

Progress in Teaching and Research of Traditional Chinese Medicine in Medical Colleges and Universities

Liu Shuping, Yang Yan, Gao Fang, Fuyong Jiao[#]

Shenmu Polytechnic College, Shenmu, Shaanxi 719300, China

[#]Corresponding Author: Fuyong Jiao. Email: 3105089948@qq.com

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Abstract

This study aims to summarize and review the key dynamics of recent teaching research in the field of traditional Chinese medicine education. Guided by the national "Healthy China" initiative, TCM education is experiencing a transformative shift—from a traditional focus on knowledge dissemination to a more balanced emphasis on cultivating competence and professional qualities. The paper examines current advancements across four critical dimensions: pedagogical innovation, integration of digital technologies, assessment system reform, and the incorporation of ideological and cultural values into curricula. Specific focal areas include the blending of apprenticeship models with formal academic training, curriculum redesign centered on competency development, the application of virtual simulation and artificial intelligence in instruction, and the implementation of Objective Structured Clinical Examination (OSCE) for evaluation. Furthermore, the study identifies existing challenges, such as reconciling standardized protocols with individualized learning needs and facilitating the professional evolution of educators. Looking ahead, the paper anticipates emerging trends including intelligent education systems and interdisciplinary convergence in medical education, aiming to contribute insights for constructing a TCM educational ecosystem that harmonizes heritage with innovation.

Keywords: Traditional Chinese Medicine education; teaching methodology; apprenticeship-based learning; educational technology; integration of ideological education in curricula; assessment reform.

1. Preface

In recent years, with the in-depth advancement of the "Healthy China" strategy and the global re-recognition of the value of traditional medicine, education in traditional Chinese medicine (TCM) has encountered unprecedented development opportunities, while also facing profound challenges of modernization, standardization, and internationalization. The focus of teaching and research has shifted from merely imparting knowledge to building a diversified, high-level education system centered on students, oriented towards abilities, and integrating modern technology [1]. This transformation aims to cultivate compound talents who are proficient in both classic TCM theories and modern clinical and research capabilities. The following are the progressions in several core areas of teaching and research:

2. Innovation in Core Teaching Models and Methods

2.1 Deep Integration of "Apprenticeship Education" and "Institutional Education"

2.1.1 Research Background:

Traditional apprenticeship education is a treasure in the cultivation of TCM talents. Its model of "oral transmission and individualized teaching" has irreplaceable value in passing on tacit knowledge and clinical experience, but it is difficult to achieve large-scale training. Modern institutional education ensures the scale and systematicness of talent output, but it is prone to homogenization and fails to fully consider the individualized development of students' TCM diagnostic thinking.

2.1.2 Research Progress:

(1) Inheritance Model of Famous Old Doctors' Workshops:

This model has evolved from loose cooperation to a formalized teaching platform. Many universities have invited famous old doctors and academic leaders to set up workshops on campus. Through organizing students to follow doctors in clinics, participate in discussions of typical cases, and systematically sort out and study the academic thoughts and clinical experiences of famous old doctors, the teaching concept of "early, frequent, and repeated clinical practice" is realized [2]. For instance, some universities require students to complete "Fellowship Notes" and "Summary Reports on Academic Thoughts", transforming their perceptual cognition into rational knowledge.

(2) "Dual Mentorship" System in Higher Vocational Colleges:

In response to the characteristics of higher vocational education emphasizing skill training and application, some vocational colleges have innovatively implemented the "Dual Mentorship" system. This system involves a full-time teacher from the school and a clinical doctor from an affiliated hospital or community medical center serving as mentors. The school mentor is mainly responsible for students' professional basic theory, classic works study, and academic planning; the clinical mentor focuses on guiding students in skill training, on-the-job internships, case analysis, and the cultivation of professional ethics. This "dual entity, collaborative" guidance model closely aligns with job demands, effectively strengthening students' integration of

theory and practice, and accelerating their transformation into high-quality technical and skilled talents.

(3) Exploration of "Modern Apprenticeship System":

During the clinical internship stage, some colleges have attempted to implement the "Modern Apprenticeship System", signing more formal learning agreements among the school, affiliated hospitals, and students. This system clarifies teaching goals, responsibilities, and assessment methods, institutionalizing and deepening "bedside teaching", ensuring that students can truly immerse themselves in real medical environments for learning [3].

2.2 Curriculum Reform Oriented towards Abilities

2.2.1 Research Background:

To overcome the problem of theoretical-practical disconnection caused by the traditional "basic theory - clinical - internship" three-stage curriculum system, current reforms emphasize breaking down disciplinary barriers, taking the cultivation of TCM thinking as the main line, and enhancing clinical abilities as the core, achieving early integration and full connection between knowledge learning and ability cultivation.

2.2.2 Research Progress:

(1) Integrated Curriculum System: The contents of originally separate courses such as TCM basic theory, TCM diagnostics, pharmacology, and formulaology are horizontally and vertically integrated to form teaching modules centered on "diseases" or "syndromes". For example, around the theme of "insomnia", the etiology and pathogenesis (basic theory), collection of four diagnostic information and syndrome differentiation (diagnostics), commonly used sedative herbs (pharmacology), and the composition and application of classic formulas like Suanzaoren Decoction are explained simultaneously and in a connected manner, enabling students to form a complete knowledge chain.

(2) Widespread application of PBL/CBL/TBL teaching methods: PBL (Problem-Based Learning): Starting from real, ill-structured clinical cases, it guides students to independently search for information, conduct group discussions, raise questions and solve problems, cultivating their comprehensive abilities of autonomous learning and solving complex clinical problems throughout the process

[4] CBL (Case-Based Learning): Carefully selected typical medical cases of renowned traditional Chinese medicine practitioners are used to guide students to deeply analyze their diagnostic thinking, treatment principles and medication characteristics, enabling them to grasp the essence of traditional Chinese medicine reasoning through case analysis.

TBL (Team-Based Learning): Tasks requiring team collaboration are designed in the course, such as jointly completing a complex case diagnosis and treatment plan, to cultivate students' communication and collaboration skills as well as team spirit.

(3) Systematization of "Early and Frequent Clinical Practice": A clinical practice teaching chain running through the entire undergraduate education has been established. From hospital recognition internships in the first year, community free clinics and follow-up internships in the second year, to specialized rotations and position internships in the third year, the practical

links progress step by step, ensuring continuous accumulation of clinical experience for students and achieving the role transformation from "observer" to "participant" and then to "quasi-medical professional".

3. Deep integration of modern educational technology

3.1 Virtual simulation and simulation teaching

3.1.1 Research progress:

(1) Virtual acupuncture/massage training system: Using high-precision force feedback devices and virtual reality (VR) technology, a virtual human body model is constructed. Students can repeatedly practice the lifting, thrusting, twisting and rotating of fine needles, the warmth sensation of moxibustion, and various massage techniques on it. The system can provide real-time quantitative feedback on technique parameters (such as angle, force, frequency), achieving risk-free, repeatable and standardized skill training [5].

(2) Intelligent models of simulated four diagnostic methods: Developed intelligent models capable of simulating dozens of common tongue appearances (such as pale tongue, red and purple tongue, greasy coating), pulse conditions (such as floating pulse, deep pulse, taut pulse) and facial colors (such as sallow, pale). Students can enhance their accuracy in collecting four diagnostic information and their ability to analyze syndromes through repeated identification [6].

(3) Virtual clinical thinking training system: Virtual patients with rich medical histories and dynamic disease changes are constructed. Starting from the initial consultation, students need to independently complete the entire diagnosis and treatment process of "observation, auscultation and olfaction, inquiry, palpation - syndrome differentiation - treatment principle - prescription". The built-in intelligent engine will evaluate and provide feedback on the logic of their diagnosis, the accuracy of syndrome differentiation and the rationality of prescriptions from multiple dimensions, making it an effective tool for training clinical decision-making ability.

3.2 Online courses and blended teaching

3.2.1 Research progress:

(1) National-level excellent online open courses: Relying on platforms such as "Smart Tree" and "Xuetang Online", many core courses of traditional Chinese medicine (such as "Basic Theory of Traditional Chinese Medicine", "Acupuncture", "Formula Studies") have been built into national-level excellent online open courses, breaking the barriers between schools and achieving wide sharing of high-quality educational resources.

(2) SPOC (Small Private Online Course): Each school uses existing MOOC resources or builds its own resources to offer SPOCs for its students. Combining online video learning, online quizzes with offline flipped classrooms and in-depth discussions, a blended teaching model of "online knowledge transmission and offline internalization improvement" has been realized, making teaching more targeted [7].

(3) Micro-lectures and MOOCs: Key, difficult and doubtful knowledge points in the course (such as "the principle of compatibility of the four ingredients in a formula [8]", "the experience of obtaining qi in acupuncture [9]", etc.) are made into short and concise micro-lecture videos of 5-15 minutes,

facilitating students to preview and review during fragmented time, enhancing the flexibility and efficiency of learning.

3.3 Application of artificial intelligence and big data

3.3.1 Research progress:

(1) AI-assisted syndrome differentiation system: Based on the data mining of a large number of medical cases of renowned traditional Chinese medicine practitioners, an artificial intelligence syndrome differentiation model is constructed. After students input the four diagnostic information of patients, the system can provide reference for syndrome differentiation analysis, recommend classic prescriptions and offer medication ideas, serving as an auxiliary tool for students to train their syndrome differentiation thinking and broaden their diagnostic and therapeutic approaches [10].

(2) Smart classrooms and learning analytics: By using the smart classroom system, data such as students' classroom interactions, in-class tests, and homework completion are collected. Through big data analysis, individual and group learning profiles are accurately depicted, enabling personalized learning alerts, resource recommendations, and intervention guidance. This shifts teaching management from experience-driven to data-driven.

4. Reform and Construction of the Evaluation System

4.1 From "Knowledge Assessment" to "Competency Assessment"

4.1.1 Research Progress:

(1) Objective Structured Clinical Examination (OSCE): It has become one of the core evaluation methods for professional certification in traditional Chinese medicine. The examination usually sets up multiple standardized stations, such as the history-taking station, tongue and pulse diagnosis station, acupuncture and massage skills operation station, case writing station, and doctor-patient communication station, comprehensively and objectively assessing students' clinical comprehensive abilities and professional qualities [11].

(2) Formative Assessment: Greatly increases the weight and frequency of assessment during the learning process. Students' performance in PBL discussions, the quality of written medical records, group project presentations, and periodic skill evaluations are included in the final grades, with timely feedback provided to guide students to focus on the learning process and address the drawback of "one exam at the end of the term determining everything" [12].

(3) Mini-CEX (Mini-Clinical Evaluation Exercise) and DOPS (Direct Observation of Procedural Skills):

Clinical instructors directly observe and provide immediate feedback on students' history-taking skills, physical examination, professional attitude, and specific operational skills (such as acupuncture, moxibustion) during real clinical work. This is an efficient bedside formative assessment method.

5. Integration of Ideological and Political Education and Cultural Confidence

5.1 Comprehensive Implementation of "Course-based Ideological and Political Education"

5.1.1 Research Progress:

Deeply explore the essence of Chinese excellent traditional culture contained in traditional Chinese medicine, such as the holistic view of "harmony between man and nature", the professional ethics of "benevolence of doctors", the dedication spirit of "great physicians are sincere and meticulous", and the philosophical wisdom of "moderation and harmony", and organically integrate them into the teaching objectives, case designs, and classroom discussions of professional courses [13]. For example, when teaching "Treatise on Cold Damage Disorders", not only the six meridian syndrome differentiation is analyzed, but also Zhang Zhongjing's "diligently seeking ancient teachings and extensively collecting various prescriptions" academic spirit is emphasized to cultivate students' scientific attitude and humanistic sentiment.

5.2 Inheritance of Traditional Chinese Medicine Culture

5.2.1 Research Progress:

By building a campus traditional Chinese medicine museum, a medicinal plant garden, holding traditional Chinese medicine classic recitation competitions, famous doctor story lectures, campus traditional Chinese medicine culture festivals, and performances of traditional Chinese medical exercises (such as Tai Chi, Baduanjin), a rich and profound traditional Chinese medicine cultural atmosphere is created, subtly enhancing students' professional identity, cultural confidence, and the sense of mission to inherit and promote the traditional Chinese medicine cause [14].

6. Challenges Faced and Future Trends

6.1 Main Challenges:

6.1.1 Balance between Standardization and Personalization:

How to effectively retain and stimulate the personalized and school-based characteristics of apprenticeship education under the national professional certification standards and unified examinations and other large-scale quality monitoring systems is a long-term challenge for institutional design.

6.1.2 Transformation of the Teaching Staff:

The successful implementation of teaching reforms requires teachers to be not only experts in traditional Chinese medicine and clinical practitioners but also "dual-qualified" or even "multi-qualified" talents who master modern educational technology and are proficient in teaching design. The cultivation and reserve of such compound talents are still insufficient.

6.1.3 Deep Integration of Technology and Content:

We need to be vigilant against the "formalism" and "show-off" tendencies in the application of educational technology, ensuring that technologies such as VR and AI truly serve the core of cultivating traditional Chinese medicine (TCM) thinking and clinical skills, rather than overshadowing the main purpose.

6.1.4 Organic Integration of Traditional Chinese and Western Medicine Curricula:

How to find the internal logical connection points in the curriculum setting that emphasizes both TCM and Western medicine, achieve "adhering to the essence of TCM while referring to Western medicine", complement each other, and avoid students forming the cognitive predicament of "two systems, unrelated to each other", is the deep water zone of curriculum reform.

6.2 Future Trends:

6.2.1 Smart TCM Education:

With the further development of artificial intelligence, VR/AR, and big data, their applications in personalized learning path planning, intelligent diagnostic assistance training, and highly immersive clinical simulation teaching will become more in-depth and widespread, building a new paradigm of human-machine collaborative smart education.

6.2.2 Cross-disciplinary Integration under the Background of "New Medicine":

TCM education will more actively intersect with cutting-edge disciplines such as modern life sciences, bioinformatics, intelligent science, and materials science, cultivating compound leading talents who can use modern technology to explain the principles of TCM and promote the modernization and innovation of TCM.

6.2.3 Global Vision:

To adapt to the strategic demand of TCM "going global", efforts will be made to further strengthen the construction of all-English teaching courses and teaching staff, actively participate in and lead the formulation of international standards for TCM education, and cultivate internationalized TCM talents with cross-cultural communication skills and the ability to step onto the world stage.

6.2.4 Lifelong Learning System:

By leveraging information technology, a seamless lifelong education system covering pre-service education, post-service education (such as standardized resident training), and continuing professional development will be constructed, supporting TCM talents to continuously update their knowledge and enhance their abilities throughout their careers.

7. Conclusion

Currently, TCM education and teaching research are in a dynamic period of transformation and reconstruction. Its core features are: centered on student development, with the dual focus on cultivating TCM thinking and enhancing clinical skills, through the deep integration of modern educational technology, systematic innovation of teaching models, scientific reform of evaluation systems, and organic integration of ideological and cultural elements, aiming to build a new educational ecosystem that can both adhere to the academic essence and cultural heritage of TCM and actively adapt to and lead the health needs of modern society. Future research and practice will continue to closely adhere to the fundamental theme of "upholding tradition while innovating", constantly exploring at both theoretical and practical levels, with the aim of more efficiently and

scientifically cultivating outstanding TCM inheritors and innovators with both virtue and talent.

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