



Research Paper

Peer Feedback in Chinese Medicine Identification Teaching: A Case Study Based on Activity Theory

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Abstract: As an important form of formative assessment, peer feedback lacks empirical investigation regarding its mechanism of application in Chinese Medicine Identification (CMI) teaching. Using the third-generation activity theory within sociocultural theory as its analytical framework, this study adopted a case study design to track the peer feedback activities of 32 undergraduates in a CMI course at a Chinese university over five consecutive weeks. It focused on how students carried out peer feedback practices around the six elements of activity theory: subject, tools, object, rules, community, and division of labor. Data were collected through classroom observation, semi-structured interviews, reflective journals, and documents. Thematic analysis revealed that: along the subject dimension, students underwent an identity transformation from evaluatee to identifier; along the tools dimension, the scoring rubric exhibited a duality of scaffolding and constraint; along the object dimension, the activity orientation gradually deepened from identification report to identification thinking; along the rules dimension, a persistent tension existed between face culture and constructive feedback; along the community dimension, the dilemma of being unable to explain clearly drove the formation of a probing culture; and along the division of labor dimension, role rotation was a key trigger for identity transformation. The study argues that the effectiveness of peer feedback depends on the degree of coordination among the six elements, rather than on the mere introduction of peer feedback.

Keywords: peer feedback; activity theory; Chinese Medicine Identification (CMI); case study

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I. Introduction

Chinese Medicine Identification (CMI) is a core course for Chinese medicine majors. Its teaching objectives are not only to enable students to master the macroscopic, microscopic, and physicochemical identification characteristics of commonly used medicinal materials, but also to cultivate a comprehensive identification eye: the ability to quickly capture key identification points within complex sensory information and make accurate quality judgments accordingly. This ability is highly practical, situated, and is difficult to cultivate effectively through classroom lectures (Guo et al., 2017).

However, the current CMI teaching faces a structural dilemma: a serious shortage of feedback resources. The formation of identification ability requires extensive repeated practice and timely feedback, but when one teacher faces dozens of students, the individualized feedback that can be provided is extremely limited. A deeper problem is that students' cognitive processes when observing medicinal materials are internal. They may see a certain characteristic but may not be able to explain clearly why they have made a certain judgment. This internal cognitive process is precisely the link that most needs to be externalized and trained in teaching.

Peer feedback offers a path worth exploring in response to the above dilemma. Peer feedback refers to the activity process in which learners evaluate peers' learning products or performances, offer suggestions, and communicate with one another (Liu & Sadler, 2003; Topping 2009). Findings in fields such as English writing and medical simulation have shown that peer feedback can expand feedback sources, promote critical thinking, and enhance metacognitive awareness (Guo et al., 2026; Yu & Lee, 2015). However, in the field of Chinese traditional medicine teaching, although some reform practices have introduced student mutual evaluation, most remain at the level of operational experience description and lack in-depth investigation of the process question of how students actually carry out peer feedback (Wang et al., 2017; Zhou, 2025).

Using the third-generation activity theory within sociocultural theory (Engeström, 2001) as its analytical

framework, this study understands peer feedback in CMI teaching as a collective activity system composed of six elements: subject, tools, object, rules, community, and division of labor. The study adopted a case study design, focused on students' feedback practice process, systematically presented the concrete manifestations and interactive relationships of the six elements in peer feedback, and answered the following core question: In the CMI course, how do students carry out peer feedback around the six elements of activity theory?

II. Theoretical Framework

2.1 Core concepts of activity theory

Originating from the sociocultural theory tradition of Vygotsky and, through the development of Leontiev and Engeström, activity theory has formed four generations (Engeström, 1987, 1999, 2001; Leont'ev, 1978, 1981; Vygotsky, 1978, 1987). Its core proposition is that human learning and cognition cannot be understood apart from the social and cultural activities in which they are embedded: cognition is not information processing inside the individual mind, but is generated and developed in tool-mediated social interaction.

The third-generation activity theory contains six elements: subject (activity participants), tools (material tools and symbolic tools), object (what the activity points to and transforms), rules (explicit and implicit norms), community (the group participating in the activity), and division of labor (roles and task allocation). These six elements form complex interactive relationships, and the outcome of the activity is the result after the object has been transformed. The activity theory particularly emphasizes the analytical value of contradictions: contradictions in an activity system are not obstacles to be eliminated, but internal driving forces that promote the development and transformation of the activity.

2.2 Analytical framework

Based on the activity theory, this study defines the six elements of the peer feedback activity system in CMI as follows:

Subject: The 32 undergraduates participating in peer feedback, who are simultaneously identifiers, evaluators, and evaluatees.

Tools: The material and symbolic tools mediating feedback activities, including scoring rubrics, feedback scaffolds, medicinal material specimens, the Chinese Pharmacopoeia, and digital platforms.

Object: What the activity points to and transforms. At the surface level, it is the identification report and identification operation; at the deeper level, it is students' identification thinking and identification ability.

Rules: The explicit norms constraining feedback activities (scoring standards, feedback format, submission deadlines) and implicit norms (face culture, learning habits, professional responsibility awareness).

Community: The groups participating in the activity, including the small-group learning community (four-person groups), the class practice community (all enrolled students and teacher), and the professional community (academic norms and professional standards of Chinese medicine).

Division of labor: The roles and task allocation among community members, including the role rotation of identifier, evaluatee, and observer and task division within groups.

III. Methods

This study adopted a qualitative case study design as the research question concerned how and why, and required an in-depth understanding of the operation process of peer feedback in a real teaching context. The study adopted a holistic single-case strategy, taking one complete teaching class as the unit of analysis and the groups within the class as embedded units of analysis.

3.1 Research context and participants

The research site was a CMI course for second-year undergraduates majoring in Chinese medicine at a Chinese university. The study focused on the macroscopic identification module in the course, lasting five weeks.

The participants were 32 undergraduates enrolled in the course, including 21 female students and 11 male students, aged 19–21. The students were divided into eight groups of four, with grouping taking into account gender balance and heterogeneity in prior course performance. The teacher was a Chinese medicine teacher with relatively rich teaching experience.

3.2 Teaching intervention design

The teacher adopted a five-stage (Identify—Explain—Evaluate—Revise—Reflect) peer feedback activity model, embedded in the regular teaching process. One complete round of activity was completed each week, for a total of five rounds.

Identify: The teacher provided unknown or mixed medicinal material samples, and students independently completed macroscopic identification and recorded the basis for their judgments.

Explain: Students orally explained their identification process and judgment basis to peers in small groups,

answering three questions: “What did I observe?”, “What standard did I use to judge?”, and “How did I handle uncertain situations?”

Evaluate: Peers evaluated group members’ identification explanations according to the scoring rubric provided by the teacher. The rubric covered four dimensions: standardization of identification methods, accuracy of characteristic descriptions, sufficiency of judgment basis, and strategies for handling uncertain situations. The teacher conducted two class periods (i.e., 90 minutes) of feedback training in advance.

Revise: Students revised their identification conclusions or improved their methods based on peer feedback, explaining which feedback was adopted, which was not adopted, and why.

Reflect: Students wrote reflective journals, answering “What blind spots did I discover?”, “What practices of my peers are worth learning from?”, and “If I did it again, how would I adjust?”

3.3 Data collection

Data collection lasted five weeks and included four types of sources.

Classroom observation: The researcher entered the classroom as a non-participant observer and conducted observation records for five sessions, focusing on the process of small-group feedback interaction and students’ language and behavioral performance. Observation used a semi-structured observation guide, while critical events were also recorded.

Semi-structured interviews: After the activity ended, one-on-one interviews were conducted with 16 students (around 25 minutes each), covering different achievement levels and different groups; one interview (around 40 minutes) was conducted with the teacher.

Reflective journals: Reflective journals from all 32 students across five rounds of activity were collected, totaling 160 journals.

Documents: Scoring rubrics filled out by students, feedback record sheets, revised identification reports, and the teacher’s classroom feedback records were collected.

3.4 Data analysis

Data analysis, adopting Braun and Clarke’s (2006) thematic analysis method, was carried out in six steps: familiarizing with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing the report. Interviews were first transcribed verbatim and then sent back to the interviewees for double checking. Coding adopted a combination of inductive and deductive strategies: on the one hand, open codes were generated bottom-up from the data; on the other hand, the six elements of activity theory were used as concepts for deductive coding. NVivo was used to assist in data management. Coding was completed independently by the researcher and an experienced teacher familiar with thematic analysis, with a consistency coefficient Kappa of 0.82; disagreements were resolved through discussion and negotiation.

IV. Research Findings

4.1 Subject: Identity transformation from evaluatee to identifier

In traditional teaching, students’ main identity is evaluatee. Peer feedback requires them to become identifiers and evaluators. At the beginning of the activity, most students felt uncomfortable. S1 said, “I haven’t even learned it well myself; how can I evaluate others?” S6 stated, “The teacher’s evaluation is authoritative; when we evaluate each other, it feels like playing house.” S3 felt worried, “Directly pointing out others’ mistakes might hurt their feelings, and I’m also afraid of saying something wrong myself.”

Transformation gradually occurred. There were three key triggers: the rubric provided a basis, role rotation allowed everyone to experience the evaluator’s position, and teacher meta-feedback conveyed that feedback ability itself is a learning goal. S14’s change was typical. In the first round she said, “Peer evaluation is just going through the motions”; by the fourth round she said, “Now when I look at medicinal materials, I unconsciously ask myself if I had to explain my judgment to someone else, how would I say it? This habit was forced out by peer evaluation.” The teacher observed, “In the later rounds, some students began to speak like a teacher, pointing out ‘there is a problem with the logic of your judgment.’ They really worked as identifiers.”

4.2 Tools: The dual nature of the scoring rubric as scaffolding and constraint

The scoring rubric was the most important mediating tool, and its role was dual. In the early stage, it mainly played a scaffolding function. S7 said, “At first, I didn’t know how to evaluate. With the rubric, I knew the four aspects to be looked at, especially ‘sufficiency of judgment basis,’ which made me realize that stating the conclusion alone is not enough.” Observation showed that the focus of discussion shifted from “Is it right or wrong?” to “What is the basis?”, with the cognitive level improved.

However, in the later stage, a constraining effect appeared. Some students mechanically checked themselves against rubric items, and feedback became formulaic. S12 wrote in a journal, “I became a tick-box machine, checking the four standards one by one, but sometimes I clearly felt that there was a problem with my

peer's identification and could not find a corresponding item, so I just kept quiet." The teacher also noticed, "Some groups' feedback became fill-in-the-blank exercises, focusing on 'whether it was written' rather than 'whether it makes sense.'" After the third round, an open feedback requirement was added, "Apart from the four aspects of the rubric, is there anything else you want to say to your peer?" This alleviated the formulaic tendency to a certain extent.

4.3 Object: Deepening from identification report to identification thinking

The direct object of the activity was the identification report, while the deeper object was identification thinking and ability. The focus of feedback underwent a three-stage evolution.

Rounds 1–2 were conclusion-oriented. Feedback revolved around "whether your judgment is correct," with language such as "I think what you said is right" and "I agree with this conclusion," remaining at the level of results. Round 3 shifted to basis-oriented feedback. The teacher's rule negotiation and the rubric's emphasis on sufficiency of judgment basis changed feedback into "What is your basis?", "You mentioned the cross-sectional characteristic, but did not say why it supports your judgment." Rounds 4–5 entered reasoning-oriented feedback. S14 gave feedback to a peer, "You noticed this characteristic, but did not connect it with that characteristic. You said the color is yellowish, and the texture is hard. These two characteristics seem independent in your account, but they may point to the same judgment." The teacher summarized, "Students moved from caring about right or wrong to caring about why, and then to caring about whether the reasoning is self-consistent, which shows that their identification thinking is deepening."

4.4 Rules: Tension between face culture and professional responsibility

Explicit rules included scoring standards, feedback format, and submission deadlines; implicit rules involved learning culture and had much influence. In the first two rounds, feedback was noticeably polite, with common phrases such as "pretty good" and "no problem." S15 said, "The group members get along well; if I say there is a problem with her identification, I'm afraid she will be unhappy." S9 added, "If I'm sure that he is wrong, I will say it. But in CMI, many times it's 'I think' rather than 'I'm certain,' so I don't dare to say it."

Before the third round, the teacher conducted rule negotiation. Instead of simply requiring students to dare to criticize, she guided discussion, "If a colleague did not point out your identification error, a patient used fake medicine, how would you feel?" This reframed feedback from interpersonal interaction to professional responsibility. After the third round, the proportion of specific feedback rose noticeably, taking up more than half of the total. S11 changed from being polite in the first round to arguing fiercely. She said that "Arguing was much more useful as it can help figure out the problem."

4.5 Community: Being unable to explain clearly drives the formation of a probing culture

The community included small-group, class, and professional levels. The most productive interaction was probing, whose formation arose from the frustration of being unable to explain clearly. In the Explain stage, many students realized for the first time that seeing it did not equal saying it. S4 said, "When looking at the medicinal material, I knew it was fake, but when asked to explain why, I got stuck, as if there was something in my mind I couldn't grasp." S10 said, "I thought I understood, but when I started talking, I found I actually didn't."

This experience initially brought frustration, but under peer probing, it was transformed into motivation. S4 later wrote, "Where I couldn't explain clearly was exactly what I hadn't truly understood. I forced myself to check and compare, and then I really figured it out." Peer probing was often more effective than teacher explanation. S8 said, "After teacher explanation, I felt I understood everything, but when a peer asked 'What is the relationship between two characteristics?', I realized I had never thought about it. Being stumped was uncomfortable, but it made me think more deeply." The teacher also believed, "That students probe each other is more useful than my explanation, because they are constructing understanding in their own language." From the perspective of activity theory, this exposed insufficient mediation between subject and object, while probing created the need to explain clearly, driving students to acquire more precise symbolic tools.

4.6 Division of labor: Role rotation and the triggering of identity transformation

Traditional division of labor was fixed: the teacher lectured and evaluated, while students listened and received. Peer feedback introduced role rotation among identifier, evaluator, and observer. In each round, group members took turns serving as presenter, lead evaluator, prober, and recorder. The study found that role rotation was a key trigger for identity transformation. S6 said, "The first time I was an evaluator, I was very nervous and afraid of saying something wrong. After doing it twice, I found that evaluating others helped me clarify my own thinking. To evaluate others, I have to be clear about what good identification is." S2 said, "When I was the observer, I noticed details I would not notice. For example, when describing cross-sectional characteristics, they would touch with their hands and scratch with their fingernails. I never paid attention to such operational details before." The teacher analyzed, "Rotation meant that no student could hide in the back. Everyone had to speak and evaluate someone at some point. This institutional pressure was more effective than teacher's repeated emphasis." By the

fourth and fifth rounds, most groups had formed a stable collaborative pattern: the presenter spoke first, peers probed and then evaluated, and finally the group collectively discussed uncertain issues.

V. Discussion

5.1 Coordination of the six elements determines the effectiveness of peer feedback

The core finding of this study is that the effectiveness of peer feedback in CMI teaching does not depend on whether peer feedback is introduced, but on the degree of coordination among the six elements of the activity system.

Specifically, along the subject dimension, students' identity transformation required role rotation and meta-feedback; along the tools dimension, the quality and flexibility of the rubric directly affected the depth of feedback, and an overly rigid rubric can obscure the activity object; along the object dimension, activity design needed to guide students from focusing on the identification report to focusing on identification thinking; along the rules dimension, the influence of implicit rules far exceeded expectations, and rule negotiation was needed to transform the constraints of face culture; along the community dimension, the formation of a probing culture was the core mechanism driving the externalization of identification thinking; along the division of labor dimension, role rotation was a key for identity transformation.

The six activity elements did not operate in isolation but mutually shaped one another. For example, role rotation (division of labor) promoted identity transformation (subject), identity transformation in turn drove probing behavior (community), probing behavior in turn required more precise symbolic tools (tools), and this further deepened understanding of identification thinking (object). This inter-element linkage constitutes the dynamic evolution of the peer feedback activity system.

5.2 Feedback as a process of externalizing identification thinking

Another important finding of this study is that the essential function of peer feedback in CMI teaching was not to provide alternative evaluation, but to create a dialogic situation in which one must explain clearly, forcing internal identification cognition to be externalized into a publicly discussable object.

Identification thinking in CMI is strongly tacit. Experts often know at a glance but find it difficult to convey the reasoning process in words. Under traditional teaching models, this tacit knowledge is mainly transmitted through teacher demonstration and student imitation, which is inefficient and difficult to scale. Through the Explain and Evaluate stages, peer feedback activities forcibly externalize identification thinking: students must use language to express what I saw, what I based my judgment on, and how I handled uncertain situations. This externalization process is itself a form of cognitive training: it forces students to examine their own reasoning and discover its gaps and ambiguities.

5.3 Contribution to the Application of Activity Theory

This study applies the activity theory to the specific field of CMI teaching, expanding the scope of activity theory application in professional education. The study found that the disciplinary particularities of CMI (sensory, experiential, and tacit) make the role of tool mediation especially prominent. The quality of symbolic tools such as scoring rubrics and feedback scaffolds largely determines whether the activity system can operate effectively. At the same time, the influence of face culture as an implicit rule suggests that the application of activity theory needs to consider the local cultural context.

VI. Conclusion

6.1 Conclusion

Through a qualitative case study, this study systematically presented the practice process of students carrying out peer feedback around the six elements of activity theory. The main conclusions are as follows. First, along the subject dimension, students underwent an identity transformation from evaluatee to identifier, with role rotation and meta-feedback as key triggers. Second, along the tools dimension, the scoring rubric exhibited a dual nature of scaffolding and constraint, requiring a balance between structure and flexibility. Third, along the object dimension, the activity orientation deepened from identification report to identification thinking, and the feedback focus evolved from correctness to reasoning. Fourth, along the rules dimension, a persistent tension existed between face culture and constructive feedback, and rule negotiation could be achieved through peer feedback training. Fifth, along the community dimension, the dilemma of being unable to explain clearly drove the formation of a probing culture, which was the core mechanism promoting the externalization of identification thinking. Sixth, along the division of labor dimension, role rotation was a key design for identity transformation. The degree of coordination among the six elements determines whether peer feedback can effectively promote the development of identification ability.

6.2 Pedagogical implications

Based on the research findings, the following suggestions are proposed for peer feedback use in CMI. First, scoring rubrics should be both structured and flexible, avoiding formulaic use. Open feedback requirements can be added to encourage deep dialogue beyond the rubric. Second, students should not simply be required to criticize; rather, feedback should be reframed from interpersonal evaluation to professional practice. Third, every student has the opportunity to experience the roles of presenter, evaluator, and observer, promoting identity transformation. Fourth, peer probing is often more conducive to deep thinking than teacher explanation, and teachers should consciously demonstrate and encourage probing strategies. Fifth, while ceding evaluation authority, teachers need to provide meta-feedback: evaluating not only students' identification but also the quality of their feedback, conveying that feedback ability itself is a learning goal.

6.3 Limitations and future research

This study has several limitations. First, the study was conducted in one class, with a limited sample size, so the generalization of conclusions requires caution. Second, the research period was five weeks and did not track the long-term impact of peer feedback on identification ability. Third, the study focused on the macroscopic identification module and did not involve microscopic and physicochemical identification.

Future research can deepen in the following directions: comparison of peer feedback designs for different types of identification skills; the tool-mediation effects of digital platforms in peer feedback; optimal integration models of peer feedback and teacher feedback; and longitudinal tracking of the long-term development of identification ability through peer feedback.

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