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Exploring the Practical Path of Open Clinical Training System to Improve the Job Competency of Medical Students

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Abstract: *The open clinical training system primarily utilizes information technology to establish a competency progression model. Its existence successfully overcomes traditional limitations of time and space in practical training. For instance, this system integrates online and offline resources while enabling personalized training through intelligent devices and student self-governance, ultimately enhancing clinical critical thinking and humanistic care competencies. Moreover, its tripartite structure of "Teaching + Training + Practice" bridges the gap between knowledge and practice. This system not only addresses pain points in traditional medical education such as fragmented resources and contextual deficiencies but also provides an innovative path for cultivating job competency among medical students, thereby reshaping the paradigm of medical education.*

Keywords: *Open Clinical Training System; Mmedical Students; Job; Competency*

1. Introduction

The current medical education system faces challenges such as insufficient practical training resources and inefficient clinical skill development, which hinder the growth of medical students' job competency. However, traditional teaching models suffer from theoretical-practical disconnects due to time and space constraints, faculty shortages, and lack of humanistic context. This paper explores the framework and value of an open clinical training system, analyzing how it achieves progressive clinical competency development through innovative mechanisms including intelligent management, student self-governance, and tiered training. These insights aim to provide practical references for transforming medical education.

2. Overview of the Open Clinical Training System

The Open Clinical Training System represents a groundbreaking medical education model rooted in modern pedagogical principles, powered by information technology, and centered on competency progression. This innovative system transcends the time and space constraints of traditional training methods, seamlessly integrating online and offline teaching resources to create a dynamic and open learning ecosystem. At its core, it leverages virtual simulation platforms and intelligent management systems, combining digital educational resources such as flipped classrooms and MOOCs to empower medical students with flexible learning path planning. This system enables personalized and precision-driven clinical skill training. For instance, in hardware implementation, the system utilizes intelligent access control systems and remote monitoring devices to optimize specialized training spaces like pulse-taking practice rooms and acupuncture operation rooms, significantly enhancing the utilization efficiency of simulation teaching aids[1].

Secondly, the system architecture primarily follows a "Teaching + Training + Practice" tripartite cultivation logic, forming an interconnected chain of competency development. For instance, during the knowledge acquisition phase, students access a 3D meridian anatomy resource library via mobile devices to achieve in-depth theoretical learning. In the skill training phase, they undergo repeated drills on simulation devices equipped with intelligent feedback systems, such as real-time optimization of operational precision using acupuncture technique testers. The clinical practice phase adopts a tiered access mechanism, where only those who pass rigorous assessments can enter actual clinical scenarios

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for bedside teaching. This progressive cultivation model organically links theoretical learning, simulation operations, and clinical practice, creating a virtuous cycle between knowledge acquisition and practical application.

Finally, the system's operational mechanism further emphasizes students' central role, innovatively establishing a "dual-track drive" management model. For instance, faculty teams oversee the development of high-quality courses and training quality monitoring, focusing on creating standardized operational video tutorials. Student associations actively participate in daily training room operations, managing devices and coordinating reservations under faculty guidance. This model ensures teaching standardization while stimulating self-motivation through student self-governance, effectively alleviating clinical faculty shortages. Notably, the system addresses TCM education's unique needs: it employs high-definition imaging systems to document dynamic tongue patterns during tongue diagnosis training, and develops 3D guidance systems for acupoint positioning in meridian training, providing scientific support for quantifying the evaluation of traditional Chinese medicine techniques[2].

At its core, the Open Clinical Training System signifies a profound paradigm shift in medical education. It transforms rigid and fixed-hour teaching into round-the-clock autonomous practice, shifts from one-way skill indoctrination to two-way competency development, and bridges fragmented teaching components into an organic closed-loop for skill growth. By establishing an openand shared training platform, it not only redefines clinical skill development processes and standards but also provides a practical model for exploring innovative teaching models that align with contemporary medical education principles.

3. The Role of Open Clinical Training System in Improving the Job Competency of Medical Students

3.1 Deepen the cultivation of clinical critical thinking ability and build a dynamic knowledge application framework

The Open Clinical Training System significantly enhances medical students' core competency in dynamic clinical information processing through restructured learning paths. For example, the system successfully overcomes the time and space constraints of traditional teaching, and integrates high-quality course resources with information technology to create immersive learning environments. In TCM specialties like acupuncture and tuina, medical students can scan meridian and acupoint models via mobile devices for real-time 3D anatomical studies, while intelligent devices like acupuncture technique testers provide instant operational feedback on operational precision. This "Teaching + Training + Practice" cyclical model enables students to immediately transition from theoretical knowledge acquisition to practical application. Through repeated drills in virtual simulation training rooms, students analyze typical cases, deducing underlying mechanisms from surface symptoms. Crucially, the open system empowers students to customize training plans addressing individual knowledge gaps. For instance, its four-step diagnosis and treatment simulation (observation, auscultation, inquiry, pulse-taking) systematically enhances integrated four TCM diagnostic skills. When handling complex cases in the qualification examinations for medical practitioners, students internalize the clinical reasoning framework cultivated by the system as an instinctive thought process, instinctively identifying key symptoms and developing multidimensional diagnosis and treatment plans aligned with the biopsychosocial medical model[3].

3.2 Strengthen the integration of humanistic care and clinical decision-making, and shape the core of professional quality

This system bridges the gap between technical training and humanistic literacy through contextualized teaching, cultivating the core professional ethos of medical students. In standardized clinical scenarios constructed within open training rooms, students engage in role-playing to deeply experience doctor-patient communication situations. The Tuina (Chinese massage) training emphasizes precise mastery of dynamic force application in techniques such as pushing, grasping, pressing, and rubbing while integrating patient emotional observation points during practice. Students are guided to simultaneously monitor physiological feedback and psychological responses during technical execution. Crucially, community clinic projects led by student associations transform training achievements into real-world services. Through interactions with diverse patient populations, students witness the entire

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process of doctor-patient relationship building, gaining profound understanding of how mutual trust significantly impacts diagnosis and treatment outcomes. This teaching design that integrates ethical principles with technical skills demonstrates that exceptional expertise requires synergistic work with empathetic competence. For instance, in tongue pulse diagnosis training, students must not only accurately identify tongue and pulse characteristics but also learn to appropriately explain diagnostic findings to patients. Medical students trained through this system naturally demonstrate professional awareness of respecting patient autonomy in clinical practice.

3.3 Promote the transformation of practical ability to job competency and improve the foundation of career development

The open training system establishes a competency transformation mechanism that elevates clinical skills into sustainable job competency. Through an intelligent management system, a tiered training path is constructed, requiring students to sequentially complete three modules: online theoretical learning assessments, simulation device operation certifications, and clinical apprenticeship practices. In acupuncture training, students first master acupoint positioning through 3D meridian animations, then undergo acupuncture angle and depth training on intelligent copper models, before obtaining clinical mentor approval via signature for real patient procedures. This "skill unlocking" mechanism ensures robust competency development. Data demonstrates this system effectively bridges learning achievements to practicing capabilities, with participants maintaining over 85% pass rates in practicing physician practice skill assessments. Employment competitiveness has significantly improved, particularly as the system's innovation capabilities have been showcased in medical competitions, with award-winning projects covering cutting-edge fields like intelligent TCM diagnosis and treatment device development. Graduates' autonomous training habits enable continuous refinement of diagnosis and treatment plans upon entering clinical roles, ultimately cultivating versatile clinical professionals with solid foundations and adaptability for the new era.

4. Analysis of the Reasons for the Lack of Job Competency of Medical Students

4.1 The deep disconnect between traditional training mode and clinical needs

The current clinical training in medical education still adheres to a one-way indoctrination teaching paradigm, leading to delayed development of students' clinical thinking. In traditional classrooms, teacher-dominated demonstration operations and mechanical imitation by students form the primary teaching model. Technical training for skills requiring delicate tactile sensitivity, such as acupuncture and Tuina, becomes a standardized procedure replication. This teaching mechanism stifles students' dynamic reasoning ability in disease diagnosis and treatment logic, making them struggle to independently analyze complex cases outside the demonstration scenario. More critically, practical training content is severely disconnected from real medical scenarios. Simulation patient operations lack integration of doctor-patient communication dimensions, while tongue diagnosis and pulse diagnosis training fails to incorporate individualized syndrome differentiation thinking. When students enter clinical internship phases, they abruptly face the multifaceted requirements of the biopsychosocial medical model. They cannot establish cognitive connections between symptoms and pathogenesis, nor can they balance technical operations with humanistic care demands during diagnosis and treatment. This disconnect between teaching and practice fundamentally exposes the educational flaws of knowledge-centered pedagogy rather than competency-building[4].

4.2 Imbalance of resource allocation and mechanismal alienation from clinical practice

The medical colleges and universities face structural contradictions in resource allocation for clinical skills training. On one hand, physicians at teaching hospitals bear triple pressures: clinical diagnosis and treatment, scientific research, and teaching guidance. Overworked under these conditions, they struggle to focus on practical teaching. Particularly in specialized fields like TCM syndrome differentiation and treatment, fragmented faculty resources directly result in students' lack of standardized operational procedures. On the other hand, numerous high-end simulation devices remain idle due to rigid curriculum arrangements. Teaching aids such as intelligent acupuncture copper models are not integrated into regular teaching processes, creating a mismatch between equipment efficiency and teaching needs. This dual contradiction of resource idleness and scarcity is further exacerbated by compressed training hours. Following enrollment expansion, per capita training opportunities have

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sharply decreased. During internships, heightened doctor-patient relationship sensitivity further reduces authentic practice opportunities, ultimately causing clinical skills to remain at textbook level. The systemic imbalance in resource allocation severs the path from skill development to clinical application, leaving students with theoretical knowledge but lacking the capability to solve real medical problems.

4.3 The lack of professional situation and the implicit dissolution of professional identity

The current medical education system severely lacks contextualized cultivation of professional traits. Traditional training focuses on technical process drills while neglecting the internalization of ethical decision-making skills in clinical settings. During simulated diagnosis and treatment scenarios, students mechanically recite diagnostic protocols without experiencing authentic pressure tests for building doctor-patient trust. Emergency training remains at the level of process drills rather than collaborative decision-making in emergencies. This decontextualized teaching model leads to delayed judgment in unexpected medical situations and communication difficulties when handling complex doctor-patient relationships. The deeper impact lies in weakened professional identity. When technical training strips away humanistic care dimensions, students struggle to grasp the core of medical compassion. As postgraduate entrance exam pressures crowd out clinical internships, the passion for technical refinement gives way to utilitarian goals. This ultimately results in role perception distortions among some medical professionals, such as simplifying medical practices as technical services and viewing patient demands as procedural barriers. The implicit erosion of professional spirit fundamentally undermines the ethical resilience and continuous improvement drive required for job competency.

5. Practical Path of Open Clinical Training System to Improve the Job Competency of Medical Students

5.1 Optimize the allocation of teaching resources

The Open Clinical Training System creates flexible and autonomous learning environments through scientific integration of teaching spaces and tool resources. This system upgrades existing training spaces with intelligent systems, including access control and monitoring system to enable unmanned management, allowing specialized areas like diagnostic labs and acupuncture/Tuina rooms to realize round-the-clock open. Essential teaching aids such as acupuncture technique testers and tongue image acquisition equipment are fully utilized, enabling students to schedule usage according to their study plans for repeated practice until mastering core skills. A comprehensive online resource library is also established, containing digital materials like anatomical dynamic diagrams and meridian circulation pathway videos, allowing students to study theoretical knowledge anytime via mobile devices. The key breakthrough lies in creating an online-offline linkage mechanism: after completing case analysis on virtual platforms, students must verify operational protocols in physical training rooms. For instance, after learning emergency procedures online, they must immediately conduct team drills using simulated models to ensure seamless integration of theoretical understanding with practical application, breaking down the time and space barriers of traditional classrooms[5].

5.2 Improve the skill training process

This system establishes a rigorous training program that creates a progressive path for competency development through theoretical simulation and practical application. In the initial phase, students systematically study standardized operation videos, expert case studies, and other resources via digital learning platforms, completing online assessments to verify foundational theoretical mastery, such as accurately identifying various pulse characteristics. The skill enhancement phase involves professional training room skills certification and assessments where students undergo practical operation verification under intelligent monitoring systems. For example, Tuina training requires precise force control, while acupuncture operations demand accurate positioning and depth control. The final phase introduces clinical mentor supervision mechanism, allowing students who pass the first two phases to practice in real medical environments. At affiliated hospitals, students work under mentors to treat actual patients, independently handling the entire process from symptom collection to treatment plan design. Key tasks include conducting systematic consultations for digestive disease patients and formulating acupuncture treatment plans. This structured training sequence ensures solid transformation from theoretical understanding to practical application of each skill.

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5.3 Innovation of teacher-student collaboration model

This system establishes a collaborative management mechanism where teachers guide student participation. The teaching team focuses on cultivating core competencies by developing specialized TCM teaching resource libraries, including standardized teaching materials like tongue diagnosis image comparison data, and dynamic pulse training tutorials, while establishing objective skill assessment benchmarks. Concurrently, student management associations are formed to deeply engage in practical training operations[6]. Association members handle equipment maintenance, scheduling coordination, and venue management, while planning community service projects under faculty guidance. Students organize practical services such as health Tuina for elderly residents in communities. This division of labor effectively alleviates faculty pressure and enhances management efficiency. More profoundly, it creates interdisciplinary exchange platforms, such as organizing joint rehabilitation plan design by students from different majors to demonstrate the value of multidisciplinary collaboration. Through self-governance processes, students simultaneously develop communication, coordination, and organization skills. Service practices allow them to deeply understand medical professionals' social responsibilities, naturally cultivating their professional spirit.

6. Conclusion

In summary, the Open Clinical Training System has restructured the fundamental logic of skill development. Its round-the-clock autonomous training and two-way competency-building model drives paradigm shifts in medical education. Through intelligent resource allocation, collaborative teacher-student management, and scenario-based practice, the system effectively bridges the gap between clinical practice and teaching, ensuring job competency development combines standardization with innovation. This model provides a sustainable solution for cultivating new-era clinical professionals who balance technical proficiency with humanistic care, propelling medical education toward a profound transformation centered on competency-based education.

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