

An Exploration into the Application Value of Critical Thinking in Higher Education from the Perspective of Big Data

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ABSTRACT

Starting from the characteristics of big data, the cognition and thinking of contemporary college students have shown new features. Therefore, it is necessary to use the technical means of big data to formulate thinking under big data, combined with critical thinking. By doing so, students can finally nurture a correct attitude and better morality and even complete the fundamental task of higher education.

1. Introduction

After the “Internet +” Action Plan was proposed in 2015’s Government Work Report, the Internet, as a technology carrier, has been integrated with government services, agriculture, healthcare, education, and other fields. Artificial intelligence technology, based on big data, is deeply integrated into everyone’s daily life, making Internet higher education based on big data technology achieve unprecedented development. In the era of big data, only by giving a potent combination of big data thinking and critical thinking in higher education, can we effectively tackle the new challenges of the times and explore new ways to adapt to the characteristics of contemporary college students’ cognition and thinking.

2. Big Data Thinking: A New Starting Point of Higher Education

The arrival of the era of big data not only means the

emergence of a new way of living, but also means the arrival of a new trend of cognitive thought at a higher level, namely big data thinking. What we call big data thinking mainly refers to a way of thinking to know the world based on the use of big data resources and technology through big data. The application of big data thinking to higher education is bound to exert an influence on traditional education methods, educational philosophy, and educational objectives. Thus, there are different views on the definition of the subject of higher education from the perspective of big data within the academic circle, namely the single-subject theory (with educators as the main body) and the double-subject theory (both the educators and the educatees are subjects). This controversy also reflects growing attention to the status of students in higher education in the era of big data. Colleges and universities are the last threshold for most students to enter the society from school, and are also the main place of higher education. The thinking mode

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is formed by college students before they cross the last threshold directly affects their behaviors in the future.

2.1 New Characteristics of College Students' Cognition

Amid the era of big data, on the one hand, college students break the limits of space in their horizons to a large extent, and on the other hand, the features of big data-4Vs¹ gradually affect the way of thinking of college students, and even play a leading role in their behavior. Although college students step from perceptual knowledge to rational knowledge in higher education, the impact of big data thinking in the process of thinking processing perceptual materials can easily lead to deviations in the final cognitive results. Coupled with the malicious infiltration of the values of Western capitalist countries, the ability of college students to tell right from wrong and discard the dross and select the essential is challenged invisibly, showing the characteristics of fuzzy cognition and confused thinking. Therefore, it is a necessary way for college students, in order to correctly recognize and transform the world, to conduct an in-depth investigation of the necessity of critical thinking in the era of big data, and make big data thinking more precise by cultivating college students' critical thinking in the cognitive process of higher education.

2.2 Cognitive New Thinking of College Students

As far as the accuracy of the data is concerned, the accuracy in the era of big data is different from the accuracy of small data. The accuracy of small data lies in individual accuracy. That is, a single database is only accurate for several individuals. When these data are used to analyze more objects, the greater the number of analyses, the less accurate the data; However, the accuracy of big data lies in all-around accuracy, that is, it may be inaccurate when people analyze a single object with a massive database of big data, but when people use big data to analyze more objects, the more objects analyzed, the more accurate the data. If small data discover the contingency of the development of things, then big data masters the development laws of human society and nature through a large amount of data and precise algorithms, thus exposing the inevitability behind the contingency.

But humans are not machines, and so human brains are different from big data algorithms, because people will be affected by the environment, thinking, and other factors at the moment brains give instructions, thereby

losing the accuracy of judging things. As some scholars mentioned when describing the relationship between big data's necessity and contingency, "in the era of big data, it is the diversification of data sources and real-time rapid processing that enable people to get rid of the interference of contingency and grasp the inevitable"^[1]. But in addition to necessity, thinking also influences how people know things, for which people's thinking is characterized by pluralism for other factors as using big data. In higher education, such pluralism is about whether college students can extract the essence from diverse values or get beyond vague appearances to the essence, and during which critical thinking is needed.

3. Critical Thinking: A New Vision for Higher Education

In the era of big data, either people's daily life or ways of thinking are affected by it. Big data not only offers teachers in higher education new teaching approaches and course content, but also brings them challenges for the distraction of various information. Critical thinking training is to help college students acquire the ability of judging, analyzing, and evaluating objective things and to cultivate their subject, as well as independent consciousness, so as to harvest better fruit of higher learning.

3.1 Origin and Development of Critical Thinking

Critical thinking started as a kind of thinking tendency. Socrates of ancient Greek time is the first with critical thinking. The well-known "Socratic dialogue" is just a method of training students' critical thinking ability through conversations. In the dialogues, characters take their stand, question the views of others from own perspectives to finally realize goals of examining themselves and consolidate knowledge.

In the early 20th century, William Graham Sumner, an American social scientist, stressed the importance of critical thinking in *Folkways*. In 1910, John Dewey, the famous American educator, described the idea of "critical thinking" in the book *How We Think*^[2]. In 1980s, the U.S. saw a large scale discussion on critical thinking as a teaching approach, after which critical thinking has always been a hot topic in academia, and the consideration over it has never been off the table. However, in China, academia began to notice this concept in late 1980s. As for now, critical thinking has only been studied in China for more than twenty years. And it is at the beginning of the 21st century that critical thinking was come up with to be applied to higher education. So it is even rare to

¹ "4Vs" refers to: Volume, Velocity, Variety, and Value.

talk about applying it to higher education in the era of big data.

3.2 Major Concepts of Critical Thinking

Critical thinking has been variously defined according to the scholars. In *How We Think*, John Dewey defined the essence of critical thinking as “temporarily suspended judgment; and the essence of this suspense is inquiry to determine the nature of the problem before proceeding to attempts at its solution.” Dewey believes that critical thinking is “Active, persistent, careful consideration of a belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends”. Critical thinking is applied to many disciplines without distinction. *Dictionary of Logic* defines critical thinking as objective judgment, analysis, or evaluation. The aim of judgement is for nothing but that of critical thinking: shortcoming not to be neglected while sensing its strong points, demerit not to be overlooked while noticing its merit. Critical thinking advocates judgment to re-conceive and reshape in pursuit of better result^[3].

Therefore, critical thinking is the combination of deconstruction and construction. Higher education is a process from externalization to internalization and then externalization, in which the internalization is the process of deconstruction and construction. As to understanding higher education from the perspective of critical thinking, some scholars believe that “to understand higher education rationally with critical thinking refers to the thinking process in which people with social attributes systematically analyze and study the practice of higher education with Marxist judgment spirit, aiming to explore the inherent law behind the phenomenon, to shed light on the nature of objective things, so as to think and judge in a scientific and rational manner.”^[4] To understand critical thinking from the perspective of higher education refers to that students acquire the ideas, grasp the inherent law for development of things, and have the thinking ability to guide their own actions in understanding objective things.

3.3 Educational Function of Critical Thinking

Critical thinking training is a process from conscious to unconscious, and its core is “to question”. This paper believes that questioning is not only to find the answer to the question, but also, as the core of critical thinking, when it is applied to higher education, educatees should have the consciousness to know why. In American academia in the 1990s, among the discussion on the definition of critical thinking, some scholars mentioned

that “generally speaking, critical thinking is rational, evaluative and self-reflective thinking”.^[5] “Self-reflection” is the new outcome of discussion, and the “self-examination” proposed by other scholars is actually also self-questioning. This paper holds that self-questioning is the premise of analyzing, evaluating and judging other objective things for college students. The standard of judging things right or wrong is objective, but people are subjective when using such standard to judge. After all, it is the thinkers who solve practical problems on critical thinking, so only by cultivating the self-questioning consciousness of college students can improve their correctness of judgement in the era of big data.

In the cultivation of critical thinking, many scholars emphasize the cultivation of critical thinking ability. Some people think that “critical thinking knowledge”, “critical thinking skills”, “critical thinking attitude and habits” are the components of critical thinking activities, and the attitude and habits are at the core of guiding knowledge and skills^[6]. The priority for higher education is to cultivate the critical thinking attitude, which is a process from externalization to internalization.

Here is a distinction between “critical thinking attitude” and “critical thinking habits”. “Attitude” is a kind of consciousness, which is a critical thinking for objective things and also a tendency and choice in thinking for college students who are receiving or after receiving higher education in the era of big data. The second is to cultivate students’ ability of critical thinking, where “ability” is equivalent to “skills”, which means that college students have critical thinking ability and can use it to analyze and solve problems during and after receiving higher education in the era of big data. The last is to form the habit of critical thinking. The “habit” here is actually an instinct, an unconscious process, and also the ideal goal for the application of critical thinking in higher education. It refers to the ability of college students to use critical thinking instinctively when understanding objective things and solving problems in the era of complex big data during and after receiving higher education.

4. Critical Thinking Cultivation of College Students: New Path for Higher Education

The era of big data brings challenges and opportunities to higher education. Universities are the main front of higher education. In the era of big data, on the one hand, the integration of big data and classroom is advocated. Certain progress has been made in class reform but phenomenon of “one voice” chaired by teacher unchanged so that a gap remains between reality and ideal. On the other hand, tremendous amount of information in the

era of big data will inevitably be mixed with useless information. College students will struggle with the useless information without protection from school, thus improving the cognitive ability of college students and consolidating the values of them, which are significant for them when came along society.

4.1 College Students' Critical Thinking Cultivation is a Realistic Need of Higher Education Reform

Although higher education has entered the era of big data, the plan of teaching reform more urgent, but it is actually at the intersection of traditional teaching mode and teaching mode in the era of big data from the perspective of the overall effect of teaching reform. In fact, big data has brought only a change to the higher education of most universities in form, but has not truly achieved the complete integration of big data and higher education.

At present, the reason why college students lack interests in the teaching content is that, on the one hand, the teaching content itself is boring, and on the other hand, the teachers ignore the cultivation of students' thinking in the process of teaching but just instill them the subject knowledge constantly. Firstly, teachers can develop students' critical thinking attitude when teaching the text, guide them to think actively, establish the spirits of questioning objective realities. In the process of constantly questioning --- answering, re-questioning --- re-answering, students can master the essence of the things' development, so as to stimulate students' interests in learning and desire for seeking knowledge. Secondly, teachers can further cultivate students' ability of critical thinking, so that they can take the initiative to find problems, think about and answer them without the guidance of teachers. Finally, after the students skillfully use the ability of critical thinking, they can form the habit of critical thinking. That is, they can actively use critical thinking to think about problems unconsciously.

The role of critical thinking in teaching reform is to return the classroom to students from teachers. Through the cultivation of critical thinking, students can learn actively, so as to effectively improve the phenomenon of "one voice" chaired by teacher and promote the higher education reform.

4.2 College Students' Critical Thinking Cultivation is a Thinking Weapon for College Students to Survive in Society

As a kind of thinking ability, critical thinking is the development goal that individuals should pursue. It is both

a worldview and a methodology. College students' higher education must eventually be in line with society, not only to enrich the knowledge, but more importantly, to shape their own abilities and values. The cultivation of critical thinking plays an important role in the improvement of cognitive ability and the establishment of values for college students when they enter the society.

On the one hand, critical thinking cultivation is an integral part of college students' cognitive ability. Active mind and being good at thinking and distinguishing are the outstanding characteristics of college students. At this stage, institutions of higher learning usually train students' creative and critical thinking, so as to improve their ability and habit of thinking independently. Big data era is synonymous with "information explosion era". Big data is pursued by the public for it can realize information collection, screening, analysis and integration in an instant. In terms of quantity alone, information delivered by big data to college students can range up to tens of thousands, and each piece of information is testing the cognitive level of college students. The cultivation of college students' critical thinking is different from the direct teaching of theoretical knowledge, which is a method of "teaching them to fish" and a kind of ability cultivation. It can not only guide college students to study diligently and think, but more importantly, can keep them levelheaded when they face the disturbances in the society.

On the other hand, critical thinking cultivation is necessary for college students to shape their values. College students are both good at exploring new things and accepting new things. Some erroneous, false and malicious information may be novel, special and acceptable to college students. To a large extent, higher education achieves its teaching purpose through the transmission and influence of mass information. Similarly, college students may also be influenced by the constant clicking and reading of other information, thus affecting the shape of correct values. The cultivation of critical thinking is to build up the ability to distinguish information. The stimulation and influence of external forces are to stimulate their own ability. Critical thinking is a kind of self-ability. College students will eventually step out of campus. Without the help of teachers, they should be clear with and stick to their own values, stand firm at all times and avoid drifting with the current.

In conclusion, in the current rapid development of the Artificial Intelligence technology in educational application, the critical thinking based on Big Data has been more and more important, especially in teaching management, teaching content, teaching strategies

selection, teaching evaluation and so on. It has a great significance in such aspects, and represents the future direction of the higher education.

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