The Role of Innovative Practice Ability in the Comprehensive Competence Development of Medical Undergraduates: Postprint

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Abstract

As medicine continues to advance, society increasingly demands medical professionals with innovative and practical capabilities. Although most educators have recognized the significance of fostering innovative and practical abilities in cultivating medical students' comprehensive abilities, limited progress has been achieved due to the persistent influence of traditional exam-oriented educational concepts and insufficient emphasis placed on clinical internships by both faculty and students. This paper briefly elaborates on the role of innovative and practical abilities in the cultivation of comprehensive abilities and the existing challenges in fostering such abilities, and proposes several approaches for developing innovative and practical competencies, aiming to enhance medical students' comprehensive abilities and lay the foundation for cultivating high-quality medical professionals.

Full Text

Preamble

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The Role of Innovative Practice Ability in the Cultivation of Comprehensive Abilities Among Medical Undergraduates

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Abstract

With the continuous development of medicine, society increasingly demands medical talents with innovative practice abilities. Although most educators have recognized the significance of cultivating innovative practice abilities for developing medical students' comprehensive capabilities, effective results remain scarce due to the long-standing influence of traditional exam-oriented education concepts and insufficient emphasis on practical training from both teachers and students. This article briefly describes the role of innovative practice ability in comprehensive ability cultivation and the current problems in its development, proposing several methods for fostering innovative practice abilities. The aim is to improve medical students' comprehensive abilities and lay the foundation for cultivating high-quality medical talents.

Keywords: Medical undergraduates; innovative practice ability; comprehensive ability

Introduction

We currently live in an era of economic globalization. The rapid development of medicine has intensified society' s demand for medical talents, requiring medical students to possess strong innovative practice abilities and comprehensive capabilities. Although the viewpoint that cultivating innovative practice abilities can promote the development of comprehensive abilities has gradually gained recognition among educators, phenomena emphasizing theory over practice still exist in the teaching process. This has resulted in medical graduates with poor hands-on skills, lack of innovative spirit, and hindered improvement in comprehensive abilities, making them ill-adapted to the 21st-century medical environment [1-2]. Under these circumstances, how to cultivate high-quality medical talents has become a primary issue for medical schools. This article briefly describes the role of innovative practice ability in comprehensive ability cultivation and current problems in its development, proposing several methods for fostering innovative practice abilities to improve medical students' comprehensive abilities and lay the foundation for cultivating high-quality medical talents.

1. Innovative Practice Ability and Comprehensive Ability

Innovative ability refers to people' s capacity to generate new knowledge, new thinking, and create new things. Practical ability refers to the actual skills demonstrated in practical activities. Medical students'innovative practice ability is mainly manifested through continuous clinical practice, gradually discovering new knowledge and fields, learning and drawing upon new sciences and technologies, and then boldly applying these new methods and means back to their own clinical practice. Through this repeated exploration, patients ultimately receive the safest and most effective treatment [3].

Comprehensive ability is a fundamental capability that medical students must

possess, including self-learning ability, observation and analysis ability, practical operation ability, communication ability, collaboration ability, and environmental adaptability [4]. Comprehensive ability is the foundation and source for cultivating innovative practice ability, as well as the only pathway for its development, while innovative practice ability can in turn promote the development of comprehensive ability.

2. The Role of Innovative Practice Ability in Comprehensive Ability Training

Innovative practice ability plays a pivotal role in the cultivation of medical students' comprehensive abilities. By developing strong innovative practice abilities, students can fully acquire self-learning ability, observation and analysis ability, practical operation ability, communication ability, collaboration ability, and environmental adaptability, thereby comprehensively improving their overall capabilities.

2.1 Innovative Practice Ability Promotes Self-Learning Ability

With the continuous development of science and technology, medical knowledge is updating at an increasingly rapid pace. Possessing innovative practice ability enables students to actively discover new knowledge in practice and complete the learning of new knowledge through independent literature review, thereby improving their self-learning ability in this process.

2.2 Innovative Practice Ability Enhances Observation and Analysis Ability

In clinical practice, students often encounter diseases with complex clinical manifestations, where one or several complications may obscure the primary disease. Good innovative practice ability can help students expand their thinking, enabling them to carefully observe and patiently analyze, listing and comparing the similarities and differences of all diseases with similar symptoms and signs, ultimately making correct diagnoses. Students' observation and analysis abilities are enhanced through this process.

2.3 Innovative Practice Ability Strengthens Practical Operation Ability

To become a qualified doctor, one must possess solid clinical operation skills. Students with innovative practice abilities are more courageous in performing real operations on patients, gaining more practice opportunities and continuously strengthening their practical training, which is significant for developing good practical operation abilities.

2.4 Innovative Practice Ability Improves Communication Ability

In recent years, medical disputes have occurred frequently, often not due to improper medical treatment but because doctors do not know how to communicate correctly with patients. This requires students to master communication skills, and innovative practice ability plays a unique advantage in this regard. By cultivating students' innovative practice abilities, they can discover and summarize patients' psychological characteristics during communication, think from the patients' perspective, enhance their sense of responsibility, and communicate patiently with patients to obtain more effective information.

2.5 Innovative Practice Ability Enhances Collaboration Ability

The development of modern medicine has gradually come to rely on the collaborative work of medical talents, such as teamwork in research or, due to the increasingly fine division of hospital departments and stronger professional specialization, doctors often do not understand diseases in other departments and may even be completely ignorant of them. The phenomenon of doctors requesting consultations is widespread. Therefore, students must learn to innovate and practice to better assist others in completing tasks at work.

2.6 Innovative Practice Ability Accelerates Environmental Adaptability

Today' s medical environment is no longer as harmonious as before. Students must continuously adapt to an increasingly tense medical environment. Cultivating students' good innovative practice abilities can continuously temper their willpower, improve their psychological endurance, and thereby enhance their environmental adaptability to better serve society.

3. Current Problems in Cultivating Innovative Practice Ability

3.1 Emphasis on Theory Over Practice

For a long time, both teachers and students have only emphasized the learning of theoretical knowledge while neglecting the significance of practical learning. The reasons for this phenomenon are as follows:

3.1.1 Teachers Lack Innovative Spirit Although many teachers realize that cultivating innovative practice ability requires strengthening the emphasis on practical teaching and have made some positive attempts at teaching method reform, most teachers still dare not easily abandon traditional teaching models due to lack of rich experience, resulting in only superficial reforms. Additionally, many medical school teachers also handle clinical and research work alongside teaching, leading some teachers to spend little time on teaching, with insufficient

teaching responsibility. In practical teaching, they only focus on teaching basic skill operations while neglecting the quality of student practice [5].

3.1.2 Students Lack Autonomous Learning Awareness Theoretical knowledge learning has long been dominated by classroom lectures, leading students to develop passive learning habits and dislike independent thinking and asking questions [6]. Moreover, students generally care most about exam scores, believing that theoretical course exams are usually difficult and easy to fail, while operation exams are generally not difficult as teachers rarely fail students. Therefore, students spend most of their study time on books and practice problems, rarely actively practicing skills after class.

3.1.3 Unreasonable Clinical Observation Arrangements Clinical observation is an important transition from theory to practice and the first step for students entering clinical practice. However, in this stage, schools arrange insufficient observation time for undergraduates and usually only emphasize consolidating theoretical knowledge and training operational skills, neglecting the cultivation of medical humanities ability—the foundation of clinical practice. This results in students generally lacking psychological preparation for communicating with patients during observation, often appearing nervous, anxious, and unconfident, making it difficult to gain patients' trust and cooperation for clinical skills training, thereby greatly affecting the quality of practical teaching [7].

3.2.1 Clinical Instructors Have No Time to Teach

As public awareness of healthcare increases, hospitals are seeing more patients. Many clinical instructors are busy with their own work and have no time for teaching, causing students to often play the role of "laborers" during internships, with daily tasks limited to writing medical records, attaching lab reports, and escorting patients for examinations, leaving no time for learning clinical skills.

3.2.2 Interns Cannot Fully Commit

During the internship period, many students are busy preparing for postgraduate entrance exams and cannot focus on internships, with some even directly stopping internships to fully commit to exam preparation. Other students, even if not taking the exam, must attend job fairs, leaving little time for hospital internships [8].

3.2.3 Patients Do Not Cooperate

In recent years, the doctor-patient relationship has become tense, with frequent medical disputes. Instructors dare not allow students to perform complex operations, and even simple operations face non-cooperation from patients who distrust interns. These factors greatly reduce students' opportunities to learn

various clinical skills, hindering the cultivation of innovative practice abilities and comprehensive abilities [9].

4. Methods for Cultivating Innovative Practice Ability

4.1 Improve Practical Teaching Assessment System to Increase Attention

Currently, school assessment mainly relies on theoretical exams, with the assessment system becoming increasingly mature after decades of exploration by educators, while operation exam design remains imperfect, leading to far less attention on operation exams from teachers and students than on theoretical exams. Therefore, improving the practical teaching assessment system is necessary. For example, arrange a group-based assessment at the beginning of each class (3-4 students per group) in the form of an operation exam to test students' mastery of the previous lesson' s content, with this assessment accounting for 40% of the final grade. At the end of class, randomly check the content learned that day—no deduction for mistakes, but bonus points for correct performance based on quality, accounting for 10% of the final grade. During final assessments, teachers should actively point out students' errors and score according to actual performance, avoiding leniency.

4.2 Shorten Class Time and Increase Practical Innovation Activities

A major characteristic of medical courses is the large number of courses and class hours, resulting in most teaching time being spent in classrooms with few hands-on practice opportunities. This article proposes optimizing the curriculum system by setting required courses according to the principle of "less but essential." For example, duplicate content from basic medical courses such as biochemistry, physiology, and pathophysiology can be deleted and integrated into Human Functional Science, reducing class hours while refining teaching content and enabling smooth transitions between disciplines. The additional practice time can be used for laboratory learning, with extended laboratory opening hours to give students sufficient time to practice on teaching models and improve operational skills. If conditions permit, clinical operation skill competitions can also be held to stimulate students' innovative practice abilities [10].

Of course, shortening class time must ensure classroom quality. Therefore, this article proposes using the flipped classroom combined with internet-based teaching models to improve learning efficiency. Before class, students self-study textbooks and watch teaching videos prepared by teachers on the teaching website, completing theoretical knowledge learning that would originally take place in the classroom, and discovering and summarizing problems during pre-class study. Students attend class with questions, while the classroom becomes an interactive venue for teachers and students, and even among students themselves, including Q&A and knowledge application, thereby improving classroom learning efficiency and laying a good foundation for subsequent practical training

[11-12].

In addition to regular teaching sessions, the rational use of spare time is also a good opportunity to cultivate students' innovative practice abilities. First, during spare time, schools can offer elective courses on basic research knowledge and skills training for undergraduates according to graduate research training programs, providing a shortcut for the majority of undergraduates with no research foundation to engage in scientific research [13]. Second, schools should encourage students to actively participate in large-scale science and technology academic competitions such as the "Challenge Cup" to improve their research spirit and innovative ability. Third, schools can also hold humanities lectures once a month, which can not only address social hotspots and expand students' knowledge but also effectively create a strong humanistic atmosphere for students, serving as a beneficial supplement to classroom teaching.

4.3 Clinical Observation Should Focus on Cultivating Medical Humanities Ability

In traditional observation arrangements, students usually go directly to hospitals for observation without any preparation, with most feeling confused when first entering the clinic, and the observation period is short, often ending before learning anything meaningful. Therefore, relevant education should be provided before observation, such as aspects needing attention during observation, potential problems, and what should be learned from observation, enabling students to be well-prepared and enter observation with clear objectives [14]. Additionally, since students begin truly communicating with patients during observation, to ensure they do not feel nervous and can confidently obtain first-hand patient information, they should first learn to handle relationships with patients properly. For example, before formal observation, students should accompany hospitalized patients for one week, comprehensively experiencing the patient care process, learning to think from the patient' s perspective, and hoping that through this week of companionship, patients can understand and trust doctors as much as possible, enabling students to handle doctor-patient relationships well in specific practice. This not only plays a positive role in clinical observation and future internships but also is crucial for cultivating students' good medical humanities ability and enabling schools to output large numbers of high-quality medical talents [15].

4.4 Change Teaching Mode and Reasonably Arrange Internships

Internship is a major component of undergraduate teaching, and both teachers and students should attach great importance to it. First, at the beginning of internships, the internship base should conduct pre-job training based on its actual situation, mainly including work environment, rules and regulations, medical record writing, self-protection, etc., enabling students to be fully prepared before entering clinical practice. Second, each time students enter a department, the department should first conduct a placement test to understand students'

comprehensive levels and select appropriate instructors for targeted internships. Third, during internships, instructors need to continuously try new internship teaching methods: Conduct problem-based learning (PBL) combined with case-based learning (CBL) to actively engage students while cultivating their ability to think independently, analyze, and solve problems [16]. Hold student-led case discussions once a week to cultivate clinical thinking and provide students with as much initiative as possible during internships [17]. Add a discussion and exchange session once a week, simulating expert consultation systems to improve practical abilities and cultivate clinical thinking. Introduce foreign virtual reality technology to simulate patient management, thereby training students' ability to manage patients independently, and even use this technology for large-scale minimally invasive surgical practice, laying a solid foundation for future clinical work [18]. Finally, when leaving a department, students are required to submit 2-3 complete medical records and undergo strict department exit exams. Throughout the internship period, schools should strengthen connections with internship hospitals and jointly manage student internships with hospitals.

5. Conclusion

Innovation is the soul of a nation' s progress, the inexhaustible source for a country' s prosperity, and the most distinctive characteristic of the Chinese nation. Medical students possessing innovative practice abilities can promote the development of comprehensive abilities. This article attempts to cultivate students' innovative practice abilities through improving the practical teaching assessment system to increase attention, shortening class time to increase practical innovation activities, focusing on cultivating medical humanities ability during clinical observation, and changing teaching modes to reasonably arrange internships. The aim is to improve medical students' comprehensive abilities and lay the foundation for cultivating high-quality medical talents who can adapt to the 21st-century medical environment.

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Note: Figure translations are in progress. See original paper for figures.