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Exploration on Reform Path of Psychological Ideological and Political Teaching in Colleges and Universities under Background of Big Data

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Abstract: The course of psychological ideological and political education (PE) is a compulsory course for higher education. However, in the process of implementing psychological ideological and political education, teachers' teaching methods are too rigid, teaching knowledge points are too monotonous, and students' learning and understanding level is low, leading to poor teaching conditions. In the current psychology and ideological and political classroom teaching in colleges and universities, the values of college students are seriously affected by the network culture, but also by the impetuous social environment. In the context of the continuous innovation of information technology, how to make psychological ideological and political education highly fit with information technology is an urgent problem in front of teaching workers. The experiment shows that for a long time, the attention of traditional psychological ideological and political teaching classroom activities is relatively low, and the school's attention to classroom activities is only 65%. Teachers only teach by infusion, but the classroom activity rate based on big data is as high as 96%. With the support of big data technology, psychological ideological and political education in colleges and universities can realize personalized, modern and interactive teaching. In the big data environment, colleges and universities should actively guide students to develop in a positive and healthy direction, promote college students to become adults, and achieve high-quality development of psychological ideological and political education.

1. Introduction

With the popularization of big data, countries attach more and more importance to big data, regard it as a strategic resource, and conduct further research on its application and value. In China's education sector, big data has also had a certain impact on the teaching model. Under the background of big data, the ideological and Political Education of students is constantly undergoing reform and innovation. The development of network information technology has provided many conveniences for psychological reform [1-2]. The ideological and political education of college

students, that is, the convenience of science and technology and the support of educational environment, have prompted the emergence of new educational methods. Although big data provides a good environment for Chinese university education reform, it also has certain limitations to a certain extent. Therefore, in order to achieve the goal of educational reform, we must combine educational concepts and educational goals [3-4]. As technology advances, people's understanding of big data has become more and more profound, and big data is not just a huge and complex network database. It mainly refers to the efficient acquisition, processing and analysis of message, so as to make correct decisions for society and groups [5]. Simultaneously, big data has also push forward the transformation of university education thinking. Therefore, we must reflect on the reasonable transformation of education methods. Facing the arrival of the era of big data and information, the teaching methods of college students' psychological and ideological and Political Education would be greatly affected. Correctly recognizing the various defiance brought by big data, and actively changing teaching methods and carrying out teaching reforms according to these challenges, are major problem faced psychological ideological and Political Education in colleges. At present, teachers of psychological, ideological and political courses in colleges generally believe that compared with other disciplines, students' classroom-related conditions are all relatively low. In the psychological and ideological and Political Education of college students, it is very important to strengthen the ideological and moral construction of college students and establish a correct concept of life values. Due to the many advantages of big data technology, its application value in psychological and ideological and Political Education has also been continuously paid attention to. It provides a new era of significance for the psychological and ideological and Political Education of college students, and also opens up a new path for the long-term development of colleges.

2. Reform Path of Psychological Ideological and Political Teaching in Colleges

2.1 Problems Existing in Teaching of Psychological and Ideological and Political Courses in Colleges

(1) Students' lack of understanding of conceptual theory

In psychological and ideological and Political Education, some concepts have a lot of content, and without good abstract thinking skills, the content in books is often difficult to understand. Simultaneously, the logic of many psychological ideological and political theory courses is also relatively strong. Without good logical thinking and divergent thinking, it is difficult to grasp the essence of their thoughts, which is not conducive to cultivating students' comprehensive thinking ability.

(2) Teachers' teaching methods are outdated

When teachers take psychological and ideological and political courses, the knowledge they learn is obtained from textbooks, and the knowledge in textbooks is some abstract theories. This knowledge is too dull and obscure for students to understand. Teachers' teaching methods are not novel enough to arouse students' interest. As a result, students are not serious in the classroom, rote memorize before the exam, and forget it after the exam. Such a learning method is not conducive to cultivating college students' values and outlook on life.

(3) Each department only takes itself as the center, and the ideological and Political Education has not yet formed a joint force

In various universities, the ideological and Political Education department, the propaganda department, the academic and industrial department, the Youth League committee and the general party branch of the college are all departments with the function of ideological and Political Education for college students. The idea of the department of psychological, ideological and Political Education is the main form approach, and other departments also have different forms.

Their purpose is to combine theory and practice to develop a scientific worldview, outlook on life and values. It improves the ability to analyze problems and solve various practical problems with Marxist theories, viewpoints and methods. In practice, there is an independent relationship between various departments, and there is a lack of vertical connection and horizontal coordination. Its teaching work is basically in the state of "single operation", which is very different from other departments of the school.

(4) Irregularities in educational institutions and management

First, there is no independent teaching plan and outline for the practical teaching of psychological, ideological and political theory courses, and there is no specific implementation method. Second, due to the constraints of many factors, the development of practical teaching has great randomness, contingency and subjectivity, which makes it difficult to carry out the practical teaching of psychological and ideological and political courses in a comprehensive, in-depth and lasting manner. Compared with the existing professional practice teaching system, its teaching mode needs to be further improved and standardized.

(5) The evaluation system is not perfect

Research results show that many colleges and universities do not include it in the syllabus, nor do they stipulate the hours and credits, while the teaching content of psycho-ideological and political science is mainly concentrated in other courses. Therefore, most colleges and universities in China have not yet formed independent evaluation standards and evaluation systems for psychological and ideological and Political Education. Table 1 shows a summary of the above issues and impacts.

Table 1. Summary of the above problems and impacts

related question	learning efficiency	Teaching efficiency	Comprehensive ability
poor understanding	48%	51%	poor
backward teaching methods	52%	49%	poor
bad social atmosphere	40%	50%	very poor
poor management	46%	53%	generally poor
Poor policy	50%	52%	poor

2.2 Challenges and Opportunities for Psychological and Ideological Education in Colleges Based on Big Data

(a) Challenges

(1)Limited Data Accessibility

Big data applications in colleges remain siloed within administrative departments, hindering direct access for ideological educators. Teachers often lack awareness of big data's relevance to their work, coupled with unclear guidelines for its use. This creates information imbalances, passive adoption, and blurred boundaries between public data and personal privacy.

(2)Negative Online Influences

The internet's anonymity allows harmful content to infiltrate, distorting values among impressionable students. Strengthened oversight is critical to leverage the web's benefits while safeguarding ideological education.

(b) Opportunities

(1)Enhanced Student Insights

Big data enables comprehensive tracking of students' learning and behavioral patterns, revealing gradual psychological shifts. Educators can identify root causes of issues and intervene proactively,

improving guidance efficacy.

(2)Data-Driven Management

Traditional methods struggle to quantify student emotions and attitudes. Big data converts subjective states into analyzable metrics, refining teaching strategies and services for targeted outcomes (see Figure 1).

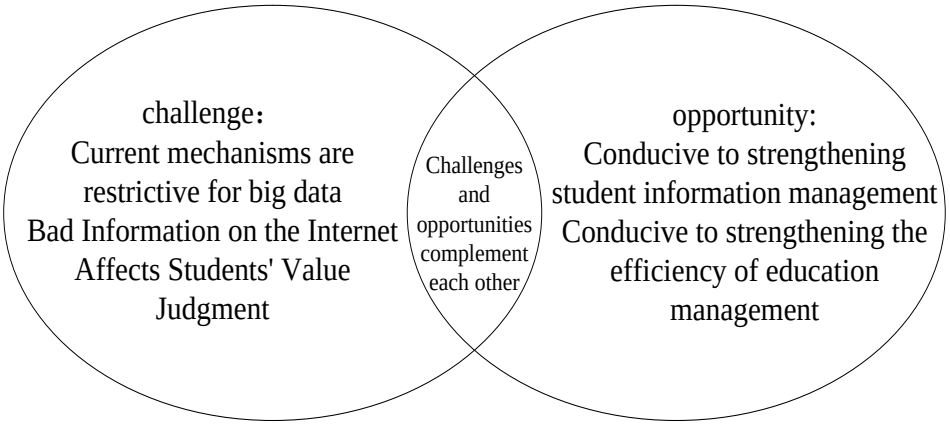


Figure 1. Interrelationship between challenges and opportunities

2.3 Reform Path of Psychological Ideological and Political Education in Colleges under Background of Big Data

The course of psychological, ideological, and political theory in universities is the core carrier for shaping students' political literacy, moral qualities, and mental health. The quality of its teaching is directly related to the construction of national ideology and the development of college students' personality. Big data is not only a challenge (such as privacy risks), but also an opportunity for reform, which requires innovation through the following paths:

(1)Data driven teaching content reconstruction

Universities integrate big data resources, optimize the teaching system, and strengthen the data analysis ability of ideological and political teachers. Universities use continuing education platforms to improve teachers' digital literacy, ensure that data resources are deeply integrated into course design, and highlight the effectiveness of education.

(2)The "micro classroom" model empowered by technology

Colleges and universities build interactive micro-classes based on big data to enhance student participation through concise and intuitive content. The combination of online independent exploration and offline teacher-student interaction in colleges and universities promotes the internalization and practical application of knowledge. The collective lesson preparation mechanism compensates for teachers' knowledge blind spots and achieves mutual growth in teaching and learning.

(3)Precise personalized teaching practice

Real time recording of learning behavior (such as classroom focus) using big data, combined with interdisciplinary data analysis, to identify teaching blind spots and customize personalized plans (see Figure 2). The implicit data lost in traditional education can be transformed to provide scientific basis for precise teaching.

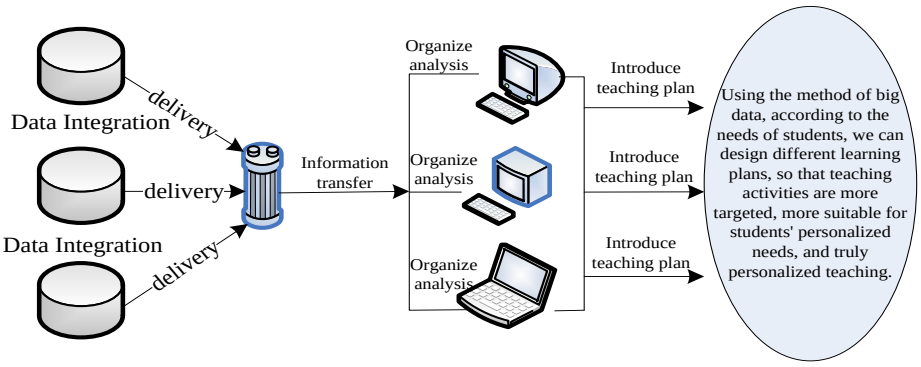


Figure 2. Simple composition of the reform path

2.4 Difference between Big Data Teaching and Traditional Teaching

(1) Different teaching resources

At present, many changes have taken place in the psychological and ideological and Political Education of colleges. The first is the diversification of educational resources. The traditional college psychological and ideological education is based on textbooks, and the textbooks were compiled relatively early. It is seriously out of touch with reality, and it is relatively far away from students' life, so that their interest in learning ideological and Political Education has declined, and they cannot feel the actual role of psychological ideological and Political Education. In the context of big data, the form of psychological and ideological and political teaching is more flexible, and the teaching resources are more abundant, gradually moving from single language teaching to visualization. Teachers integrate videos, pictures, tables and other content into classroom teaching through network collection and daily accumulation, so as to stimulate students' various perceptual abilities. By enhancing their perception of ideological and Political Education and transforming it into their own thoughts, the effectiveness of psychological and ideological and Political Education in colleges would be stronger.

(2) Flexibility in teaching form

Psychological and ideological and Political Education in the Internet age breaks through the limitations of time and space, and there are a lot of resources and materials in big data. Students can learn and explore independently. Under the massive amount of information, they would slowly build up their own understanding, thereby enhancing the judgment of right and wrong. The psychological and ideological and Political Education of college students should adopt various forms, and improve the effect of ideological and Political Education by means of micro-lectures, flipped classrooms, and example reproduction. Simultaneously, it is also needed to provide students with online learning platforms after class, such as online communication, micro-classroom, new media, etc. When students encounter problems, they can ask teachers for help through WeChat, telephone, Weibo and other software, and can also communicate through the Internet to guide their thinking.

(3) The teaching process can be quantified

Nowadays, as long as students are active online, there would be a certain amount of activity data. Teachers can master their study time based on students' learning data, understand what platforms they use for psychological, ideological and political activities, and focus on what to study. In this way, a comprehensive understanding of students' psychological, ideological and political learning can be obtained. Actions can be taken in a timely manner even if there is a problem. Traditional psychological and ideological teaching is limited to classrooms, and teachers have limited energy. It is impossible to accurately remember each student's learning situation, and it is impossible to take

targeted teaching measures. Big data teaching can analyze the characteristics and needs of college students' psychological ideological and political work through a large amount of data, so as to prescribe the right medicine. Table 2 summarizes the differences between the two.

Table 2. Summary of the difference between the two

teaching mode	education resources	teaching fun	energy consumption
Big data teaching	diversification	93.54%	42.66%
traditional teaching	monotonous	49.12%	88.91%

2.5 Experiment Analysis of Educational Model Based on Big Data

With the popularity of big data, the psychological and ideological and Political Education of colleges must conform to the trend of the times, seize the chances and defiances of the development of the times, and use big data to change the current situation and improve its feasibility.

In the reform path of psychological ideological and political teaching in colleges, due to the limitations of scientific and technological level, different data sources, systematic errors, gender and racial discrimination and other factors, the collected data is often subjective and lacks objectivity. Because of its existence, the credibility of the data is greatly affected. Therefore, how to effectively solve the practical problem of big data has become a common concern in the current academic circles. Suppose, given M input-output pairs (x_i, y_i), the training sample set $D = [(x_i, y_i)]_{i-1}^{M}, x_i \in R^d, y_i \in R$, selects the appropriate kernel space transformation $\varphi: x \to \phi(x)$, then the vector regression machine algorithm constructs a linear function $f(x) = \omega^T \varphi(x) + b$ in the kernel space. For simplicity, this function can be expressed as $f(x) = w^T \varphi(x)$, where $w = (w^T, b)^T, \varphi(x) = [\varphi(x)^T, 1]^T$ maximizes the reliability ∂ of big data, then the following provisions are obtained:

$$|y - f(x)|_{\partial} = \begin{cases} 0, if |y - f(x)| \le \partial \\ |y - f(x)| - \partial, otherwise \end{cases} \tag{1}$$

By introducing historical psychological and ideological and political teaching materials and controlling risks, a vector regression machine algorithm can be constructed to optimize its possible reform risks. The regulations are as follows:

$$\min_{w} \|w\|^2 + \frac{C}{\mu M} \sum_{i-1}^{N} (\delta_i{}^2 + \delta_i^{*2}) + 2C\partial \tag{2}$$

$$\begin{cases} y_i - w^T \varphi(x_i) \le \partial + \delta_i, i = 1,2,3, \cdots\cdots, M \\ w^T \varphi(x_i) - y_i \le \partial + \delta_i^*, i = 1,2,3, \cdots\cdots, M \\ w^T d = 0 \end{cases} \tag{3}$$

In the formula

$$d = \frac{\sum_{(x_i, y_i) \in D_1} \varphi(x_i)}{M_1} - \frac{\sum_{(x_i, y_i) \in D_2} \varphi(x_i)}{M_2} \tag{4}$$

D_1 and D_2 are the two subsets obtained by dividing the dataset D; M_1 and M_2 represent the number of samples in D_1 and D_2, respectively, that is, d is the difference between the average vectors of D_1 and D_2 in the kernel space, and M is the number of samples. C is the penalty factor, ∂ is the insensitive loss parameter, $\delta_i, \delta_i^* > 0$.

For the reform and optimization problem of formula (2), it can be described as the following planning form:

$$\max_{\alpha^*}(\alpha^T, \alpha^{*T})\begin{pmatrix} \frac{2}{C}y' \\ -\frac{2}{C}y' \end{pmatrix} - (\alpha^T, \alpha^{*T})K\begin{pmatrix}\alpha \\ \alpha^*\end{pmatrix} \tag{5}$$

$$(\alpha^{\mathrm{T}}, \alpha^{*\mathrm{T}})1 = 1, \alpha, \alpha^* \geq 0$$

$\alpha = (\alpha_1, \alpha_2, \alpha_3, \cdots, \alpha_{\mathrm{M}})^{\mathrm{T}}$ and $\alpha^* = (\alpha_1^*, \alpha_2^*, \alpha_3^*, \cdots, \alpha_M^*)^T$ are Lagrange multipliers.

$y' = (y_1, y_2, y_3, \cdots, y_M)^T$ is the known output;

$$\mathrm{K} = \begin{bmatrix} (\mathrm{K}_1 + 11^{\mathrm{T}} + \mathrm{K}_2) + \frac{\mu \mathrm{M}}{\mathrm{C}}\mathrm{I} & -(\mathrm{K}_1 + 11^{\mathrm{T}} + \mathrm{K}_2) \\ -(\mathrm{K}_1 + 11^{\mathrm{T}} + \mathrm{K}_2) & (\mathrm{K}_1 + 11^{\mathrm{T}} + \mathrm{K}_2) + \frac{\mu \mathrm{M}}{\mathrm{C}}\mathrm{I} \end{bmatrix} \tag{6}$$

It is the kernel matrix, where,

$$\begin{cases} K_1 = (k_{ij})_{NN}, k_{ij} = \varphi(x_i)^T\varphi(x_j) \\ K_2 = \frac{1}{d^T d}(k_{ij})_{NN}, k_{ij} = \varphi(x_i)^T\varphi(x_j) \end{cases} \tag{7}$$

In addition

$$\varphi(\mathrm{x_i}) = \left[\frac{\sum_{\mathrm{t}-1}^{\mathrm{M}_1}\varphi(\mathrm{x_t})^{\mathrm{T}}\varphi(\mathrm{x_i})}{\mathrm{M}_1} - \frac{\sum_{\mathrm{t}-1}^{\mathrm{M}_2}\varphi(\mathrm{x_t})^{\mathrm{T}}\varphi(\mathrm{x_i})}{\mathrm{M}_2}\right] \tag{8}$$

I is the identity matrix, 1 is a vector with elements of 1, and the parameter with superscript (*) only indicates whether the parameter has (*)

Introducing the Lagrangian multiplier $\alpha_{\mathrm{i}}^*, \beta$, it is stipulated as follows:

$$\mathrm{L}(\mathrm{w}, \delta_{\mathrm{i}}^*, \alpha_{\mathrm{i}}^*, \beta) = \|\mathrm{w}\|^2 + \frac{\mathrm{C}}{\mu \mathrm{M}}\sum_{\mathrm{i}-1}^{\mathrm{M}}({\delta_{\mathrm{i}}}^2 + {\delta_{\mathrm{i}}^{*}}^2) + 2\mathrm{C}\,\partial + \sum_{\mathrm{i}-1}^{\mathrm{M}}\alpha_{\mathrm{i}}\left[\mathrm{y_i} - \mathrm{w}^{\mathrm{T}}\varphi(\mathrm{x_i}) - \partial - \delta_{\mathrm{i}}\right] \tag{9}$$

From the constraint $\mathrm{w}^{\mathrm{T}}\mathrm{d} = 0$, we can get:

$$\beta = \frac{\sum_{\mathrm{i}-1}^{\mathrm{M}}(\alpha_{\mathrm{i}} - \alpha_{\mathrm{i}}^*)\varphi(\mathrm{x_i})^{\mathrm{T}}\mathrm{d}}{\mathrm{d}^{\mathrm{T}}\mathrm{d}} \tag{10}$$

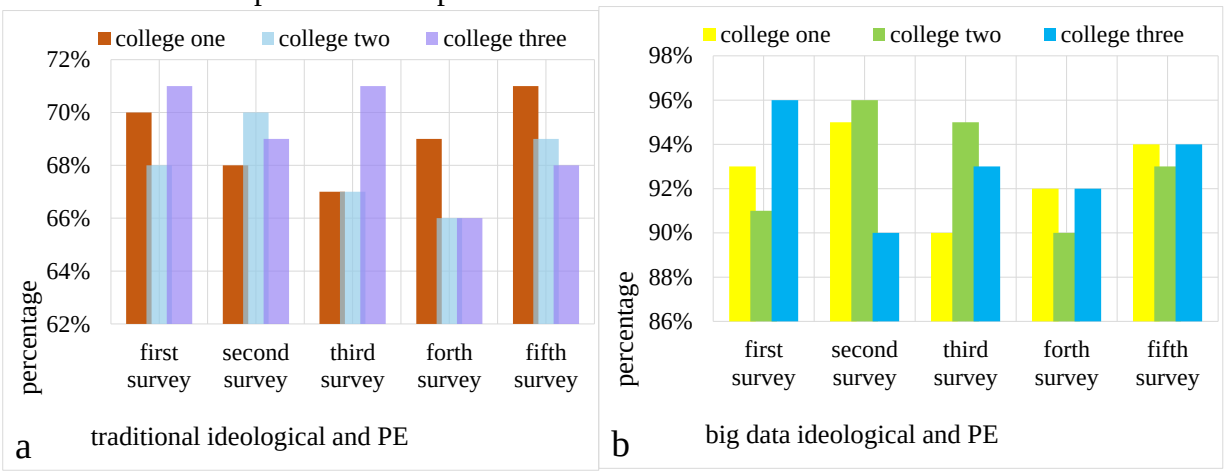
Therefore, in the large-scale data environment, the actual number of iterations and operation time of this method are much smaller than the theoretical maximum. This shows that the algorithm has a certain role in promoting the reform of psychological, ideological and Political Education in a large-scale data environment. By compressing the data, it can quickly find the best ideological education route, which provides a reliable guarantee for its effective application to the school's psychological ideological and Political Education mode.

3. Comparative Analysis of Big Data Psychological Ideological and Political Education and Traditional Psychological Ideological and Political Education

Why is the psychological ideological and Political Education based on big data so much valued by people? It is precisely because of the combination of big data and mathematical thinking that the reform direction of ideological and Political Education can be predicted to a certain extent, thereby promoting the healthy development of ideological and Political Education. The traditional

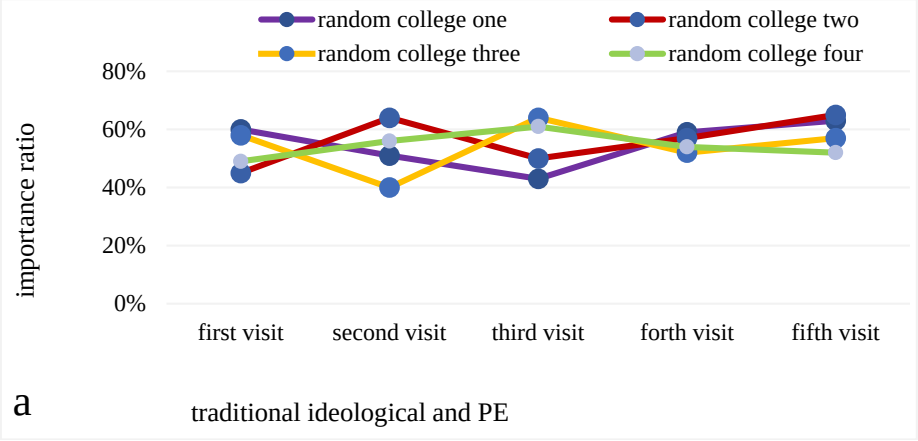
psychological and ideological and Political Education model is too limited, cannot keep up with the development needs of the times, and cannot avoid the fate of being eliminated by society. It can also be said that the comparison between the two is more obvious in terms of degree of personalization, classroom activity, teaching resources, teaching mode, and school's attention. The classroom activity comparison is shown in Figure 3.

From the survey data of traditional psychological and ideological and Political Education in Figure 3a, it can be seen that the classroom activity has been maintained between 66% and 71% for a long time. It can be seen that the students' enthusiasm for the classroom is low, but the classroom activity of psychological ideological and Political Education based on big data in Figure 3b is as high as 96%. It can be seen that the teaching model based on technology is more popular. Figure 4 shows the school's emphasis on comparison.

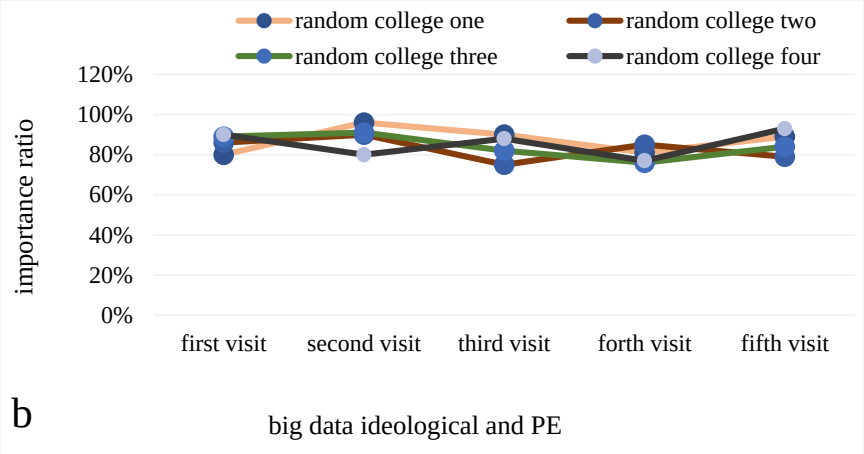


3a: Classroom activity under traditional ideological and Political Education
3b: Classroom activity under big data ideological and Political Education

Figure 3. Classroom activity comparison



4a: The school's emphasis on traditional ideological and Political Education

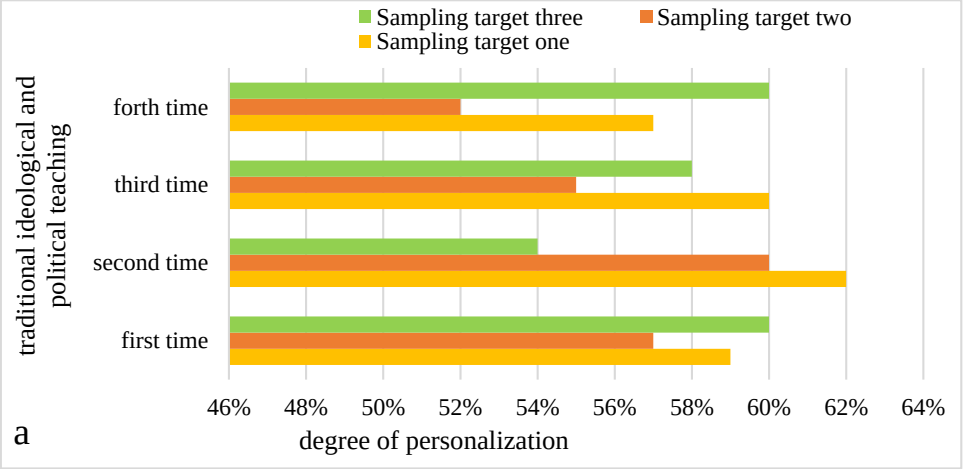


4b: The school's emphasis on big data ideological and Political Education

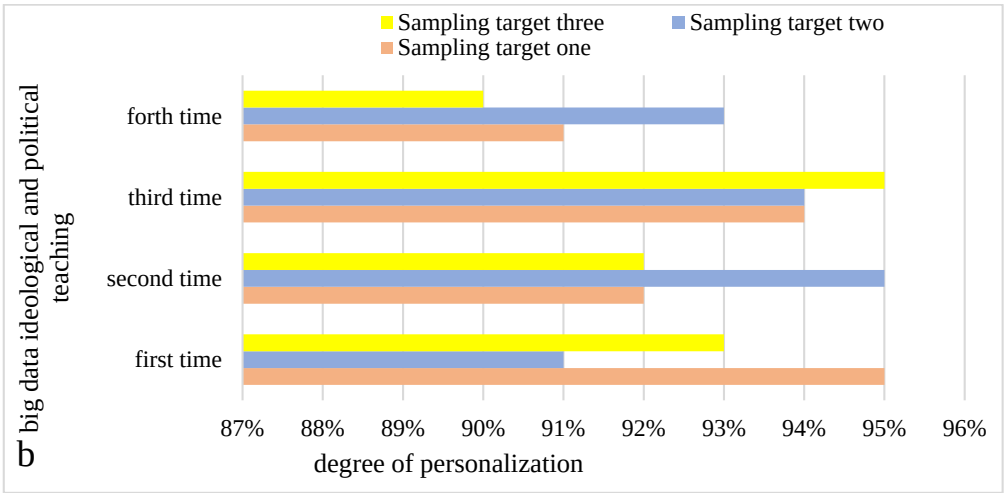
Figure 4. Comparison of the importance of schools

Through a random survey of the importance attached to psychology and ideological politics in colleges, it is found that the psychological and ideological and political teaching in colleges based on big data is paid more attention. In the previous traditional psychological and ideological education model, it can be seen from Figure 4a that schools attach the highest importance to it only 65%, and it would be difficult to adapt to the development needs of colleges and universities in the future. As shown in Figure 5, the degree of personalization is compared.

From Figure 5a, it can be seen that the degree of individualization of the traditional psychological and ideological education model is very low, and it can be said that it has no personality at all. Teachers would only follow the indoctrination teaching and ignore the ideas of students. As shown in Figure 5b, the degree of personalization of psychological ideological and Political Education under big data is as high as 95%. Considering the current form of social development, the use of big data is more worthy of further promotion.



5a: The degree of individualization of traditional ideological and Political Education



5b: The degree of personalization of big data ideological and Political Education

Figure 5. Comparison of the degree of personalization

4. Conclusion

In a word, in the context of today's social and economic development, universities must carry out some teaching reforms and innovations according to the actual situation. Whether starting from the healthy development of college students or the needs of society, the development of psychological and ideological education is beneficial and harmless. The popularization and application of big data technology has brought new chances and new defiance for the construction of diversified platforms for psychological, ideological and political theory courses in colleges. Therefore, it is needed to innovate the teaching mode of psychological and ideological and political education, change the traditional indoctrination teaching mode, grasp the valuable data transmitted from the psychological and ideological and political education links from all aspects, and innovate the teaching mode of psychological and ideological and political courses. Therefore, educators in colleges must keep up with the pace of the times and seize the fleeting opportunity for development. It is needed to overcome various difficulties, continuously improve their teaching and work ability, and make big data technology truly applied in teaching and self-value enhancement. Only in this way can we bring real innovation and development to the courses of psychological ideological and political theory in colleges, and create a new situation of Chinese psychological ideological and political education.

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