

Integrating the Teaching for Understanding (TfU) Framework in Graduate Pharmacy Education: A Blended Learning Approach to Traditional Chinese Medicine Identification at Guilin Medical University

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Abstract

Combined with the education law of pharmacy postgraduates and the characteristics of the discipline, this study introduces the TfU teaching concept into the theoretical course of traditional Chinese medicine identification for the master's degree of pharmacy in this school, and constructs a teaching reform mode integrating "online + offline" hybrid teaching, focusing on cultivating postgraduates' scientific research thinking ability, and promoting the students' independent acquisition of knowledge. It focuses on cultivating postgraduates' scientific research thinking ability, promoting students' ability to independently acquire knowledge, excavate knowledge, raise questions, analyze problems and solve problems, and has achieved good teaching results in teaching practice, to provide a reference for the research of blended learning mode of other similar courses in this specialty.

Keywords

TfU teaching mode; graduate students; blended teaching; traditional Chinese medicine identification.

1. Introduction

The Teaching for Understanding (TfU) model, initially conceptualized by the Harvard Graduate School of Education's Project Zero research team, represents a pedagogical framework designed to transcend traditional rote learning by prioritizing deep comprehension and practical application of knowledge. Rooted in constructivist learning theory, the TfU model emphasizes four interrelated components: Generative Topics (themes that engage learners and connect to broader disciplinary concepts), Understanding Goals (explicit objectives guiding learners toward mastery of core ideas), Understanding Performances (tasks requiring students to demonstrate and apply their knowledge in novel contexts), and Ongoing Assessment (continuous, formative feedback to refine learning trajectories). Unlike conventional didactic approaches, TfU shifts educators' focus from mere content delivery to fostering learners' ability to internalize, synthesize, and transfer knowledge—skills critical for addressing complex, real-world challenges.

Since its inception, the TfU framework has garnered international recognition, with successful implementations across diverse educational systems in North America, Europe, and Asia. Its introduction to China in 2005 marked a pivotal shift in pedagogical practices, particularly in secondary education, where it has been integrated into natural science curricula to enhance teachers' instructional strategies and students' analytical capabilities. For instance, studies have demonstrated its efficacy in cultivating scientific inquiry and problem-solving skills among high school students, thereby aligning with China's educational reforms aimed at nurturing innovation-driven competencies[1].

However, the application of TfU in higher education, particularly in specialized disciplines such as pharmacy, remains underexplored. Graduate-level pharmacy education demands not only advanced theoretical knowledge but also robust research acumen and the ability to bridge interdisciplinary gaps—a challenge compounded by the dynamic evolution of fields like traditional Chinese medicine (TCM) identification. Current pedagogical practices in TCM education often struggle with passive learning environments, limited student-teacher interaction, and a disconnect between theoretical instruction and research application. These shortcomings highlight the urgent need for innovative teaching models that align with the cognitive and professional demands of graduate students.

Against this backdrop, the integration of TfU principles into graduate-level TCM identification courses emerges as a strategic response. By coupling TfU's emphasis on understanding-driven pedagogy with blended learning methodologies (e.g., online-offline hybrid models), educators can create a scaffolded learning ecosystem. Such an approach not only addresses the limitations of traditional lecture-based instruction but also cultivates essential competencies, including independent knowledge acquisition, critical thinking, and the ability to design and execute scientific inquiries—skills indispensable for thesis writing and future research endeavors. This study thus seeks to extend the TfU framework into the realm of higher pharmacy education, offering a replicable model for disciplines requiring similar syntheses of theoretical depth and practical innovation.

2. The Current Situation of Teaching Traditional Chinese Medicine Identification to Graduate Students in Our University

Identification of Chinese medicine is a specialized course for the training of master's degree students of pharmacy in the School of Pharmacy of the University, which mainly includes the research on identification methods of Chinese medicine, safety evaluation of Chinese medicine, research on quality standards of Chinese medicine and standard substances of Chinese medicine, research on the influence of factors on the quality of Chinese medicine, and research on the identification of Chinese medicine and new drugs, etc. The focus of the teaching of Chinese medicine identification is the same as that of undergraduate study. The teaching of Chinese medicine identification for master's degree students is not the same as that of undergraduates, and it does not require students to memorize the information-intensive and complicated general theories and theories, but to follow the development of the times, reflect the latest progress of academic research, and construct the core content of teaching to guide graduate students to carry out in-depth theoretical and practical research related to the discipline, so this course requires extremely high requirements for the professional knowledge reserve and scientific research and practice ability of the lecturers. Therefore, this course requires a high level of professional knowledge and research and practice ability from the lecturers. At present, the Department of Biopharmacy in the School of Pharmacy of the University undertakes the teaching of this course, but some of the lecturers lack the educational background in traditional Chinese medicine, and their scientific research ability is relatively weak, and the theoretical classroom teaching of traditional Chinese medicine appraisal has not yet formed a stable and effective teaching mode, and there is no scientific teaching concept to guide the students, so there is a lack of interaction between teachers and students in the classroom, and the students' participation is low, and their understanding of the content of the teaching of this discipline is biased and not thorough. Teaching reform at the graduate level should focus on helping students flexibly apply the theoretical knowledge they have learned to the writing of their dissertations, and in the process improve their scientific research ability and cultivate their scientific research quality and innovative thinking[2].

After many discussions with the course team, the TfU teaching concept is applicable to the teaching method of our master's degree in the course of traditional Chinese medicine identification for graduate students, therefore, in this teaching reform practice, we adopt the TfU teaching model integrated with the "online + offline" blended teaching model, which provides teachers with references and guidance for the design and implementation of the teaching. The model helps teachers to clarify their thinking in the form of a framework, guides them to analyze the teaching content accurately, clarifies the situation of the students, chooses appropriate teaching methods, designs diversified teaching activities, mobilizes students' enthusiasm, and encourages them to learn knowledge independently, improve their ability and construct their own knowledge system.

3. TfU Teaching Concept Combined with The Construction of An "Online + Offline" Blended Teaching Mode

3.1. Preparation for teaching the course

Reorganize the professional teaching team, combine the TfU teaching concept with the "online + offline" blended teaching mode, design the specific implementation plan for each chapter of the course; complete the summary of e-learning resources, update the teaching plan and the course assessment guide, record the relevant micro-teaching videos, and produce e-courseware adapted to the teaching and learning of the "Rain Classroom". The program will complete the summary of online learning resources, update the teaching plan and course assessment guidelines, record relevant micro-lesson videos, and produce electronic courseware adapted to the "Rain Classroom" teaching.

3.2. Implementation of "online + offline" mixed-mode teaching activities

Before the lesson, the teacher defines and refines the "inspiring thesis" to determine the "comprehension objectives"; during the lesson, a series of "comprehension activities" are carried out to help students understand the content of the study. During the lesson, a series of "comprehension activities" are carried out to help students understand the learning content; at the end of the lesson, "continuous evaluation" is obtained through the performance and behavior of students in the teaching activities. The technical approach and program for implementation are as follows:

3.2.1. Pre-course activities

- (1) Push open subject topics, microclass (or Mooc) videos, and PPT courseware before class for students to utilize fragmented time outside class for learning and thinking.
- (2) Discussions on subject topics are collected before class, and teachers analyze the learning situation and adjust the teaching plan according to students' self-study feedback.

3.2.2. Classroom activities

- (1) Introduce cutting-edge research, disciplinary literature, and other information to stimulate students' interest in learning and initiate the learning of the content of the lectures.
- (2) Flexible design of the teaching program according to the content of the lecture, combined with the teacher's guidance for group discussion and other activities, prompting students to think about the subject matter.
- (3) Students will ask questions about the important and difficult points, encourage students to participate in the discussion, and finally the teacher will give a concise lecture.

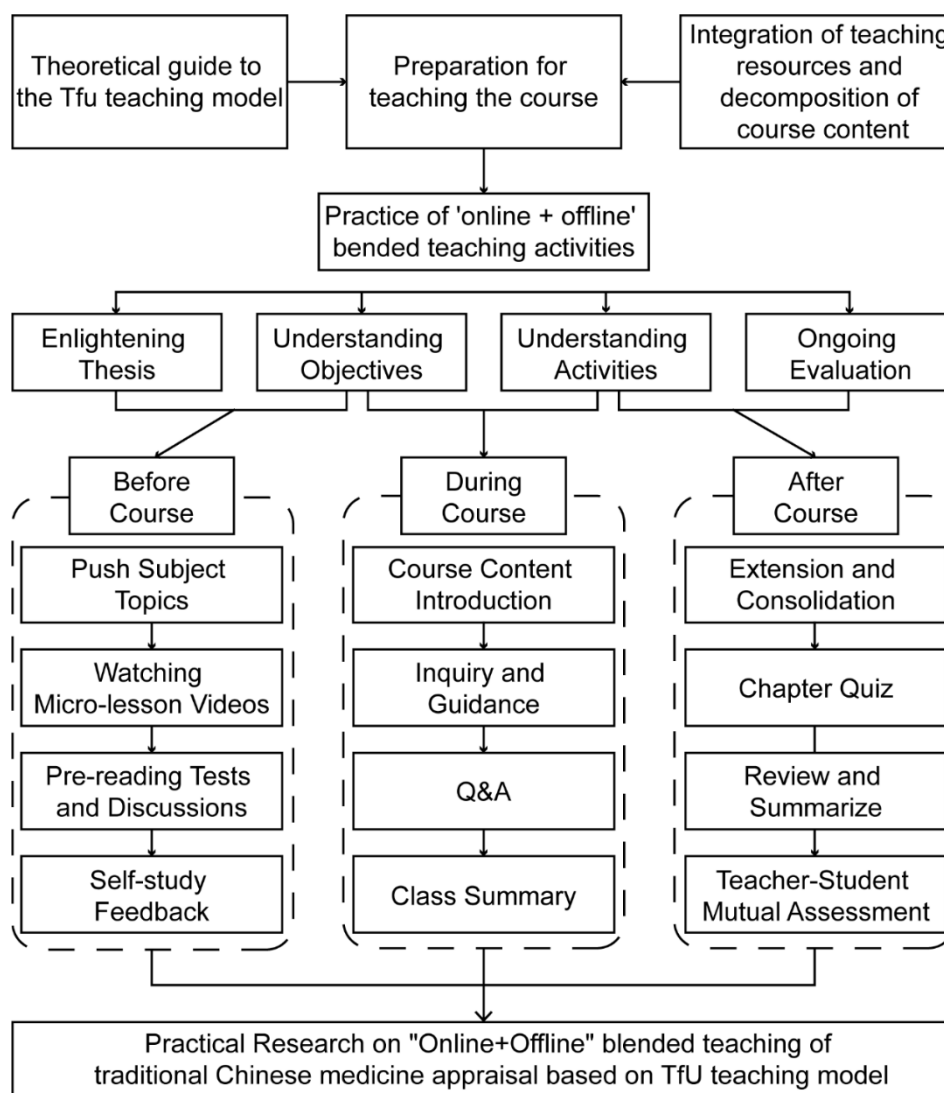


Figure 1. Implementation of "Online + Offline" Blended Teaching Activities Based on the TPU Teaching Model

3.2.3. After-school activities

(1) Teachers push relevant popular science videos, scientific research papers, or extended reading materials on the Rain Classroom platform to supplement expand, and consolidate classroom content.

(2) Teachers determine the evaluation methods such as students' self-assessment, students' mutual assessment, and teachers' comments, and encourage students to evaluate the content, link teachers' teaching, etc. Teachers adjust their teaching strategies according to the classroom effect and students' feedback.

4. Achievements and Perspectives of Educational Reform Practices

4.1. Constructing a New Teaching Mode for Graduate Students in Traditional Chinese Medicine Appraisal

Building upon the TfU framework, this study develops a hybrid "online + offline" model for teaching traditional Chinese medicine (TCM) identification to graduate pharmacy students. Central to the model is the integration of TfU's four pillars—Generative Topics, Understanding Goals, Performances, and Ongoing Assessment—with the Rain Classroom platform on WeChat.

By leveraging mobile internet, this approach overcomes temporal and spatial classroom constraints, fostering a dynamic, student-centered learning ecosystem.

The model addresses limitations of conventional methods, such as passive learning and fragmented comprehension. Pre-class activities include micro-lectures and discussion prompts via Rain Classroom, allowing students to engage with content at their own pace. In-person sessions feature case-based seminars, collaborative tasks, and debates to deepen understanding of TCM principles like authentication techniques. Post-class, supplementary materials and peer discussions reinforce learning, while real-time analytics enable adaptive teaching and self-assessment.

Empirical findings highlight the model's success: students reported increased motivation due to flexible blended learning and task relevance to thesis research, such as applying class techniques to authenticate herbal samples. Online forums and virtual office hours bridged theory and practice, transforming lectures into an interactive process that enhances academic performance and research readiness—key outcomes for graduate pharmacy education.

4.2. Organize a diversified faculty based on TfU teaching concepts to improve the quality of the teaching team

To align with the TfU framework's emphasis on interdisciplinary depth and innovation, this study restructured the faculty to leverage diverse academic expertise. A competency-based matrix was used during the pre-preparation phase, prioritizing both vertical depth (e.g., TCM authentication) and horizontal breadth (e.g., pharmacology, quality standardization), ensuring a balance of theoretical rigor and applied research in the curriculum.

The restructured team includes three tiers:

(1) Early-Career and Mid-Level Lecturers : Deliver foundational content using TfU-aligned methods like scaffolded problem-solving and inquiry-based lectures to build conceptual understanding.

(2) Senior Researchers and Professors : Act as mentors, guiding students in experimental design, data interpretation, and thesis alignment while embedding scientific inquiry into teaching.

(3) Interdisciplinary Collaborators : Experts from fields like pharmacognosy and molecular biology co-design modular content, linking classroom themes to real-world challenges.

This structure operationalizes TfU's Generative Topics by connecting classroom themes to research projects. For example, a module on ginseng quality evaluation was co-taught by a natural product chemist and a TCM resources specialist, contextualizing abstract principles within practical research. Research-driven teaching fostered a "teaching-research symbiosis," with faculty case studies enriching classroom discussions and student data contributing to research databases.

A cyclic feedback mechanism based on TfU's Ongoing Assessment refined strategies through peer evaluations and workshops. For instance, gaps in chromatographic comprehension identified via Rain Classroom analytics led to targeted micro-lectures by analytical chemists and pharmacologists.

The restructured model has strengthened science-education integration, evidenced by increased student participation in publications and improved performance in TCM assessments. This collaborative framework supports interdisciplinary innovation, advancing graduate pharmacy education amid global healthcare demands..

4.3. Practical research results and experiences can be used to inform similar curricular reforms

The research results and practical experiences derived from this study hold significant potential for informing and enhancing the construction of the Chinese medicine identification course for master's degree students in pharmacy at our university. Beyond its immediate application, this project also serves as a valuable reference for the subsequent updating of teaching and training programs, as well as the refinement of syllabi across related disciplines. Within the broader framework of graduate pharmacy education, several courses share high similarities in their teaching objectives and methodologies, such as biopharmacology and molecular biopharmacology. These disciplines, like Chinese medicine identification, emphasize the integration of theoretical knowledge with applied research and require innovative pedagogical approaches to address complex scientific challenges.

The practical insights gained from this study—ranging from the implementation of the hybrid "online + offline" model to the strategic reorganization of faculty expertise—can be effectively adapted to reform these analogous courses. For instance, the emphasis on interdisciplinary collaboration, competency-based faculty structuring, and the incorporation of real-world research scenarios into classroom instruction can serve as a blueprint for enhancing the design and delivery of biopharmacology and molecular biopharmacology curricula. Furthermore, the TfU framework's principles, particularly its focus on generative topics and ongoing assessment, can be seamlessly integrated into these courses to foster deeper conceptual understanding and practical skill development among students.

By leveraging the outcomes of this project, our university can promote the systematic advancement of professional curriculum construction for master's degree programs in pharmacy. This not only ensures alignment with evolving disciplinary trends and global healthcare demands but also establishes a sustainable model for continuous curricular innovation. Ultimately, the dissemination of these research findings and practical experiences contributes to elevating the overall quality of graduate-level pharmacy education, fostering a new generation of researchers and practitioners equipped to address the complexities of modern pharmaceutical sciences.

5. Conclusion

This study demonstrates the successful integration of the TfU teaching framework with an "online + offline" blended learning model in graduate-level traditional Chinese medicine (TCM) identification courses. By prioritizing understanding-driven pedagogy and leveraging digital platforms like Rain Classroom, the reform enhanced students' scientific research thinking, independent knowledge acquisition, and problem-solving skills. The restructured interdisciplinary faculty and diversified teaching activities fostered active engagement, bridging theoretical knowledge with practical research applications. Empirical results highlighted improved student motivation, academic performance, and research readiness, particularly in thesis-related tasks. The model's adaptability and emphasis on continuous assessment provide a replicable framework for similar disciplines in pharmacy education, aligning with global demands for innovation in graduate training. Future efforts should focus on expanding interdisciplinary collaborations and refining assessment mechanisms to sustain long-term educational impact.

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