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Research on the Mechanism of Blended Teaching Empowering the Development of College Students' Critical Thinking

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Abstract: Against the backdrop of deepening digital transformation in higher education, blended teaching has become the mainstream model of classroom teaching reform in universities, profoundly reshaping college students' learning styles and thinking development paths. As the core component of college students' higher-order thinking ability, critical thinking is a key competency for cultivating innovative talents, supporting academic inquiry, and realizing lifelong development. It also serves as an important goal of morality education and ability-oriented cultivation in colleges and universities. This paper deconstructs the internal mechanism of blended teaching empowering the development of college students' critical thinking and analyzes the practical problems existing in the current implementation of blended teaching. Furthermore, it proposes optimization paths for the better development of blended teaching, aiming to provide theoretical references and practical insights for universities to deepen higher-order thinking education and improve the critical thinking cultivation system via blended teaching.

Keywords: Blended teaching; Critical thinking; Mechanism; Teaching reform; Higher-order thinking

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1. Introduction

Generative AI has triggered the iteration of knowledge production modes and also constituted a structural force that forces the transformation of higher education paradigms [1]. At present, digital technology is deeply integrated into higher education, bringing about systematic changes in teaching modes, which has become an irreversible trend. Blended teaching, as a product of the deep integration of online digital learning and offline face-to-face instruction, has evolved from cutting-edge exploration into a mainstream model that promotes classroom revolution and practices the student-centered educational philosophy. Correspondingly, the focus of talent cultivation in colleges and universities is also undergoing a potential shift, from knowledge transmission to thinking shaping.

Critical thinking, as the core of higher-order thinking ability, has become increasingly prominent. It is not equivalent to simple doubt or negation, but a comprehensive literacy involving prudent judgment, logical argumentation, and reflective introspection, namely objective judgment, analysis, or evaluation of things. The purpose of critique, that is, the purpose of critical thinking, is to identify deficiencies while recognizing strengths and to avoid defects while acknowledging merits [2]. Especially for students majoring in philosophy and social sciences, the cultivation of such thinking ability is directly related to whether they can use scientific theories to understand complex realities and remain sober amid diverse ideological trends. Through independent thinking, learners create new knowledge, new selves, and a new society — this is exactly the goal of critical thinking education [3].

However, a striking contrast exists in reality. In many classrooms, especially in highly theoretical courses, teacher-led lectures and one-way knowledge transmission remain common, and classrooms lack sufficient speculative tension and discussion space. As a result, the growth of students' critical thinking is often spontaneous, scattered, and unsystematic. Meanwhile, blended teaching, which is expected to break such dilemmas, often presents another situation in practical promotion. Many practices remain at the superficial level of technical application. When designing courses, some teachers merely focus on online resource uploading and class hour redistribution, without touching the deep reconstruction of teaching structures. Consequently, no organic and necessary connection has been formed between technical tools and thinking cultivation objectives. Such a phenomenon of "formal integration without spiritual integration" constitutes a thought-provoking practical puzzle.

Academia has explored relevant issues, but most existing studies focus on independent cultivation strategies of critical thinking or general application effects of blended teaching. Studies that deeply integrate the two and systematically explain how blended teaching promotes the development of critical thinking remain insufficient. Therefore, focusing on the internal relationship and practical problems between blended teaching and college students' critical thinking development, systematically deconstructing the mechanism by which blended teaching empowers critical thinking, and proposing feasible optimization approaches are expected to fill the research gap and support colleges and universities in carrying out critical thinking education and achieving higher-order cultivation goals through blended teaching.

2. Internal logic and practical dilemmas of blended teaching empowering critical thinking

Discussions on critical thinking can be traced back to Socrates' teaching practice about 2,500 years ago. It gradually matured under the nourishment of Western philosophical thought. In the early 20th century, Dewey (1933) systematically elaborated on it under the term "reflective thinking" in his work How We Think [4], and it formally took shape in Glaser's (1941) work An Experiment in the Development of Critical Thinking [5]. Judging from current talent cultivation goals in higher education, critical thinking cultivation is an important part of achieving higher-order education objectives. As one of the mainstream teaching models, blended teaching ought to play an active role in this process. Nevertheless, a significant gap exists between its theoretical "ought-to-be" advantages and its "actual-being" performance in teaching practice.

2.1. Internal logic of blended teaching empowering critical thinking

The concept of blended teaching first emerged in 1999. The Sloan Consortium in the United States defined it as "a combination of face-to-face instruction and online teaching in a certain proportion" [6]. The empowerment of critical thinking by blended teaching is not a simple superposition of online and offline activities, but systematic advantages consistent with the laws of thinking development based on its inherent characteristics. Its functional logic is mainly reflected in three dimensions.

First, in terms of spatiotemporal logic, blended teaching breaks the physical boundaries of fixed classrooms and constructs a ubiquitous speculative environment, which is crucial for the formation of critical thinking. It extends thinking training from limited, synchronous in-class time to asynchronous, continuous out-of-class online space. Especially under the current social context, the strong embedding of digital technology has broken the limits of education. In particular, generative AI technology has changed learners' learning cognition and educational experience, providing personalized learning services and support [7]. Students can independently browse diverse viewpoints and participate in topic discussions during fragmented time after class, so that links essential to critical thinking, such as information collection and comparative reflection, gain temporal extension and spatial flexibility, laying a foundation for the continuous infiltration of critical thinking.

Second, in terms of subject logic, blended teaching effectively promotes the return of teaching focus from "teaching" to "learning", activating and enhancing students' internal motivation for independent speculation. In traditional learning, students often lack sufficient learning freedom, as teachers usually determine learning progress and content. In blended teaching, students enjoy the initiative to choose resources, adjust learning pace, and express themselves freely in online sessions, transforming from passive knowledge recipients into active inquirers. In offline sessions, they can focus on in-depth discussions and viewpoint exchanges, encouraging students to defend and revise their opinions in interaction.

Third, in terms of process logic, blended teaching constructs a training chain consistent with the law of cognitive progression through the three-stage closed loop of "online independent inquiry — offline in-depth analysis — online reflective extension". Pre-class online exposure and questioning activate cognition; in-class offline sessions focus on analysis, argumentation, and debate to temper thinking skills; after-class online sessions carry out metacognitive regulation through reflective journals and peer evaluation to promote thinking internalization.

2.2. Multiple obstacles to blended teaching empowering critical thinking development

Although blended teaching has broad theoretical prospects, its effect in cultivating critical thinking in real teaching scenarios is often restricted by a series of intertwined practical dilemmas. These dilemmas include both long-standing drawbacks and new problems caused by improper application of blended teaching.

First, teaching concepts are solidified, and thinking cultivation goals are suspended in both design and implementation. In blended teaching practice, such conceptual deviation directly leads to "old wine in new bottles" — instructional design only centers on how to deliver knowledge points more efficiently. Online and offline arrangements lack specialized and serialized thinking training links, leaving thinking cultivation goals hollow at the source and formalized in practice.

Second, the transformation of teaching modes is slow, making it difficult to form a "field" for in-depth speculation. The inertia of the traditional "lecture-dominated" mode remains strong. The offline parts of many blended classrooms have not undergone substantial changes. Interactive links that should serve as the core of speculation generally present a "superficial" state: online discussions tend to become information stacking or simple agreement; offline group discussions often lack effective design and degrade into superficial exchanges or off-topic talks, making it difficult to trigger real viewpoint conflicts and logical debates.

Third, students' learning inertia is stubborn, and endogenous motivation for independent inquiry is insufficient. The implementation effect of blended teaching depends to a certain extent on students, among which the most important variables are students' autonomous learning ability and information literacy [8]. Long-term passive acceptance has made students accustomed to seeking standard answers and reluctant to conduct independent critical inquiry. In blended learning, such inertia is manifested as "procedural completion" of learning tasks — being satisfied with finishing videos and submitting assignments, rather than taking the initiative to use online resources for extensive reading, comparative analysis, and questioning reflection. Their learning behaviors have not naturally shifted to in-depth speculation due to the mixed teaching form.

Fourth, teachers face difficulties in key role transformation, and the literacy of "speculative coaches" urgently needs improvement. Teachers are the key to whether blended teaching can successfully empower thinking cultivation. Blended teaching requires teachers to transform into learning designers, process leaders, and data analysts, and such identity transformation affects teachers' role recognition [9]. However, some teachers have literacy shortcomings: on the one hand, they are not good at designing real problems and topics that stimulate cognitive conflicts; on the other hand, in classroom interaction, they struggle to control in-depth discussions and fail to capture educational opportunities in students' viewpoint collisions for necessary logical correction and theoretical improvement.

3. Mechanism of blended teaching empowering college students' critical thinking development

Faced with dilemmas, a core question naturally arises: through what inherent and systematic mechanism can blended teaching transform its structural advantages into tangible thinking-cultivation effects? Without a clear answer to "how it works", any optimization suggestion will be rootless.

3.1. Resource empowerment: Diversified digital resources consolidate the cognitive basis of speculation

Blended teaching relies on online platforms to build a special resource base suitable for critical thinking cultivation, integrating controversial teaching cases, academic viewpoint reviews, social hot topics, logical reasoning tutorials, classic debate materials, and other content. University teachers should deeply analyze teaching effects through massive teaching data, adjust and improve teaching in a targeted manner, and create highly participatory personalized learning experiences and a sense of gain for students in each link [10]. By providing diverse, opposing, and open viewpoint materials, students are guided to compare different positions, distinguish information authenticity, sort out internal logic, exercise abilities in information screening, induction, and preliminary judgment, and consolidate the cognitive foundation for critical thinking development.

3.2. Interactive empowerment: Multi-dimensional interaction catalyzes the generation of speculative ability

Interaction is a non-negligible teaching link in blended teaching. At the student-student interaction level, online community discussions and offline group exchanges promote students to exchange different viewpoints, question and supplement each other, break thinking stereotypes, broaden cognitive perspectives, and cultivate an open and inclusive speculative quality; at the teacher-student interaction level, teachers provide precise guidance for students' logical loopholes and cognitive deviations, teach analytical methods and argumentation logic, and guide students to establish rational and prudent thinking habits; at the platform interaction level, online anonymous expression reduces herd mentality, encourages students to dare to challenge authorities and express independent opinions, and cultivate critical spirit.

3.3. Evaluation empowerment: Diversified process evaluation guides continuous improvement of thinking

Whether in the era of traditional teaching or the current mixed teaching era, the learning evaluation of students has always failed to break through the stereotypes of "efficiency first" and "quality priority" [11]. However, from the current overall teaching implementation process, compared with the traditional teaching era, blended teaching is more committed to building a special evaluation system for critical thinking with process evaluation as the core, covering online speculative speeches, pre-class inquiry results, classroom debate performance, reflective journal quality, group discussion contributions, and other content. Break the limitation of score-only evaluation, set evaluation indicators from the dimensions of questioning spirit, logical reasoning, argumentation ability, reflection awareness, etc., and use evaluation orientation to urge students to take the initiative to participate in speculative training and continuously improve critical thinking literacy.

4. Optimization paths of blended teaching based on the action mechanism

4.1. Concept reconstruction: Establish the core educational goal of thinking cultivation

Existing blended teaching requires university teachers to break the old thinking of patching up traditional education models. The integration of online education and traditional education is not to subvert traditional education, but to return to the concept of personalized and lifelong learning [12]. On this premise, teachers' educational concepts need to abandon the traditional teaching concept of emphasizing knowledge over thinking, establish a trinity teaching concept of "knowledge impartment — ability cultivation — thinking shaping", integrate critical thinking into the core goals of blended teaching, run through the whole process of pre-class, in-class, and after-class, integrate speculative training into every lesson and every teaching activity, and highlight the core position of higher-order thinking education.

4.2. Resource optimization: Build a hierarchical and classified speculative resource base

To achieve the teaching goal of blended teaching empowering college students' critical thinking development, it is necessary to build a digital resource base of critical thinking suitable for different majors and grades around four themes: logical reasoning, case analysis, academic controversy, and social hotspots. Configure materials hierarchically by basic level, improvement level, and expansion level, supporting discussion question banks, debate cases, and reflection models, so as to provide systematic resource support for students' independent speculative inquiry and cultivate students' critical digital literacy, namely the higher-order cognitive ability to distinguish technical limitations, evaluate answer quality, and reflect on technical ethics [13].

4.3. Process optimization: Solidify the three-stage thinking training closed loop

In blended teaching, strictly implement the teaching process of "pre-class independent questioning — in-class analysis and argumentation — after-class reflection improvement", and fix speculative teaching links in each course. Clarify the focus of thinking cultivation in each link: activate questioning awareness before class, exercise analysis and argumentation ability in class, and cultivate reflection and internalization quality after class, so as to normalize and standardize thinking training. It should be clarified that critical thinking is not only a skill, but also an attitude, requiring awareness of one's own thinking, respect for others' viewpoints, doubt about knowledge, and pursuit of facts [14].

4.4. Teacher improvement: Strengthen comprehensive literacy of speculative teaching

Teachers play a crucial role in the effective implementation of the blended teaching model [15]. University management departments should regularly carry out special teaching and research training on blended teaching and critical thinking cultivation to improve teachers' abilities in topic design, activity organization, and logical guidance. Build a teaching exchange platform, promote excellent speculative teaching cases, carry out demonstration lessons and open classes, and comprehensively improve teachers' thinking leadership and blended teaching design abilities to ensure the implementation effect of blended teaching.

5. Conclusion

In summary, blended teaching, with its unique advantages of online-offline integration, has built a cultivation platform for the cultivation of college students' critical thinking, and is an important path to promote the reform of higher-order thinking education in colleges and universities. There are still problems in current practice, which restrict the actual effect of thinking cultivation. Only by truly implementing resource empowerment, interactive empowerment, and evaluation empowerment can we continuously improve students' questioning spirit, logical speculation, and reflective innovation ability, lay a solid foundation for cultivating high-quality innovative talents meeting the needs of the times, and promote the high-quality development of higher education.

Disclosure statement

The author declares no conflict of interest.

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