Research on the Current Situation and Countermeasures of the Cultivation of Students' Critical Thinking Ability in Application-oriented Private Universities under the Background of Big Data

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Abstract. Cultivating students' critical thinking ability in the era of big data helps to enhance students' innovative consciousness and ability, and is of great significance to the improvement of students' comprehensive quality. Colleges and universities are important places to cultivate high-quality talents and transform students' social roles. Therefore, higher education not only needs to pay attention to the teaching of knowledge and skills, but also needs to strengthen the cultivation of students' comprehensive quality and critical thinking. Taking X College in Anhui Province as an example, this study first analyzes the current situation of colleges and universities in the cultivation of students' critical thinking ability under the background of big data era, and then combines advanced foreign experience to put forward targeted countermeasures and suggestions. Research has found that students' critical thinking is generally weak, social adaptability is low, and educational effects are not satisfactory. The reason lies in the lag of teaching philosophy, curriculum system, and teaching methods. Therefore, it is necessary to further strengthen the summary of practical experience, promote the reform of the teaching system, and then improve the critical thinking ability of college students.

1 Introduction

Critical thinking includes the use of logical reasoning knowledge and skills and the attitude of thinking about problems seriously, questioning the truth based on evidence, and the cognitive skills of logical reasoning and analysis and evaluation. These are the qualities that college students who are about to enter society should possess. The educational concepts of advanced foreign countries are open and pay more attention to the cultivation of creative talents with good and critical cognitive skills and the courage to criticize. The independent thinking ability of college students is relatively high. However, domestic college students are mostly in a state of passive learning and do not have the ability to challenge teachers, and the lack of critical thinking training results in unsatisfactory results in the cultivation of students' innovative thinking. Therefore, it is of great significance to strengthen research in this area. Since the era of big data, more and more colleges and universities in our country have begun to pay attention to the cultivation of students' critical thinking. They have continuously strengthened their critical thinking education by offering relevant courses, improving teaching methods, and enriching the textbook content. For applied private colleges and universities, critical thinking courses and teaching content have not yet been fully introduced into students' daily teaching, resulting in a relative lack of

critical thinking ability of students, which has seriously affected the healthy development of students, and deviate from quality education in our country. Therefore, based on the analysis of the necessity of the cultivation of critical thinking ability of college students, this study takes X College in Anhui Province as an example, through investigation and analysis, understands the current situation of critical thinking ability of applied private undergraduate students in the era of big data, and then combines advanced domestic and foreign advanced thinking skills, this provides policy inspiration for improving the critical thinking ability of applied private undergraduate college students.

2 The necessity of cultivating college students' critical thinking

2.1 Critical thinking is an important foundation for the cultivation of innovative talents

Innovation ability can not only improve the competitiveness of individuals in the post, but also has practical significance for the realization of the development goal of the country's economic stability. Critical thinking is the prerequisite for the formation of innovative thinking, especially in the era of knowledge economy. There is not only the superposition of new knowledge, but also the process of critical internalization

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and revision of old knowledge. In this regard, critical thinking has inevitably become an important driving force for the development of the times. Critical thinking helps to discover the nature of the problem, and then solve the problem. From questioning to solving doubts, it is inseparable from the use of critical thinking to demonstrate and explain unreasonable problems through existing theoretical knowledge. Innovative talents refer to talents with innovative spirit and innovative ability. On the one hand, they must have the innovative qualities of dare to explore and dare to try; on the other hand, they must also have the keen insight ability and the will to innovate unless they reach their goals. In the cultivation of innovative talents in our country, both the quality of innovation and the will to innovate are inseparable from the cultivation of critical thinking ability.

2.2 Critical thinking is an inevitable choice for students to adapt to the era of big data

The influence of information on social development has gradually increased, and it has grown geometrically; however, uneven information is widespread, especially in the period of big data, where the amount of data is large and diverse, and the value density is low. People's freedom to choose information has been greatly improved, but how to find valuable information in massive amounts of information should have the ability to critically select and process information, so that you can see what you see. Therefore, quickly finding valuable information data has also become an important evaluation indicator of personal data information cognitive ability and sensitivity. If college students do not have critical thinking, they will be no critical trade-off between the kinds of information collected under the guidance of the problem, and the action plan will not be perfect, and they will gradually be abandoned by the big data and information age. Critical thinking ability improves students' insight, analysis, and problem-solving abilities by cultivating students' divergent thinking and critical thinking creative ability, so that they can quickly eliminate roughness, remove falsehoods and preserve truth when faced with massive amounts of information, in order to get the objective reality and the theoretical logic of the conclusion.

3 Analysis of the status quo of students' critical thinking ability training in applied private undergraduate colleges——Taking X College of Anhui Province as an example

In order to understand the current situation of students' critical thinking ability training in applied private undergraduate colleges and universities, this study first used the "California Critical Thinking Tendency Questionnaire (CCTDI)" as a survey tool to investigate the critical thinking of X College students in Anhui Province. The questionnaire is mainly developed from five dimensions: analysis skills, evaluation skills, inference skills, reasoning skills, and induction skills. Each dimension has 14 items to understand the scores of college students' critical thinking skills[1] and compare them with the scores of American norms[2]. The questionnaire is divided into 6 levels from "strongly agree" to "strongly disagree". The negative items are assigned a value of 1 to 6, and the positive item is assigned a reverse value. The score interval is 14 to 84 points. Among them, 50 points are regarded as the cut-off value for distinguishing between strong and weak critical thinking tendencies. The possible range for the total score is between 70 and 420, and the total score is greater than 280, indicating a critical thinking character; on the contrary, if the score is less than 280, it is considered that there is no critical thinking[3]. A total of 180 questionnaires were distributed to X College students, and 168 valid questionnaires were returned, with a recovery rate of 93.33%.

The results showed that the CCTST scores of X college students were 207-383 points, with an average score of 263.56 points; among them, analysis skills averaged 35.28 points, evaluation skills averaged 53.61 points, inferred skills averaged 65.26 points, reasoning skills averaged 52.37 points, and inductive skills averaged 60.18 points. American university norms show that the CCTST scores of college students are 254-391 points, with an average score of 309.20 points; among them, analytical skills average 56.72 points, evaluation skills average 58.63 points, inferred skills average 63.29 points, reasoning skills average 62.12 points, and inductive skills average 70.14 points .

Analytical skills are at the core of critical thinking and consist of three parts: classification，clarification, and meaning decoding. Domestic students have relatively poor analytical skills. Evaluation skills refer to the credibility of evaluation statements, including evaluation basis and evaluation propositions. It also refers to the conclusion of inferring statements and evaluating the correctness of reasoning based on background. Evaluation runs through the entire process of higher education in our country, and students will judge things based on a certain standard; for this, the score is relatively high, but the evaluation skill score is lower than that of foreign college students. Inference refers to the ability to draw conclusions based on known information and data and existing knowledge and experience, which is quite different from the inference skills scores of American college students. Reasoning refers to the ability to use deductive reasoning to judge conclusions, which is not much different from the reasoning skills scores of American college students. There is a big gap between the inductive skills score and those of American universities.

4 Enlightenment of Critical Thinking Cultivation of Foreign Students

4.1 Change concept

First of all, teachers should change their responsibilities. Teaching philosophy directly affects teaching activities. American college students' critical thinking skills score is high, which is not unrelated to teachers' modern teaching

concepts. Teachers should put aside the majesty of the teacher and solidify their image, and encourage and guide students to dare to question academic views. Actively change the leading position of teachers, continuously improve students' sense of ownership, adopt student-based teaching methods, enhance teacher-student interaction, and reverse the passive learning pattern of students. Teachers should strengthen students' independent thinking and guidance, and help students to internalize knowledge into their own qualities and abilities through teaching methods such as project training or scenario simulation. Teachers should strengthen their sense of responsibility, take the initiative to take the responsibility of cultivating students' critical thinking skills, play an exemplary role as teachers, and cultivate more innovative and thinking talents.

Secondly, it separates students from traditional learning attitudes and concepts. Critical thinking is not about opposition or denial, but cautious verification, reflection and innovation with a spirit of seeking truth from facts and a spirit of bold questioning, so as to reflect the value of critical thinking and prevent students from entering the misunderstanding of critical thinking. As the beneficiaries of higher education, students should actively participate in the cultivation of critical thinking to meet the needs of social development for the emotional characteristics and knowledge and skills of talents. Students should recognize the importance of cultivating critical thinking, improve their critical initiative, and actively learn the skills, methods and methods required to deal with problems with critical thinking. Actively participate in social practice, realize the application of learning and comprehend by analogy, apply critical thinking to all areas of life, and finally realize the improvement of theoretical practice ability and the sublimation of theoretical knowledge. Social practice is of great significance to the improvement of students' critical thinking ability. The content of various social practices carried out by colleges and universities is to cultivate students' social adaptability and the ability to understand the world, so as to prepare for employment. Social practice has practical significance for the cultivation of students' creative ability and critical ability. In the 1990s, American educational institutions compared the impact of in-class and extra-curricular experience on the development of students' critical thinking skills, and found that compared with classroom teaching and curriculum settings, extra-curricular experience also occupies an important position. The study found that the teaching methods of social science teachers have a positive effect on the development of students' critical thinking ability. In this regard, in the talent training plan, enriching students' classroom and extracurricular experience will achieve the goal of talent training faster[4] .

Schools should continuously optimize the critical thinking training system. Critical thinking is the quality that talents should have; for this, the concept of critical thinking quality training should be penetrated into the field of higher education. Colleges and universities should strengthen the test of students' critical thinking and establish a database to lay a solid foundation for personnel training. At the same time, optimize the curriculum system to cultivate critical thinking.

Finally, in the era of big data, more attention should be paid to the cultivating critical thinking. In the face of massive amounts of mixed truth and false information, lack of critical thinking will lead to chaos. Living in the information age, citizens are required to have the ability to distinguish right from wrong and to remove the false and keep the truth, and to criticize online public opinion through questioning and thinking, so as to maintain their own ideological security and promote the development of social modernization[5] .

4.2 Optimize the curriculum system

American scholar Dewey studied the impact of various types of courses on the development of students' critical thinking, and found that interdisciplinary courses and writing courses, honor training programs, science courses, ethics courses, etc. have a positive effect on the cultivation of students' critical thinking[6] . It is found that reading skill courses and supplementary courses are not conducive to the improvement of students' critical thinking ability. Only when the curriculum is combined with effective teaching methods can the ideal thinking training effect be achieved. The design of the critical thinking training curriculum system is reflected in the following aspects: One is the independent curriculum system. Separate thinking training courses are set up, and students are required to complete a critical thinking course before they can graduate, and realize the targeted training of critical thinking. Teach the principles and methods of critical thinking and guide students to apply them to various scenarios. American higher education pays attention to the cultivation of students' critical thinking skills, interpersonal communication skills, and problem-solving skills, and regards them as an important goal of education, requiring students to have critical thinking before graduation. American colleges and universities generally offer basic or topical courses on critical thinking. In the form of seminars, students are required to write articles based on topics, discuss and communicate, and students' classroom performance and writing articles are taken as important evaluation indicators and included in the overall academic performance. In order to adapt to students of different grades, the types of critical thinking courses should be enriched, including subject courses and summit courses. Curriculum settings should be based on the teaching resources and students' ability to design a reasonable teaching plan. Further clarify the teaching objectives, and earnestly exert the incentive role of the curriculum. Introduce real cases to realize the organic combination of real life and course teaching. Guide students to practice more and strengthen the detection of students' mastery. Teaching should be targeted, especially professional terminology should be easy to understand, to ensure the best course design effect[7] . The second is the integrated curriculum system. In order to ensure that students can realize the natural transition and migration of critical thinking in various fields, and to break the barriers of knowledge between various disciplines, it is a talent training requirement that cannot be completed by an

independent curriculum system. Different disciplines have different requirements for critical thinking, and the integrated critical thinking training model respects the teaching mode of each discipline, and realizes the effective penetration of the quality of critical thinking skills. Emphasizes effective penetration and integration in the teaching of various disciplines, no need to set up special courses, which are consistent with the form of professional courses in various disciplines; no need to set up special critical thinking training teachers, pay attention to the cultivation of students' critical thinking, and pay more attention to the knowledge and skills of various disciplines . On the basis of the quality training of various disciplines, the teaching objectives and content of the training of critical thinking have been added, and the original teaching plan has been revised in a small range. In this regard, compared to independent curriculum systems and thinking training models, integrated curriculum systems and practices are easier to adopt. In the teaching of various subjects, a quarter of the class hours can be used to cultivate critical thinking. Teaching methods and training methods such as immersion or instillation are mainly used to realize the manifestation or implicitization of the teaching goals of critical thinking, and realize the effective penetration of thinking training and subject education. The third is the comprehensive curriculum system. The independent curriculum system teaches students the principles and methods of thinking, while the integrated curriculum system realizes the organic combination of thinking and knowledge of various subjects. In order to highlight the effectiveness of the two training modes, a comprehensive curriculum system should be set up to integrate the advantages of the two, realize the integration of thinking teaching and independent thinking skills teaching in the conventional curriculum, improve the dimension of research and application, imperceptibly cultivate students' critical thinking. Through mixed teaching methods, after teaching critical thinking, combined with daily subject teaching and critical thinking skills training[8] . For freshmen, critical thinking education can be carried out in basic courses such as university introduction to help them adapt to university life. Evaluate students' thinking ability through time-limited writing test, and adopt reasonable teaching methods based on the results of the assessment. The content of the thematic critical thinking course is integrated with the content of the general education course to help students internalize their knowledge into good qualities such as critical thinking.

4.3 Enrich teaching methods

The first is the heuristic teaching method. Teachers should actively set up a critical review of the problem bracket, leaving a critical space, and guiding students to use critical thinking to review thinking and analysis[9] . In teaching, teachers cultivate students' ability to discover and solve problems through the teaching process of suggestion and question, hypothesis, and reasoning verification. Teachers first state the phenomenon or fact, reduce the obstacles for students to explore the essence, and guide students to analyze the reasons around the facts, so as to find and ask questions. Guide students to conceive solutions to problems, and gradually complete the demonstration and improvement of the program, and finally subtly cultivate students' critical thinking skills and qualities.

The second is the case teaching method. Teachers select representative cases based on the content of teaching knowledge, and after stating relevant information requirements, organize students to start independent thinking, guide students to use the knowledge they have learned to analyze cases, and draw regular conclusions through group discussions and other methods . The teacher supplements the information based on the students' reports and ideas, and guides the students to discuss and report again. Teachers provide original explanations and plans, focus on real scientific research scenarios, guide students to put forward hypotheses after analyzing data, demonstrate hypotheses by collecting and screening information, and then through information collection, students' critical thinking can be continuously expanded, and what they have learned can be applied. Students' handling of real cases related to reality can stimulate students' enthusiasm for participation, guide students to start role-playing, and be able to intervene in cases deeply to ensure the pertinence and effectiveness of problem-solving solutions. Through case analysis and personal experience, students have a deeper experience of the case, and their thinking such as anticipation can be significantly improved.

Finally, the project-driven teaching method is designed to design experimental projects based on problems or situations, especially when students pay attention to political and environmental issues. This not only realizes the expansion of teaching content, but also ensures the effectiveness of students' critical thinking training. In the implementation of the project-based learning method, teachers and students discuss jointly and determine the theme of the project, and guide students to choose research methods and collect data independently. After the students have determined the research object, they will carry out research and data collection, the students will write the project investigation and analysis report, show the project achievements results, and teachers' evaluation of project results. Teachers change the role of organizers and guides flexibly , respect and protect students' main body, so as to realize the teaching goals of innovative practice and critical reflection ability as soon as possible.

In addition, modular teaching methods should be used flexibly[10] . After decomposing the teaching content, the teacher assigns learning tasks to the learning group, the group completes the learning tasks independently, and finally realizes the construction of the whole learning content. The knowledge and skills imparted by teachers are replaced by group members who learn from each other. The group members are responsible for different tasks. The groups complement each other to achieve the desired learning effect. Teachers play the role of coordinator and controller in the classroom situation with students as the main body, guiding students to sort out and summarize scattered knowledge and analyze more scattered information. In the cooperative teaching method, the completion of group tasks directly affects the overall

learning effect, which forms a good learning atmosphere of mutual supervision and competition between groups. Students have a comprehensive understanding of the content they are responsible for, which is more conducive to the improvement of critical thinking skills.

5 Conclusion

The critical thinking skills scores of domestic college students are much lower than those of American college students, which also reflects the lag in the cultivation of innovative talents in the domestic higher education field. Teaching methods, teaching concepts and curriculum settings are important factors that affect the development of critical thinking of college students. In addition, they also include extracurricular experience and teaching models. Under the background of big data, colleges and universities should strengthen teacher training and education to ensure that they choose teaching methods reasonably according to the actual situation of students and ensure the effectiveness of critical thinking training. Colleges and universities should widely organize students to carry out social practice actively, so that students can learn by doing and learn by doing, and improve their critical ability as soon as possible, and constantly optimize the curriculum system of colleges and universities, so as to promote higher education reform.

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