

Research on the Transformation Mechanism and Innovative Cultivation Paths from Clinical Competence to Career Development Competence for Postgraduates of Ethnic Medicine

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Abstract: Aiming at the disconnection between clinical practical ability and long-term career development literacy in the postgraduate education of Zhuang Medicine, this study deeply explores the transformation mechanism and innovative cultivation between the two. Firstly, this study constructs a three-level analytical framework of “individual–knowledge–environment”, and clarifies that the transformation is a socialized process synergistically promoted by the internal drive of cultural identity, knowledge creation through the integration of clinical practice and scientific research, as well as empowerment by diverse communities of practice and “dual-competent” supervisors. Furthermore, this study proposes a systematic solution of “One Core, Two Wings, Three Synergies” guided by the cultivation of “scholarly Zhuang Medicine physicians.” By building a practical platform integrating clinical practice, scientific research and community service, constructing a dual-module curriculum system of cultural inheritance and career development, and deepening the collaborative education ecosystem among master-apprenticeship and academic education, clinical practice and community service, as well as multiple disciplines, this solution aims to achieve a fundamental transition of postgraduates from “skill inheritors” to “innovative pioneers adhering to the right principles.” This study provides a reform blueprint with both theoretical depth and practical feasibility for the cultivation of high-level and interdisciplinary talents in Zhuang Medicine and other ethnic medicines.

Keywords: Ethnic medicine; Clinical competence; Career development competence; Transformation mechanism; Cultivation path

Online publication: April 28, 2026

1. Introduction

Against the background of the in-depth implementation of the “Healthy China” strategy and the innovative

development of medical education in the new era, ethnic medicine, as a unique health resource and cultural treasure of China, the training quality of its high-level talents is directly related to the inheritance, innovation, and social service capacity of the discipline^[1-2]. Taking Zhuang Medicine as an example, it has unique theories such as “Three Dao and Two Lu” and “disease caused by toxin and deficiency”, as well as rich therapies including eye diagnosis, needle pricking, and herbal bamboo cupping, constituting an important part of Zhuang cultural heritage and modern health service system^[3-4]. Postgraduate education is the main channel for cultivating top innovative talents of ethnic medicines, including Zhuang Medicine. However, the current training mode generally focuses on the training of “clinical competence” such as characteristic diagnosis and treatment techniques, and prescription application. Graduates often face a “plateau dilemma” in subsequent career development—their solid “clinical competence” is difficult to be effectively transformed into sustainable and comprehensive “career development competence.” The latter covers key dimensions such as scientific research innovation, cross-cultural communication, medical service management, knowledge inheritance and transformation, and lifelong learning according to disciplinary characteristics^[5-6]. Such a disconnection between “skills” and “literacy” not only restricts the professional competitiveness and growth space of individual talents, but also profoundly affects the adaptability and development vitality of Zhuang Medicine and other ethnic medicines in the process of modernization and scientization. Therefore, taking Zhuang Medicine as a specific observation example, deeply exploring the internal mechanism of the dynamic transformation from clinical competence to career development competence, and systematically designing targeted innovative cultivation paths accordingly, has become a major topic with both theoretical value and practical urgency. Beyond the superficial description of traditional training modes, this study focuses on the core contradiction in Zhuang Medicine postgraduate education, deeply analyzes the key mechanisms of the transformation between the two, and constructs a systematic path centered on empowering growth. It is expected to provide a referable theoretical basis and practical schemes for solving the bottleneck of postgraduate training of Zhuang Medicine and similar ethnic medicines and improving the quality of high-level talent training, so as to help the high-quality development of ethnic medicine through adhering to integrity and innovation.

2. Theoretical mechanism of the transformation from clinical competence to career development competence

One of the core contradictions in the training of ethnic medicine postgraduates lies in how to effectively transform solid traditional clinical skills training into comprehensive abilities supporting their long-term career development and disciplinary innovation. To solve this contradiction, it is first necessary to clarify the connotation of the transformation, construct an analytical framework, and explain its internal mechanism at the theoretical level.

2.1. Connotation and dimensions of the transformation

The transformation from clinical competence to career development competence is not a simple extension of knowledge or superposition of skills, but a qualitative leap process involving the reconstruction of cognitive structure, deepening of identity, and innovation of practical mode^[7-8]. In the context of Zhuang Medicine, clinical competence is mainly reflected in the standardized and procedural practical ability to solve individual pain under the guidance of core theories such as “harmony between man and nature”, “synchronization of

three qi” and “Three Dao (grain dao, water dao, qi dao) and Two Lu (dragon lu, fire lu)”, by skillfully using characteristic diagnostic methods such as eye diagnosis, nail diagnosis and abdominal diagnosis, as well as rich therapies including oral administration of herbs, fumigation, herbal wearing, scraping, needle pricking and horn therapy. Its core characteristics are “inheritance through oral instruction and personal teaching” and “dexterous operation based on experience”, emphasizing the mastery and application of pathogenesis theories such as “disease caused by toxin and deficiency” and a large number of folk proven prescriptions and techniques. Career development competence refers to the comprehensive literacy set that enables individuals to achieve sustainable growth, create multi-dimensional value, and promote disciplinary progress in a dynamically changing professional environment. For high-level talents of Zhuang Medicine, career development competence is embodied in a multi-dimensional comprehensive literacy system, specifically covering the following five key aspects: first, the ability to deepen and innovate clinical diagnosis and treatment, that is, to flexibly deal with difficult and severe diseases based on the core therapeutic principles of Zhuang Medicine “regulating qi, detoxifying, tonifying deficiency and unblocking collaterals”, and gradually form diagnostic and treatment ideas with personal characteristics; second, the ability of scientific research transformation and academic development, able to use modern scientific methods to carry out mechanism research, efficacy verification and product development on Zhuang Medicine characteristic techniques, prescriptions and theories such as “Three Dao and Two Lu”; third, the ability of cross-cultural interpretation and communication, able to clearly explain the dialogue space between Zhuang Medicine theories and modern medical knowledge to people inside and outside the industry, and improve disciplinary identity and social acceptance; fourth, the ability of service management and organizational collaboration, including the operation of Zhuang Medicine clinics, the management of Zhuang Medicine health projects, or leading teams to carry out resource investigation and cultural protection; fifth, the ability of lifelong learning and professional adaptation, maintaining knowledge renewal and professional resilience in the changes of medical development and policy environment.

Therefore, the core connotation of the transformation is to leap from the “skill” of mastering and applying established knowledge and skills taught orally to the “competence” of criticizing, integrating, innovating, and leading in complex situations. This process is a dynamic development process that externalizes and systematizes the “tacit knowledge” derived from Zhuang folk practice and contained in supervisors’ experience, and links it with the broader knowledge system of modern medicine, pharmacy, public health, and the needs of the health industry^[9-10]. The symbol of its success is that postgraduates grow from skilled inheritors of Zhuang Medicine skills to pioneers who can achieve innovative development while guarding the tradition of Zhuang Medicine.

2.2. Construction of the core transformation mechanism

At the individual level, the transformation starts from the subjective awakening and cognitive reform of postgraduates, with the core being the internal drive of deep identity with Zhuang Medicine culture and professional self-confidence, as well as the establishment of reflective learning ability^[11-12]. At the knowledge level, the transformation is reflected in the profound change of knowledge form and nature, that is, the unique tacit knowledge of Zhuang Medicine contained in rich folk therapies and personal experiences is partially encoded, externalized and created into new shareable and testable “modern interpretive knowledge” through dialogue, collision and integration with modern biomedicine, evidence-based medicine and other knowledge systems. At the environmental level, the transformation process is deeply embedded in specific and diverse social and cultural contexts. Different “communities of practice” such as folk inheritance groups, Zhuang

Medicine departments in hospitals, modern scientific research laboratories, Zhuang community health service stations, and intangible cultural heritage protection institutions provide differentiated learning resources, interaction rules, and identity templates. These environmental elements jointly form a dynamic empowering field by providing necessary resource support, such as specific scientific research projects and interdisciplinary cooperation opportunities, and setting realistic cognitive challenges, such as modern evidence-based evaluation requirements for clinical efficacy, continuously catalyzing or inhibiting the occurrence of transformation. The three levels of individual, knowledge, and environment are not isolated, but constitute an interrelated and mutually reinforcing ecosystem. The individual's deep reflection on the value of Zhuang Medicine forms the logical starting point for the modern creation of knowledge; the knowledge creation activity of scientifically interpreting Zhuang Medicine experience can, in turn, consolidate and deepen the individual's professional identity and promote the complete construction of their "scholarly physician" identity. At the same time, the external environment not only profoundly shapes the direction of individual and knowledge activities, as reflected in the current policy encouragement for Zhuang Medicine research and development, but also adjusts and changes with the innovative achievements of individuals and knowledge, such as new products successfully developed based on Zhuang Medicine theories, gaining market recognition. This multi-level and interactive analytical framework provides a structured theoretical perspective for the systematic analysis of the three core transformation mechanisms below.

2.3. Individual drive, knowledge creation, and environmental empowerment

Based on the above framework, this study proposes three core mechanisms driving the competence transformation of Zhuang Medicine postgraduates: first, the individual drive mechanism constitutes the internal engine of the transformation, with the core being the establishment of cultural identity and the cultivation of reflective practice^[13-14]. The fundamental driving force of the transformation comes from postgraduates' value identity and emotional investment in Zhuang culture and Zhuang Medicine wisdom. When students go beyond the superficial mastery of techniques such as "needle pricking" and "scraping", deeply understand the overall philosophy of "synchronization of three qi" and the systematic life view of "Three Dao and Two Lu" behind them, and regard Zhuang Medicine as a living cultural inheritance and survival wisdom, the learning of professional skills is sublimated into an internal value pursuit and cultural mission. Such profound cultural identity and professional self-confidence provide sustainable psychological motivation for overcoming various challenges in the transformation process. Driven by this, reflective clinical practice becomes a key link to transform motivation into cognitive development. It requires students to be not only executors of treatment behaviors, but also observers and thinkers of their own practices, such as exploring the internal mechanism of stimulating specific "network nodes" to regulate distal pain, explaining the modern nerve conduction and body fluid regulation principles that may be involved, or analyzing the modern pharmacological connotation of the "detoxification" effect in commonly used detoxification proven prescriptions. By writing in-depth medical cases integrating Zhuang Medicine theories and modern medical analysis, and participating in interdisciplinary case seminars, students can upgrade scattered and empirical diagnosis and treatment records into systematic "practical wisdom" that can be examined and discussed, thus starting the key identity transformation from "mechanic operating according to prescriptions" to "reflective researcher."

Second, the knowledge creation mechanism is the core process for the realization of the transformation, focusing on the knowledge integration in clinical situations and the scientific externalization of tacit knowledge^[15-17]. The

knowledge system of Zhuang Medicine has distinct context dependence and empiricism, and the transformation occurs in specific situations of dealing with real clinical problems. This mechanism is mainly reflected in two levels: first, the clinical integration of multi-paradigm knowledge. When facing complex cases, postgraduates need to build a bridge of communication and mutual verification between the pathogenesis interpretation of “disease caused by toxin and deficiency” and “channel blockage” in Zhuang Medicine and the laboratory test indicators and imaging findings in modern medicine, so as to form complementary and integrated diagnosis and treatment decisions. Such knowledge dialogue and integration training at the clinical frontline is the key to cultivating their cross-paradigm clinical thinking ability and innovative problem-solving ability. Second, the scientific coding and creation of tacit knowledge. When postgraduates complete a “randomized controlled study of Zhuang Medicine herbal bamboo cupping therapy in the treatment of knee bi” or explain the mechanism of a characteristic external therapy, they must strive to transform the “ineffable” experience taught orally by supervisors and existing in personal touch and mental techniques—such as accurate judgment of “sha signs” and subtle grasp of fresh herbal compatibility—into modern scientific languages that can be reviewed, tested and disseminated, such as specific operational standard procedures, objective biomarker changes, statistical analysis charts and even preliminary theoretical models. This process of “scientific coding” is not only to endow traditional knowledge with modern forms, but also a profound process of re-understanding, re-verification, and new knowledge creation, which is the academic starting point for the modern development of Zhuang Medicine.

Finally, the environmental empowerment mechanism provides the necessary social and cultural soil and key catalysts for the transformation, in the form of support from diverse communities of practice and intermediary guidance of “dual-competent” supervisors ^[18–19]. The transformation and development of competence cannot be separated from specific social and cultural environments. Postgraduates are simultaneously immersed in diverse “communities of practice” such as folk inheritance groups, Zhuang Medicine departments in hospitals, modern scientific research laboratories, Zhuang communities, and intangible cultural heritage protection fields. Each community provides a unique set of behavioral norms, knowledge resources, and role expectations: realizing the inheritance of “medical ethics” in inheritance groups, learning teamwork and standardized management in modern hospitals, mastering scientific discourse in academic circles, and feeling cultural roots in communities. The “boundary experience” of shuttling between these communities prompts students to continuously reconcile multiple identities such as “inheritor”, “clinician”, and “scientific researcher”, and finally construct a composite professional self. In this diverse network, “dual-competent” supervisors play an irreplaceable key intermediary role. They often have profound Zhuang Medicine family inheritance or apprenticeship experience, as well as systematic modern scientific research training and academic vision. Their core role goes far beyond skill teaching; it is to demonstrate to students how to build a dialogue bridge between traditional wisdom and modern science through their own cognitive and behavioral methods, how to transform the clinical assertion that “this prescription is effective” into a scientific question of “how to design a study to prove why it is effective and for whom it is more effective”, so as to directly guide, accelerate and deepen the entire transformation process of students.

In summary, the transformation from clinical competence to career development competence for Zhuang Medicine postgraduates is a socialized construction process driven by individual cultural identity and reflective practice, realized through knowledge integration and scientific externalization at the intersection of clinical practice and scientific research, and accelerated by the empowerment of diverse communities and “dual-competent” supervisors. This mechanistic understanding clearly reveals how the transformation occurs, where it deepens, and what promotes it, providing a solid and clear theoretical basis and practical guidance for the

systematic and targeted design of cultivation intervention paths in the next step.

3. Construction and practical strategies of innovative cultivation paths

Based on the theoretical analysis of the transformation mechanism from clinical competence to career development competence, the innovation of training mode must go beyond partial patching of existing links, and carry out systematic top-level design and ecological reconstruction. Aiming at the particularity of Zhuang Medicine postgraduate training, this part aims to construct an innovative training system centered on empowerment and integration and oriented to practical transformation, and put forward specific and feasible implementation strategies. The system focuses on three levels: goal reshaping, path design, and support guarantee, striving to transform theoretical insights into operable education programs.

3.1. Goal reshaping: from “skill inheritors” to “scholarly Zhuang Medicine physicians”

The primary premise of training path innovation is to realize the fundamental transformation of talent training goals^[20-21]. The traditional model focuses on cultivating “skill inheritors” who can skillfully master and apply Zhuang Medicine characteristic techniques and prescriptions, while the innovative path aims to cultivate “scholarly Zhuang Medicine physicians.” This new goal emphasizes that talents should have dual core characteristics: first, the depth of “upholding integrity”, that is, having a deep understanding and firm confidence in the core theories of Zhuang Medicine such as “Three Dao and Two Lu” and “disease caused by toxin and deficiency” derived from cultural identity, being able to skillfully use techniques such as eye diagnosis, needle pricking and scraping to solve clinical problems, and becoming faithful guardians of the roots of Zhuang Medicine culture. Second, the breadth of “innovation”, that is, having the ability to examine, interpret and develop traditional wisdom in the modern context, being able to explore the mechanism of Zhuang Medicine efficacy with scientific thinking, being able to manage medical projects, disseminate disciplinary value, and lead Zhuang Medicine to open up new fields in the modern medical system and health industry. The positioning of “scholarly Zhuang Medicine physicians” marks a paradigm shift from single skill output to composite ability generation. It requires postgraduates to be not only clinicians who implement diagnosis and treatment plans, but also innovative subjects who can raise questions, design studies, integrate resources, create new knowledge, and promote application. This goal positioning directly responds to the internal requirements of the transformation mechanism described above, condenses the drive of individual cultural identity, the demand of knowledge integration and creation, and the possibility of diverse environmental empowerment into clear talent training specifications, providing value guidance and the ultimate basis for all subsequent path designs.

3.2. Path design: Constructing a “One Core, Two Wings, Three Synergies” training system for Zhuang Medicine postgraduates

To achieve the training goal of “scholarly Zhuang Medicine physicians”, an implementation framework with tight logic and coordinated elements needs to be constructed. This study proposes a “One Core, Two Wings, Three Synergies” training system model. This model takes the practical platform of deep integration of clinical practice and scientific research as the core, the curriculum modules of cultural inheritance and career development as two wings, and optimizes the training ecology through three synergistic relationships to systematically catalyze competence transformation^[22-23].

“One Core” refers to building an integrated practice platform of “clinical practice–scientific research–

community service” to consolidate the foundation of transformation. This is the core “training ground” for competence transformation. The separation between clinical internship, scientific research training, and community service must be broken. Specifically, a “research-oriented clinical teaching unit” can be specially set up in the Zhuang Medicine department of affiliated hospitals or demonstration Zhuang Medicine clinics. In this unit, postgraduates undertake clinical reception tasks, and at the same time, under the guidance of supervisors, systematically collect and sort out medical record data, and establish a Zhuang Medicine characteristic clinical database for dominant diseases. For example, aiming at the advantages of Zhuang Medicine in the treatment of bi syndromes, postgraduates not only carry out herbal bamboo cupping treatment, but also design clinical observation schemes to collect symptom scores, inflammatory indicators and even microscopic imaging changes before and after treatment, so that clinical practice is closely integrated with problem raising, data collection and analysis verification from the beginning. At the same time, postgraduates are included in the work of grassroots community Zhuang Medicine health service stations, so that they can understand health needs in real community scenarios, carry out health education, and bring problems found in community practice back to clinical and scientific research platforms. This integrated platform keeps postgraduates in a cycle of “practice–reflection–research–re–practice”, providing an institutionalized scenario for the externalization of tacit knowledge and the scientization of clinical problems.

“Two Wings” support is reflected in the systematic construction of two major curriculum modules of “cultural inheritance” and “career development”, aiming to provide structural empowerment for competence transformation. These two modules are not isolated knowledge teaching, but precise supplementation and expansion for the core literacy required for the future growth of Zhuang Medicine postgraduates. The cultural inheritance module focuses on deepening students’ theoretical foundation and cultural consciousness. Its teaching content goes beyond the single interpretation of classic literature, and constructs a curriculum group including modern interpretation of Zhuang Medicine core theories, comparative studies of medical anthropology and Zhuang Medicine culture, as well as intangible cultural heritage protection and innovative transformation strategies. This module aims to guide students to deeply understand the value system and practical wisdom of Zhuang Medicine from multiple perspectives, such as philosophical view, cultural logic, and intellectual property rights, and realize the leap from knowledge memory to cultural identity and innovative consciousness. The career development module focuses on improving students’ comprehensive competitiveness in the context of the modern academic and health industry. This module is designed around the general core skills in modern scientific research and professional activities, systematically integrating basic data management and analysis in clinical research, writing and expression, and scientific communication strategies of academic achievements, as well as planning, management, and teamwork of Zhuang Medicine health projects. Its goal is to enable students not only to be proficient in their majors but also to effectively manage knowledge, projects, and communication, and have the practical ability to transform Zhuang Medicine characteristics into social value and academic influence. These two modules are like closely coordinated wings: one anchors the cultural roots, and the other expands the future space, jointly providing key momentum for postgraduates to adhere to the traditional essence while soaring to meet the needs of the times.

“Three Synergies” refers to deepening three key synergistic relationships to optimize the transformation ecology. First, the institutional synergy between apprenticeship education and academic education. Improve the “dual-supervisor system”, equip each postgraduate with a Zhuang Medicine practical supervisor with rich folk experience and an academic supervisor with modern scientific research ability, and establish a regular joint

case discussion and academic exchange mechanism to promote direct dialogue between empirical thinking and scientific thinking. Second, the project-based synergy between clinical training and community service. Taking participating in community chronic disease Zhuang Medicine health management, Zhuang Medicine culture science popularization, and other projects as compulsory practical links and granting credit recognition, making service learning an important way for competence integration and social responsibility training. Third, the platform-based synergy within disciplines and interdisciplinary disciplines. Cooperate with life science, bioinformatics, material science, management, and other disciplines to jointly set up platforms such as “Interdisciplinary Research Center for Zhuang Medicine Mechanism”, offer interdisciplinary courses, and encourage the establishment of interdisciplinary research groups, so that Zhuang Medicine postgraduates can learn interdisciplinary language and team leadership skills in collaborative research.

3.3. Support system: Safeguarding path implementation with developmental evaluation and systematic guarantee

The implementation of innovative paths cannot be separated from the strong support of evaluation reform and resource guarantee. The first is to promote the reform of the evaluation system and establish a diversified evaluation mechanism based on the principles of “development” and “value-added.” The evaluation criteria should shift from focusing on the number of papers and skill assessment to comprehensively investigating the growth of career development competence. For example, in graduation assessment, in addition to dissertations, a comprehensive analysis report of complex cases reflecting clinical problem-solving ability or a Zhuang Medicine health service project design plan based on community needs can be required to be submitted. In awards and evaluations, interdisciplinary cooperation achievements, science popularization works, patient management effectiveness, and other indicators are included in the evaluation, giving full play to the “baton” role of evaluation to guide students to consciously pursue the comprehensive transformation of competence.

At the guarantee level, a systematic support project needs to be implemented. In terms of faculty construction, launch the “Zhuang Medicine Supervisor Competence Improvement Plan”, cultivate more “dual-competent” supervisors by funding practical supervisors to further study scientific research methods and academic supervisors to deeply learn Zhuang Medicine classics and clinical practice. In terms of resource platforms, promote the establishment of the regional “Zhuang Medicine Clinical Scientific Research Data Sharing Center” and “Zhuang Medicine Resource Physical Specimen Library” to provide data and material basis for the integrated platform. In terms of policies and systems, actively appeal for and promote the coordination of education, health, drug regulation, science and technology and other departments, formulate preferential support policies for interdisciplinary talents trained in accordance with innovative paths in postgraduate enrollment plans, special funding support, definition of Zhuang Medicine practice scope, in-hospital preparation development policies, as well as talent evaluation and professional promotion channels, fundamentally break the institutional bottleneck of their career development, and ensure that outstanding talents can stand out and achieve success.

In summary, the “One Core, Two Wings, Three Synergies” training system, aiming at “scholarly Zhuang Medicine physicians”, combined with developmental evaluation and systematic guarantee, constitutes a complete and operable innovative training plan for Zhuang Medicine postgraduates. This plan is closely aligned with the theoretical findings of the transformation mechanism and strives to transform the transformation from clinical competence to career development competence from a spontaneous and accidental process into a

guided, institutionalized, and predictable educational outcome through systematic intervention.

4. Conclusion and prospect

Focusing on the core problem of disconnection between clinical competence and career development competence in Zhuang Medicine postgraduate training, this study systematically explains the internal logic of the transformation between the two through theoretical construction and mechanism analysis, and proposes innovative cultivation paths accordingly. The transformation is a synergistic process driven by individual cultural identity and reflective practice, realized through knowledge integration and scientific externalization in the intertwined situation of clinical practice and scientific research, and catalyzed by the empowerment of diverse communities and dual-competent supervisors. Based on this, this paper innovatively constructs a “One Core, Two Wings, Three Synergies” training system aiming at cultivating scholarly Zhuang Medicine physicians, with the integrated platform of “clinical practice–scientific research–community service” as the core, the curriculum modules of “cultural inheritance” and “career development” as two wings, and the synergy of “apprenticeship/academic education, clinical practice/community service, discipline/interdisciplinarity” as the ecology, and puts forward corresponding support and guarantee strategies. It provides a systematic theoretical basis and practical scheme for the reform of high-level talent training in Zhuang Medicine and other ethnic medicines. The limitation of this study is that the constructed path model is mainly based on theoretical deduction and qualitative analysis, and its long-term effect and universality need to be verified and revised in a wider range of educational practices. Future research can be deepened from two aspects: first, carry out long-term tracking and comparative studies to evaluate the specific effects and differences of implementing this path in different colleges and universities; second, explore the deep integration of emerging technologies such as artificial intelligence and big data into this training system, and empower clinical experience mining, knowledge transformation and personalized learning through digital means, so as to continuously promote the high-quality development and paradigm innovation of ethnic medicine postgraduate education.

Funding

Innovation Project of Guangxi Graduate Education (No. JGY2020105)

Disclosure statement

The authors declare no conflict of interest.

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