Consequently, students may lack innovative thinking abilities and may not be fully equipped for societal roles. To address this challenge, enhancing the competency of medical teachers, who serve as the pillars of medical education<sup>[20]</sup>, is paramount. This can be achieved by reinforcing professional awareness among medical school teachers, instilling ethical values, a sense of responsibility, and a commitment to lifelong learning. The teaching concept of online and offline integration can be promoted among medical school teachers through the interpretation of national policies and evaluations conducted by school supervisors, peers, and students. Strengthening teachers' knowledge and information capabilities can involve training them in new technologies and providing them with updated knowledge in basic medical theory, teaching experience, medical skills, and academic proficiency in the medical field. To enhance teaching quality, emphasis should be placed on developing online teaching resources, utilizing online teaching platforms, offering personalized and differentiated learning guidance, and integrating online teacher-student interaction. Various teaching evaluation methods should be employed, and curriculum optimization based on online and offline data should be regularly reviewed. Activities such as viewing and learning sessions, teaching competitions, and teacher assessments can be organized to enhance the teaching ability of medical school teachers and promote the advancement of online and offline integrated medical education.

#### **Disclosure statement**

The authors declare no conflict of interest.

#### **References**

- [1] Zheng W, Wu X, 2021, Exploration of Basic Medical Teaching Reform Under the Medical-Education Collaborative Model. *Industry and Science and Technology Forum*, 20(5): 173–174.
- [2] Chen Y, Qing Y, 2023, Thoughts on Applying Online and Offline Hybrid Teaching in "Preventive Medicine". *Continuing Medical Education*, 37(10): 29–32.
- [3] Sheng S, Yang Z, 2022, Exploration of the Application of Online and Offline Mixed Teaching Models in Medical Immunology Experimental Teaching. *Modern Medicine and Health*, 38(6): 1064–1066 + 1073.
- [4] Yan G, Zhao Q, Wang J, 2019, Practice and Exploration of the SPOC Online and Offline Mixed Teaching Model in

Medical Statistics Teaching in the Post-MOOC Era. *Educational Modernization*, 6(44): 192–194.

- [5] Chen P, Li M, Wang P, et al., 2022, Application of Online and Offline Hybrid Teaching Model in Medical Microbiology Experimental Teaching. *Health Vocational Education*, 40(2): 109–111.
- [6] Opinions of the Ministry of Education on Accelerating the Construction of High-Level Undergraduate Education and Comprehensively Improving Talent Cultivation Capabilities. *Gazette of the State Council of the People's Republic of China*, 2019(3): 34–41.
- [7] Guiding Opinions of the Ministry of Education and Other 11 Departments on Promoting the Healthy Development of Online Education. *Bulletin of the Ministry of Education of the People's Republic of China*, 2019(9): 14–17.
- [8] Notice of the Ministry of Education on Strengthening the Informatization of Education Management in the New Era. *Bulletin of the Ministry of Education of the People's Republic of China*, 2021(4): 33–37.
- [9] Key Points of the Ministry of Education's Work in 2022. *Bulletin of the Ministry of Education of the People's Republic of China*, 2022(5): 11–21.
- [10] Le S, Yu T, Liu C, 2019, Preliminary Exploration of the “Golden Course” Construction Path of Mixed Online and Offline Medical Genetics. *Basic Medical Education*, 21(11): 891–893.
- [11] Wang S, 2023, Implement the Spirit of the 20th National Congress of the Communist Party of China and Deeply Promote the Digitalization of Higher Education. *China Education Network*, 2023(Z1): 8–9.
- [12] Yang S, Li G, 2020, Discussion on the Application of Online and Offline Hybrid Teaching in Medical Physiology Teaching. *Occupation*, 2020(5): 94–95.
- [13] Liu D, Cao Y, Bai X, et al., 2023, Exploration and Practice of Online and Offline Hybrid Teaching in Undergraduate Teaching of “Social Medicine”. *Journal of Youjiang Medical College for Nationalities*, 45(2): 359–362.
- [14] Li J, Zhang S, Tang Y, 2020, Application of Online and Offline Interactive Teaching Models in Basic Chemistry Teaching in Medical Schools - Taking “Buffer Solution and Its Mechanism of Action” as an Example. *Chemical Education (Chinese and English)*, 41(16): 67–72.
- [15] Si R, Wu Y, Hao D, et al., 2021, Application of Online and Offline Hybrid Teaching Model in Medical Physiology Teaching. *Journal of Chifeng University (Natural Science Edition)*, 37(5): 96–99.
- [16] Zhang D, Liu W, Pan S, et al., 2023, Application Exploration and Improvement Strategies of Online and Offline Hybrid Teaching Models in Education and Teaching in Higher Vocational Medical Schools. *Technology Wind*, 2023(3): 96–99.
- [17] Shang J, 2023, Analyzing the Research Hotspots and Trend Analysis of Online and Offline Blended Learning in Medical Teaching Reform in China. *Chinese Health Service Management*, 2023(4): 302–305.
- [18] Wang Q, 2023, Analysis of the Implementation Effect of Online and Offline Hybrid Teaching – An Empirical Investigation Based on a Medical School in Guangxi. *Higher Education Forum*, 2023(5): 46–48 + 111.
- [19] Wang W, Zhang L, Jiang X, et al., 2021, Thoughts on the “Internet +” Medical Teaching Reform in the Post-Epidemic Era – Exploration of Hybrid Teaching Models. *Health Vocational Education*, 39(13): 15–17.
- [20] Ning H, Zhou X, Wang D, et al., 2023, Construction of a Competency Model for Medical School Teachers Under the Background of Online and Offline Hybrid Teaching. *China Continuing Medical Education*, 15(13): 161–165.

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