

"Three-Dimensions, Three Positions, Three Links": Innovative Construction and Practical Paths of a Teaching System Addressing Core Challenges in Traditional Chinese Medicine Education

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Abstract

Current higher education in Traditional Chinese Medicine (TCM) faces systemic challenges in knowledge transmission, clinical integration, and evaluation mechanisms. Targeting three core pain points—"scattered knowledge points difficult to connect", "disconnection between basic and clinical teaching", and "a single and rigid curriculum evaluation system"—this paper innovatively constructs a comprehensive teaching reform system titled "Three-Dimensional Exploration of 'Li' (Theory), Three-Dimensional Integration of 'Tong' (Integration), and Three-Link Achievement of 'He' (Harmony)". The system aims to deepen theoretical understanding through three dimensions ("historical origin, philosophical thinking, modern cognition"), promote capacity transformation via three integrations ("theory-practice, classroom-clinic, inheritance-innovation"), and ensure students' all-round development relying on a multi-dimensional evaluation mechanism ("combination of process and summative evaluation, linkage of knowledge, ability and literacy, collaboration of human-machine and multi-subject evaluation"). This paper systematically elaborates on the core concepts, implementation paths, and theoretical foundations of the system, intending to provide a systematic and operable solution for the inheritance and innovation of TCM talent training models in the new era.

Keywords

Traditional Chinese Medicine education; teaching reform; Three-Dimensional Exploration of "Li"; Three-Dimensional Integration of "Tong"; Three-Link Achievement of "He"; clinical thinking; formative evaluation

Introduction

Confronting the Era's Questions in Higher TCM Education

TCM is a treasure of Chinese civilization, whose vitality and inheritability are deeply rooted in its unique theoretical system and practical wisdom. However, in the context of modern higher education, the traditional training model for TCM talents is encountering unprecedented structural tensions. While institutionalized and large-scale education has realized the standardization and efficiency of knowledge dissemination, it has inevitably brought about prominent problems such as knowledge fragmentation, separation of theory from practice, and a single evaluation orientation. These problems are not isolated but interrelated and mutually reinforcing, collectively forming a bottleneck restricting the improvement of TCM education quality [1].

The primary challenge is the difficulty in establishing organic connections between TCM knowledge points. Derived from ancient philosophy and long-term clinical observations, TCM theories—such as Yin-Yang, Five Elements, Zang-Fu organs, Qi, blood, and body fluids—possess high abstraction, integrity, and relationality. Although the traditional subject-based teaching method facilitates the teaching of individual knowledge points, it easily traps students in the predicament of "seeing trees but not the forest". Students often memorize conclusions like "the liver governs dispersion" but struggle to understand its origin and profound meaning within the cosmic view of "correspondence between heaven and human beings" and the dynamic system of "inter-generation and restriction of the Five Elements", let alone establish meaningful dialogue with modern physiological and pathological knowledge. Knowledge becomes isolated memory points rather than an interconnected cognitive network [2].

Second, there is a significant disconnection between theory and clinical practice. TCM is a practical medical discipline, whose essence lies in the clinical thinking and skills of "syndrome differentiation and treatment". However, in the current educational model, basic theoretical teaching and clinical practice are often arranged in two relatively independent stages, with obvious temporal, spatial, and content gaps. Students lack perception of clinical contexts when learning theories in lower grades, and when entering clinical practice in higher grades, they feel at a loss due to the ineffective internalization of theories. This disconnection leads to the lag in cultivating students' clinical thinking abilities, making it difficult to achieve the ideal goal of "early clinical practice, frequent clinical practice, and repeated clinical practice" [3].

Finally, the curriculum evaluation system tends to be simplistic. At present, the evaluation of many TCM courses still relies heavily on final summative written examinations, focusing on assessing the memory of knowledge points. This "one-exam determines all" model can neither fully measure the establishment of students' TCM thinking, the mastery of clinical skills, nor the exploration of innovative potential. It also reversely leads to an exam-oriented learning orientation, stifling students' interest in inquiry and innovation. The guiding role of evaluation has not effectively guided teaching towards a competence and literacy-oriented transformation [4].

Faced with these deep-seated problems, sporadic and partial teaching improvements are no longer effective; a systematic and top-down reconstruction of the teaching system is imperative. To this end, we propose and construct an innovative teaching system of "Three-Dimensional Exploration of 'Li', Three-Dimensional Integration of 'Tong', and Three-Link Achievement of 'He'". Directly targeting the above three core challenges, this system aims to reshape the teaching ecology of TCM education through the coordinated reform of concepts, paths, and mechanisms, cultivating outstanding TCM talents who are well-versed in traditional essence and adaptable to the development needs of modern medicine [5].

1. Three-Dimensional Exploration of "Li": Constructing a Stereoscopic and Communicable Cognitive Network of TCM Theories

The "Three-Dimensional Exploration of 'Li'" is a fundamental teaching strategy addressing the fragmentation and abstraction of knowledge points. Its core lies in refusing to inculcate TCM theories as static and closed conclusions, but guiding students to conduct in-depth meaning-seeking and understanding construction through three cognitive dimensions—"history, philosophy, and modernity". This restores isolated knowledge points into a rooted, soulful,

and verifiable three-dimensional network, ultimately achieving the sublimation of cultural understanding and theoretical identification [6].

1.1 Historical Dimension: Tracing the Cultural Origin and Evolution of Theories

Any theory is a product of a specific historical culture. Exploring "Li" from the historical dimension means leading students back to the original context of the creation and development of TCM theories. For example, when teaching the concept of "Yin-Yang", we not only explain its attribute of "unity of opposites" but also trace its historical process from a philosophical category in *I Ching* to systematic medicalization in *Huangdi Neijing* (Yellow Emperor's Internal Classic). When teaching "Zang-Fu organs", we analyze the profound influence of ancient astronomy, geography, and social structures on their naming and functional definition in combination with the ancient thinking mode of "image analogy". Through historical tracing, students can understand that TCM concepts are not generated out of thin air but are the crystallization of wisdom through which ancient people observed, summarized, and interpreted life phenomena under a specific worldview. This not only demystifies theories but also cultivates students' historical perspective of "empathic understanding", enhancing their identification with and confidence in excellent traditional Chinese culture [7].

1.2 Philosophical Dimension: Grasping the Thinking Core and Cognitive Model of Theories

The philosophical dimension is the soul of TCM theories. Unlike the reductionist analysis of modern medicine, TCM emphasizes holistic view, dynamic view, and relational view, supported by a unique set of thinking modes such as image thinking, dialectical logic, and systematic thinking. Exploring "Li" from the philosophical dimension focuses on thinking training. In teaching, we guide students to use "image analogy" to understand "the liver belongs to wood and its emotion is anger"; use "observing the exterior to infer the interior" to train their ability to deduce internal pathogenesis through tongue coating and pulse conditions; and use "Yin-Yang waxing and waning" and "inter-generation and restriction of the Five Elements" to analyze the dynamic evolution and complex connections of diseases. This process externalizes and curricularizes implicit and tacit thinking modes. For example, with the help of visualization tools such as "knowledge graphs", teachers can display the complex network relationships between core concepts, while students can actively construct and externalize their own understanding frameworks by drawing personalized knowledge graphs, transforming abstract philosophical relationships into operable thinking models. This transforms students from passive recipients of knowledge into active constructors of thinking modes [8].

1.3 Modern Dimension: Building a Dialogue Bridge Between Traditional Theories and Modern Science

Upholding tradition does not mean clinging to the past, and innovation requires openness. Exploring "Li" from the modern dimension aims to use modern scientific language, technologies, and discoveries to provide new observational perspectives and interpretive possibilities for traditional theories, building a cognitive bridge for dialogue between ancient and modern, Chinese and Western. This is not a simple "one-to-one correspondence" or "interpreting Chinese medicine with Western medicine", but a heuristic connection based on functional and phenomenological correspondence. For example, when teaching the

morphological structure of the "heart" in anatomy, we link TCM theories of "the heart governs blood vessels" and "the heart stores spirit", and discuss modern psychosomatic medicine and neuroendocrinology research on the correlation between emotions and cardiovascular function, thereby establishing multi-level cognition at the level of "structure-function-overall regulation" [9]. Technology plays a key role in this dimension. The use of 3D anatomy and virtual simulation technology can intuitively display the three-dimensional adjacency relationships between meridians/acupoints and peripheral nerves/vessels; dynamic imaging can simulate the imagery of "Qi and blood" circulation. These technical means transform invisible theoretical assumptions into visible and perceptible interactive experiences, greatly reducing students' cognitive load and promoting the visualization of abstract concepts [10].

The "Three-Dimensional Exploration of 'Li'" is an organic whole. The historical dimension endows theories with temperature and depth, the philosophical dimension endows cognition with soul and logic, and the modern dimension endows understanding with a sense of the times and openness. Collaborating synergistically, they guide students to complete the cognitive leap from "knowing what it is" to "knowing why it is" and further to "knowing what it may become", fundamentally solving the problem of isolated and difficult-to-internalize knowledge points [11].

2. Three-Dimensional Integration of "Tong": Creating a Boundaryless and Progressive Path for Incubating Clinical Competence

While the "Three-Dimensional Exploration of 'Li'" addresses the problem of "understanding", the "Three-Dimensional Integration of 'Tong'" is committed to solving the problem of "application". Targeting the predicament of disconnected basic and clinical teaching, this system proposes breaking the inherent boundaries of theory, classroom, and inheritance, promoting in-depth integration of three dimensions—"theoretical teaching and clinical practice", "classroom teaching and clinical site", and "inheritance education and innovative development". It aims to create a seamless connection and progressive competence path of "early clinical practice, frequent clinical practice, and repeated clinical practice" [12].

2.1 Integration of Theoretical Teaching and Clinical Practice: Paradigm Shift from "Learning Then Doing" to "Doing While Learning"

The traditional linear model of "theory first, practice later" is one of the main causes of disconnection. The "Three-Dimensional Integration of 'Tong'" advocates the full interweaving and spiral upgrading of theoretical teaching and clinical practice. In basic courses for lower grades, we vigorously promote the "case-led teaching method" and "virtual simulation training". For example, when teaching "spleen deficiency syndrome" in *Diagnostics of Traditional Chinese Medicine*, a real or virtual case of a patient with spleen deficiency is introduced, allowing students to learn relevant theories with the clinical question of "how to diagnose and treat". Subsequently, students can access platforms such as the "3D virtual simulation training system for TCM pulse diagnosis" to practice inspection, listening/smelling, inquiry, and pulse-taking skills in a highly simulated environment [13]. This "theory-virtual training" microcycle immediately provides application scenarios for theories, enabling knowledge to be activated and consolidated in simulated practice. In clinical courses and internship stages for higher grades, we emphasize "practice feeding back theory". Through teaching ward rounds and case discussions, students are guided to use learned theories to conduct in-depth analysis of real medical conditions, discover the inadequacies of theories in

this process, and stimulate their re-learning and rethinking of classic texts, thereby forming a spiral deepening of "clinical practice-theory-clinical practice" [14].

2.2 Connection of Classroom Teaching and Clinical Site: Eliminating Temporal and Spatial Barriers Between Campus and Hospital

With the help of modern information technology, we can "move" the clinical site into the classroom and extend the classroom to the consulting room. On the one hand, by building an "integrated Chinese and Western clinical case database" and using high-definition live broadcast technology, we regularly carry out "cloud-based follow-up consultations" or "live surgery/diagnosis and treatment courses". Although students are in the classroom, they can real-time observe the entire diagnosis and treatment process of renowned experts, experience real doctor-patient interaction and clinical decision-making, and conduct remote questioning and interaction. This realizes the cross-temporal and spatial sharing of high-quality clinical resources, making "ten thousand people in the same class" possible [15]. On the other hand, we promote "bedside teaching" and "dual-teacher classrooms". Some clinical courses are directly offered in affiliated hospitals, co-taught by school teachers and clinical physicians. Clinical physicians bring the latest diagnosis and treatment plans and encountered intractable diseases into the classroom, greatly enhancing the timeliness and vitality of teaching. This connection makes clinical practice no longer a distant goal but a vivid background throughout the learning process [16].

2.3 Parallel Integration of Inheritance Education and Innovative Development: Cultivating Future Physicians Rooted in Classics

TCM education must both inherit the essence and uphold tradition while innovating. The "Three-Dimensional Integration of 'Tong'" system integrates the essence of apprenticeship education into institutional education and injects the era requirements of innovative development. We implement a "full-course tutorial system", assigning academic and clinical tutors to students from enrollment. Through following tutors to copy prescriptions and sort out medical cases, implicit knowledge is imparted through oral instruction and personal demonstration [17]. At the same time, we set up "interdisciplinary extended research training programs", encouraging and guiding students to transform clinical problems discovered during apprenticeship or virtual diagnosis and treatment into research projects. Students can learn how to use data mining technology to analyze the rules of ancient prescriptions, how to use modern experimental methods to verify the efficacy mechanisms of traditional Chinese medicines, or how to design clinical research protocols [18]. In addition, we actively organize students to participate in academic competitions such as the "TCM Classic Knowledge Competition" and the "Integrated Chinese and Western Medicine Innovation Competition", promoting learning and innovation through competitions. These initiatives aim to cultivate students' "translational medicine" thinking—being able to draw nutrients from the profound tradition while using modern scientific and technological means to explore new knowledge, becoming a bridge connecting traditional wisdom and future medicine [19].

Through the "Three-Dimensional Integration of 'Tong'", we have constructed a three-dimensional clinical competence training ecosystem from virtual to real, from basic to cutting-edge, and from inheritance to innovation. In this system, students can gradually transform the theoretical cognition gained from the "Three-Dimensional Exploration of 'Li'" into comprehensive abilities to solve practical clinical problems [20].

3. Three-Link Achievement of "He": Constructing a Diversified and Developmental Teaching Evaluation and Quality Assurance System

A scientific evaluation system is the "baton" and "calibrator" of teaching reform. Addressing the drawback of a single evaluation method, the "Three-Link Achievement of 'He'" evaluation reform aims to break through the limitation of "one-exam determines all", establishing a comprehensive evaluation mechanism that can fully reflect students' growth, effectively promote teaching improvement, and ultimately realize the harmonious development of students' knowledge, abilities, and literacy [21].

3.1 Combination of Formative and Summative Evaluation: Depicting a Dynamic Hologram of Learning Growth

We significantly increase the weight and refinement of formative evaluation, forming a synergy with summative evaluation. The core of formative evaluation lies in tracking and providing feedback on the entire learning journey of students. Using an integrated learning management platform and AI analysis tools, the system automatically collects and analyzes students' multi-dimensional learning data to form a "personalized digital learning profile". Such data includes but is not limited to: video viewing duration and interaction points of online courses, decision-making logic paths and operation accuracy in virtual simulation diagnosis and treatment, completeness and innovation of knowledge graph construction, and contribution and thinking depth in group case discussions [22]. These dynamic data constitute objective evidence for evaluating students' learning engagement, thinking activity, and skill proficiency. Summative evaluation is upgraded and transformed, reducing rote memorization questions and increasing high-level assessment forms such as comprehensive case analysis, complex scenario decision-making, and research report writing. The combination of the two focuses not only on the final learning outcomes but also values the efforts and growth in the process, realizing the transformation from "evaluating learning results" to "promoting learning occurrence" [23].

3.2 Linkage of Knowledge, Ability, and Literacy Evaluation: Establishing a Talent Measurement Benchmark for All-Round Development

The evaluation content is expanded from a single knowledge dimension to a "KAQ" three-dimensional matrix emphasizing Knowledge, Ability, and Quality. Knowledge evaluation ensures students' solid grasp of core concepts and theoretical systems through online question banks and standardized examinations. Ability evaluation is the key, focusing on TCM clinical thinking ability (assessable through virtual OSCE assessments and case analysis reports), practical operation ability (assessable through physical or virtual skill assessments), and scientific research and innovation ability (assessable through research project reports and competition works) [24]. Literacy evaluation focuses on students' medical ethics, humanistic care, teamwork, and TCM thinking qualities, which can be conducted through feedback from Standardized Patients (SP), 360-degree peer review, and reflective journals. For example, in virtual consultations, AI systems can perform semantic analysis of students' communication language and empathetic expressions; in team projects, a peer review mechanism is introduced [25]. This multi-dimensional linked evaluation encourages both students and teachers to focus on the comprehensive qualities that are more important for becoming excellent physicians.

3.3 Collaboration of Human-Machine and Multi-Subject Evaluation: Forming an Objective and Fair Evaluation Community

We construct a multi-subject evaluation network involving AI agents, professional teachers, clinical tutors, peers, and students themselves. As "objective recorders" and "primary analysts", AI agents provide 24/7 uninterrupted and standardized formative data collection and preliminary diagnosis, such as identifying normative errors in skill operations [26]. Teachers and clinical tutors act as "senior diagnosticians" and "value judges", conducting qualitative evaluation and personalized guidance on the depth of students' thinking, the value of innovation, and the performance of literacy based on AI-provided analysis reports combined with their professional insights. Peer review is widely used in project-based learning and group case discussions, cultivating students' critical thinking and collaborative spirit [27]. In addition, students are guided to conduct self-evaluation and reflection, establishing learning portfolios to record their growth trajectories and insights. This "human-machine collaboration, multi-subject joint" evaluation network integrates evaluation wisdom from different perspectives, making evaluation results more comprehensive, three-dimensional, and fair, as well as more educational and developmental [28].

The ultimate goal of the "Three-Link Achievement of 'He'" evaluation system is to "achieve harmony"—promoting the harmony between teaching and learning, the harmonious development of students' various qualities, and the harmonious integration of traditional evaluation culture and modern educational concepts. It returns evaluation to its educational essence, becoming a core mechanism driving students' continuous improvement, encouraging teachers to optimize teaching, and ensuring the continuous improvement of talent training quality [29].

4. Conclusion and Outlook

The innovative teaching system of "Three-Dimensional Exploration of 'Li', Three-Dimensional Integration of 'Tong', and Three-Link Achievement of 'He'" is a systematic and structural response to the deep-seated problems in current higher TCM education. It is not a simple superposition of several teaching methods but an overall reform from educational concepts and teaching processes to evaluation mechanisms. The system addresses the challenges of cognitive construction through the "Three-Dimensional Exploration of 'Li'", reshaping the teaching ecology of TCM theories; breaks the barriers to competence cultivation through the "Three-Dimensional Integration of 'Tong'", reconstructing the practical path of clinical teaching; and reverses the deviation of evaluation orientation through the "Three-Link Achievement of 'He'", re-establishing a quality culture that promotes development. These three components are interlocking, forming an organic whole with unified goals, self-consistent logic, and coordinated operation [30].

Practice has proven that the exploration and implementation of this system can effectively guide students from rote memorization to meaning construction, from theoretical empty talk to clinical confidence, and from exam-oriented learning to all-round development. It cultivates new-era TCM talents who are "enlightened in principle, proficient in skills, diligent in practice, and benevolent in spirit"—"enlightened in principle" through three-dimensional exploration, "proficient in skills" through three-dimensional integration, and "diligent in practice" and "benevolent in spirit" nurtured and demonstrated under the guidance of three-link evaluation.

Looking forward, the deepening and promotion of this system still face many challenges, such as the general improvement of teachers' interdisciplinary teaching capabilities, the large-scale development of high-quality integrated curriculum resources, the in-depth integration of intelligent teaching platforms, and the adaptive adjustment with traditional teaching management systems. In the next step, we will continue to make efforts in two dimensions: "vertical deepening" and "horizontal collaboration". Vertically, we will systematically migrate and deepen successful experiences from pilot courses to core TCM course groups, and promote the formal institutionalized credit recognition of "students' competence digital files". Horizontally, we will strive to build a regional or national TCM teaching innovation alliance, co-constructing and sharing virtual case libraries, teaching resources, and evaluation standards, and conducting multi-center teaching research.

In conclusion, facing the era's responsibility of revitalizing and developing TCM and the global wave of medical education innovation, only by adhering to inheritance and innovation and carrying out deeper and wider educational and teaching reforms can we cultivate outstanding TCM successors who can both inherit the ancient benevolent medical skills and shoulder the responsibility of building a Healthy China. The "Three-Dimensions, Three Positions, Three Links" system is a firm exploration in this direction, providing valuable theoretical thinking and practical paths for constructing a TCM education paradigm with Chinese characteristics and world-class standards.

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