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# *The Construction and Application of the Effectiveness Evaluation Model of Ideological and Political Education in Colleges and Universities under the Background of 5G Artificial Intelligence*

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***Abstract:*** With the rapid development of social economy, ideological and political education in colleges and universities has ushered in a new development. As one of the main contents of college education construction, its teaching task is to improve the quality of college students' ideological and political education, so that students can better adapt to the current development situation. Therefore, it is the most critical issue to innovate the ways and means of ideological and political work and improve the effectiveness of education. Based on 5G AI background, this paper uses matrix and probability methods to establish a mathematical model, which provides an effective analysis method for the effectiveness evaluation of ideological and political education. The fuzzy analytic hierarchy process is used to determine the weight of the indicators, and the analytic hierarchy process is used to comprehensively evaluate the indicator system, so as to make a scientific and accurate judgment on the development of the ideological and political work in schools. The paper set up a comparative experiment on the effectiveness of IPE in schools, which verified the positive effects of ensuring the safety of the people's lives, promoting the improvement of education and maintaining social harmony and stability. Under the background of public health emergencies, students' recognition of IPE increased by 7.45%.

## 1. Introduction

IPE occupies a very important position in colleges and universities, and it is the core and foundation of the ideological and political work of college students. Under the new situation of the continuous spread of the epidemic, strengthening the moral education of students is of great practical significance to improve the comprehensive quality of college students, and the education of ideological and moral cultivation has become the top priority. At present, many schools offer professional courses to improve students' ideological and moral levels, but the effect is not obvious at present, which requires further exploration of innovative methods. Doing a good job in

ideological and political work has positive significance for the whole society, so this article discusses how to better improve the ideological realm of students under the background of public health emergencies.

IPE has always been an important means to improve the overall quality of the whole society, and relevant scholars have carried out in-depth research accordingly. Dong W used mathematical models to study the trend of IPE in colleges and universities in the information age, discuss the possible problems and countermeasures in the application of modern information technology and network technology in IPE, and promote the effectiveness of IPE [1]. Zeng F found out the main problems of college students' online ideological education in the era of big data through questionnaires, in-depth interviews and literature analysis. From the theoretical level, his empirical study was carried out on the factors that affected the effect of college students' network ideological education, so as to cultivate students' self-awareness [2]. In modern IPE, Wang S advocated cultivating students to form a correct view of freedom, promoting their free and comprehensive development, and providing reference for further improving the IPE system in colleges and universities [3]. LU's research included co-election, surveillance and monitoring, as well as a multi-level system of IPE, which promoted students to acquire knowledge and ability in the all-round development of morality, intelligence and physical education through various forms, and improved their political quality [4]. Li Z analyzed the current situation of the application of new media in the IPE in contemporary colleges and universities, and proposed methods and approaches to improve the effectiveness of IPE, forming a good development trend [5]. IPE is a huge system, which needs to be organized and implemented scientifically and effectively to achieve the expected results.

5G artificial intelligence have been a hot topic of discussion in all sectors of society in recent years, and many scholars have studied them. Wang Y analyzed the AI teaching expert system, summarized its functions and characteristics, and pointed out that the college students' ideological and political teaching system based on mobile AI terminals can serve as teaching managers, teaching assistants, and even as teaching objects to guide students' learning [6]. Wang S believes that it is of great value for ideological and political educators to enhance their awareness of artificial intelligence, improve their way of thinking, fully master intelligent analysis technology, and prepare for the 5G era to improve the quality of ideological and political education and enhance the level of education [7]. Yu Z has used VOSviewer and CiteSpace to make a metrological evaluation and classification of relevant literature on the application of AI in the field of education, studied the effectiveness and efficiency of AI in education, and found that the use of AI in education in the future is likely to require interdisciplinary cooperation of computer science and other theories [8]. At present, most researches only discuss the significance of 5G AI in ideological and political education from the theoretical level, and do not conduct in-depth research from a practical perspective.

At present, there are a series of deficiencies in school moral education. Therefore, it is necessary to combine IPE with practice to improve students' moral consciousness and political awareness. Under the background of 5G AI, people must attach great importance to the effectiveness of ideological and political education and take effective educational measures to deal with it.

## 2. Summary of 5G Artificial Intelligence and Connotation of Ideological and Political Education in Colleges and Universities

1) 5G and Artificial Intelligence

5G and artificial intelligence (Al) are breakthrough technologies under social development, which have had a great impact on all aspects of human life [9].

5G is not only a long-term evolution of access technology, its main advantages lie in expanding network capacity and reducing latency[10]. With the help of network slicing and service orchestration capabilities, 5G and network transformation have laid the foundation for building an intelligent, secure and reliable infrastructure, and can adapt to new services, use cases and applications with different resource and service requirements on demand. At present, 5G combined with edge computing has become an important driver for AI to improve network edge capabilities and reduce data dependence on the cloud. At the same time, 5G's low latency response and edge computing capabilities enable devices to communicate directly and work together. 5G's edge computing capabilities also mean that devices will be able to better understand their working environment. The nearby deployment and service of 5G network support service capability have greatly improved the service capability, flexibility and efficiency. The introduction of 5G network provides a basis for artificial intelligence.

AI is the core engine to promote the next round of Internet upgrading. Intelligent machines, intelligent networks and intelligent interactions will create intelligent economic development models and social ecosystems[11]. The highly symmetrical, harmonious and efficient social ecology based on cloud computing, big data and the Internet of Things will be a symbol of human centered intelligence.

2) Effective features of IPE in colleges and universities

The effectiveness of IPE means that in a certain time and space, through the correct education of values, outlook on life, and moral education for college students, so that they can set up good ideas, form a scientific way of thinking and noble moral sentiments. In the new era, in order to make the IPE of colleges and universities play a better role, it is necessary to implement targeted quality education for students, and on the other hand, teachers need to constantly improve their own quality and ability, and have the courage to explore new methods and new ideas in the teaching process. The effectiveness characteristics of IPE are shown in Table 1.

Table 1 Effective features of IPE

| Feature | Description |
|---|---|
| Concealment | Cultivation character hidden in the heart |
| Hysteresis | Persevere |
| Long term | Step by step |

IPE is directly related to the construction of the mental health system of college students. The effectiveness is reflected in the ideological and moral, psychological and emotional changes of college students, that is, hidden in the depths of the heart is the inner cultivation and character. Although sometimes they may adapt to external changes insincerely, but the moral and literacy hidden in their hearts are relatively fixed. Only in a pinch, especially when certain emergencies occur, can they play out effectively. There is a lag in IPE work. To actually improve the ideological and political quality of college students can not be accomplished overnight, which depends on the patience, meticulousness and perseverance of ideological and political workers. The lag is also reflected in the fact that college students can only show effectiveness in specific services and practices after they start working. The effectiveness of IPE work is not only to improve the ideological and moral quality of college students, but also to comprehensively improve the comprehensive quality of college students, which can benefit college students for life. This is an invisible and long-term process, which needs to be carried out step by step. IPE is a complex system, which not only needs to grasp and analyze the ideological dynamics and development laws of college students as a whole, but also must be student-oriented, and pay attention to cultivating their good moral quality, scientific and cultural quality and innovative spirit in the teaching process. Therefore, the theoretical teachers of this major should actively build a teaching model that meets

the requirements of contemporary talent training, improve their professional level, so as to enhance the effectiveness of IPE in colleges and universities [12].

3) Problems in IPE under the Background of 5G Artificial Intelligence

As a key part of talent training in colleges and universities, IPE's main task is to improve the cultural accomplishment and moral quality of college students, and to cultivate socialist qualified builders and reliable successors, providing intellectual support and spiritual power for the realization of national prosperity. However, under the impact of the epidemic in recent years, some universities and colleges have gradually relaxed their ideological work, lacking pertinence and effectiveness, and many new situations and problems have emerged in educational work, specifically as shown in Figure 1.

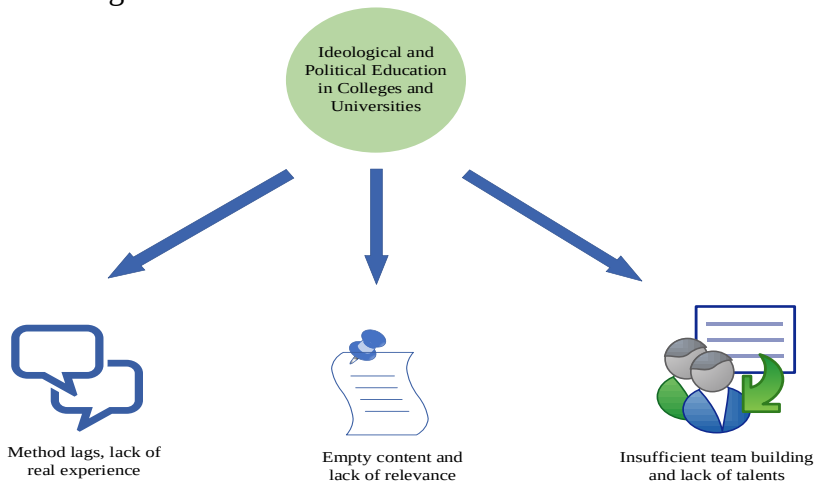


Figure 1 Problems in IPE under 5G Artificial Intelligence

As shown in Figure 1, the problems in IPE in the context of 5G artificial intelligence are mainly divided into three categories. First of all, the educational methods and methods are lagging behind, and it is difficult to fit the real experience of students and instill ideological and political theories into students in a formalized manner, which only serves as a mechanical preaching, making students lose their awareness of their own values and beliefs. Secondly, the teaching content is vague and lack of pertinence, and the teaching content is out of touch with reality, which can easily lead to students' resistance. As a result, their enthusiasm for learning may be not high, and it does not enable students to form the habit of independent inquiry and effectively master knowledge. Finally, there is a lack of professional guidance and training in the teaching process, and teachers' professional quality and professional ethics are not standardized. The key to dealing with these problems is to have a set of effective emergency plans to ensure the cultivation of good psychological and behavioral habits of college students, and to lay a solid foundation for them to engage in social work in the future [13].

4) IPE methods in the context of 5G Artificial Intelligence

Under the influence of the new crown pneumonia epidemic, traditional education methods have been divorced from the reality of life due to the lag in teaching concepts, outdated teaching contents, single teaching methods, and limited communication channels, which can no longer meet the current needs of major schools. The methods and approaches of IPE in the context of public health emergencies should be based on the development needs of college students and the actual situation of students. High-quality talents should be cultivated by constructing multiple teaching models, carrying out various forms of practical activities, and innovating talent training models. The specific methods and means are shown in Figure 2.

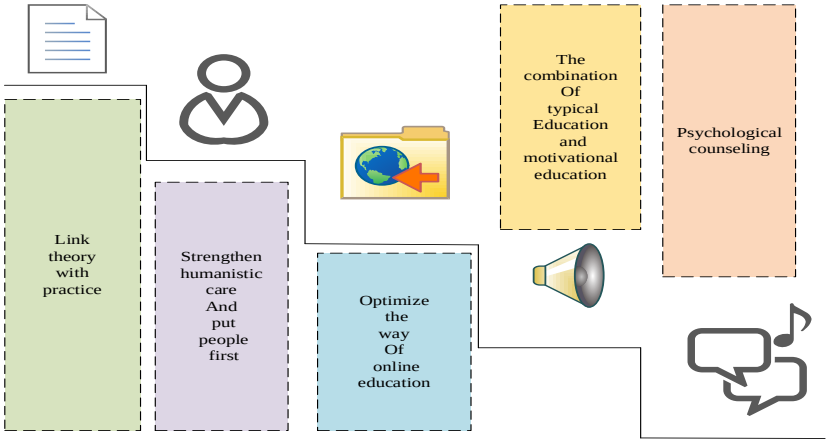


Figure 2 Methods of IPE under public health emergencies

As shown in Figure 2, IPE in colleges should follow the policy of combining theory and practice, and apply story-based teaching to the classroom from the learning psychology and ideological reality of college students to better achieve students' understanding and mastery of theoretical knowledge, and it should continuously improve the level of ideological quality, playing a "backbone" role in the fight against the epidemic. IPE has distinct characteristics and advantages in advocating people-oriented, strengthening humanistic care, and strengthening psychological counseling. Strengthening the teaching of ideological and political courses in colleges and universities should not only pay attention to cultivating innovation and practical ability, but also pay attention to educating students on ideals and beliefs to enhance their ability to resist the impact of emergencies. After the occurrence of public health emergencies, normal offline IPE activities are often blocked, and online IPE has become the main path choice. By building a new ideological and political work model that combines online and offline, the healthy development of IPE under the new normal can be promoted. IPE is different from ordinary cultural disciplines. It needs typical education and incentive education methods to exert the greatest effect. One of the most effective ways is to guide and encourage students by example, so that they can be nurtured in a subtle way. In addition, negative cases can also guide students to recognize the nature and harm of their mistakes, so that IPE is more profound and powerful. Under the background of 5G artificial intelligence, college students are prone to anxiety and depression. It is especially important to strengthen the psychological intervention and counseling of college students in a scientific, standardized and orderly manner [14].

## 3. Effectiveness Evaluation Model of IPE in Colleges and Universities

1) Judgment matrix

Judgment matrix is an important tool to describe the system state and process characteristics, and it plays a vital role in the study of control theory and methods. Mathematical methods such as matrices and probability can be used to solve practical problems in ideological and political work [15].

The equation is introduced as a mathematical model for effectiveness evaluation, and the individual ideological and political status of college students is defined under the combined effect of objective and subjective factors as:

$$F(i) = \alpha A g(i) h(i) \tag{1}$$

In Equation 1, $\alpha$ is the correction coefficient; A is a constant; $g(i)$ is the influence of the

external environment on the individual; $h(i)$ is the individual's acceptance of the environment.

When individuals resist IPE, there is Equation 2:

$$-1 < h(i) < 0 \tag{2}$$

At this time, the effectiveness of education is not good, which is a negative effect.

When individuals receive IPE, there is Equation 3:

$$0 < h(i) < 1 \tag{3}$$

At this time, the individual's state of mind is in a positive and affirmative state, which is a positive effect.

$g(i)$ is a function. There are three representations according to different influencing factors, namely:

$$g(i) = g(T_1(i), T_2(i), T_3(i)...T_n(i)) \tag{4}$$

$$g(i) = g(S_1(i), S_2(i), S_3(i)...S_n(i)) \tag{5}$$

$$g(i) = g(R_1(i), R_2(i), R_3(i)...R_n(i)) \tag{6}$$

In Equations 4-6, $T(i)$ is the objective factor of the external environment that affects IPE, and $S(i)$ is the basic ideological and political quality factor that college students already possess.

For school IPE evaluation, the evaluation value equation is:

$$r = \sum_{i=-1}^{n} d_i \times E_i \tag{7}$$

The effectiveness evaluation model is determined:

$$P = \sum_{j=1}^{n} r_j \times K_j \tag{8}$$

In Equation 8, $d_i$ is the theoretical score; $E_i$ is the proportion of theory in the education system; j is the evaluation system index; $K_j$ is the weight of the j-th index.

2) Evaluation model based on fuzzy AHP

Fuzzy Analytic Hierarchy Process (AHP) is an important decision support system with strong generality and flexibility. Applying it in the effectiveness evaluation model of IPE can not only improve work efficiency, but also effectively promote the quality of IPE work in colleges and universities [16-17].

Assuming that the quality evaluation of IPE in schools can be divided into 5 levels, the evaluation set is defined as:

$$B = \{b_1, b_2, b_3, b_4, b_5\} \tag{9}$$

The evaluation factor set can be expressed as:

$$D = \{L_1, L_2, L_3, L_4, L_5\} \tag{10}$$

$$L_i = \{C_{i1},...C_{i2}\} \tag{11}$$

Among them, $i = 1,2,3,4,5$.

The contrast matrix is constructed by combining the AHP method with triangular fuzzy numbers. The triangular fuzzy numbers are:

$$m_{ij} = (u_{ij}, v_{ij}, z_{ij}) \tag{12}$$

When $L_i$ is more important than $L_j$, there are:

$$m_{ij} = (u_{ij}, 5, z_{ij}) \tag{13}$$

After pairwise comparison, the judgment matrix can be obtained:

$$M = (m_{ij})_{5*5} \tag{14}$$

$$m_{ij} = (\frac{1}{a}\sum_a u_{ij}^a, \frac{1}{a}\sum_a m_{ij}^a, \frac{1}{a}\sum_a m_{ij}^a) \tag{15}$$

The results are standardized to obtain the weight evaluation set of each indicator:

$$W = \{w_1, w_2, w_3, w_4, w_5\} \tag{16}$$

The evaluation matrix is constructed:

$$P_i = (r_{ij}^k)_{i \times k} \tag{17}$$

After normalization, the first-level index evaluation results can be calculated:

$$Q_i = W_i \times P_i = (Q_{i1}, Q_{i2}...Q_{ik}) \tag{18}$$

After being normalized, Equations 19 and 20 can be got:

$$Q = (q_1, q_2...q_k) \tag{19}$$

$$M = \max(q_1, q_2,...q_k) \tag{20}$$

## 4. Comparative Experiment on the Effectiveness of IPE in Colleges and Universities under the Background of 5G Artificial Intelligence

1) Experimental method

Twenty students were invited to participate in a questionnaire survey from the ideological and political college of a university, and the analysis found that 10 of them had participated in volunteer activities for the new coronavirus pneumonia. They were grouped into a group and named as Group A, and the remaining 10 college students were named as Group B. It is known that members of the two groups A and B were of the same age, and the gender distribution was even. A comparative experiment was designed from three aspects: recognition, supervisor's initiative and knowledge level, to explore the effectiveness of IPE in colleges and universities under the background of public health emergencies, and to observe and record experimental data.

2) Data analysis

Recognition

By analyzing the questionnaire results, the recognition scores of the two groups for the effectiveness of IPE were obtained, and the results are shown in Figure 3.

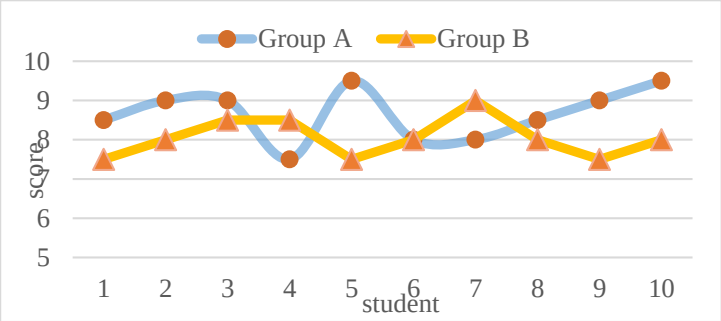


Figure 3 Comparison of recognition scores between the two groups

As shown in Figure 3, it can be clearly seen that the score results of Group A were higher. The highest score of Group A was 9.5, which was close to the full score, indicating that the student had good moral literacy and comprehensive quality. The lowest score was 7.5 points, which was consistent with the lowest score in Group B, indicating that participating in volunteer activities for epidemic prevention and control had a different impact on each college student volunteer, depending on the student's personal willingness, ability and other relevant circumstances. On the contrary, it can be seen that most of the students in Group B gave an evaluation of less than 8 points, and only one student gave a score of 9. The overall evaluation recognition was far lower than that of Group A. After calculation, the average score of Group A was about 8.65 points, and the average score of Group B was about 8.05 points. Compared with Group B, Group A's recognition of effectiveness was increased by about 7.45%. It can be seen that, in terms of both overall and various dimensions, college students who participated in volunteer services during the epidemic showed a higher sense of social responsibility than other groups. At the same time, it also reflected their positive attitude and strong will to actively participate in the anti-epidemic work.

Subjective initiative

Five IPE experts were invited to rate the subjective initiative of the two groups in dealing with emergencies, with a full score of 10. The results are shown in Figure 4.

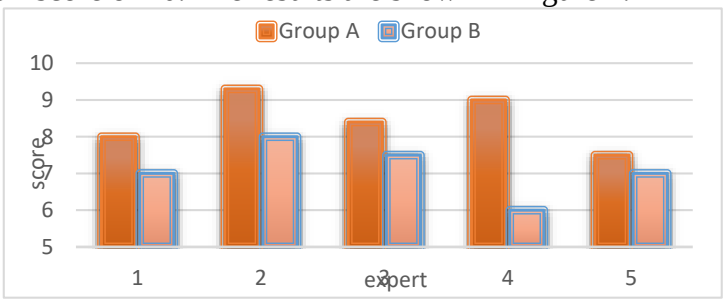


Figure 4 Comparison of subjective motivation scores between the two groups

As can be seen from Figure 4, the experts more recognized the students in Group A. It can be seen from the chart that all 5 experts gave Group A a high score, and two of them gave a score of more than 9 points, showing that students who had participated in volunteer activities were more mature in psychology and were more willing to take the initiative to understand and solve problems. On the other hand, observing Group B, the highest score was 8 points, and even one expert gave only 6 points. Limited by students' own personality and psychological conditions, students in Group B cannot flexibly apply the knowledge they have learned to practical problems when faced with emergencies, resulting in themselves in a passive position. Overall, the average score of Group A was about 8.44 points, and the average score of Group B was about 7.1 points. Therefore, under the

background of public health emergencies, the performance of students' subjective initiative was better than that of the general situation, and the effectiveness of IPE had also been well reflected.

Knowledge level

The professional knowledge level of the two groups of students was examined at the same time, and an educational knowledge test was set up within a limited time, with a full score of 100 points. The specific results are shown in Figure 5.

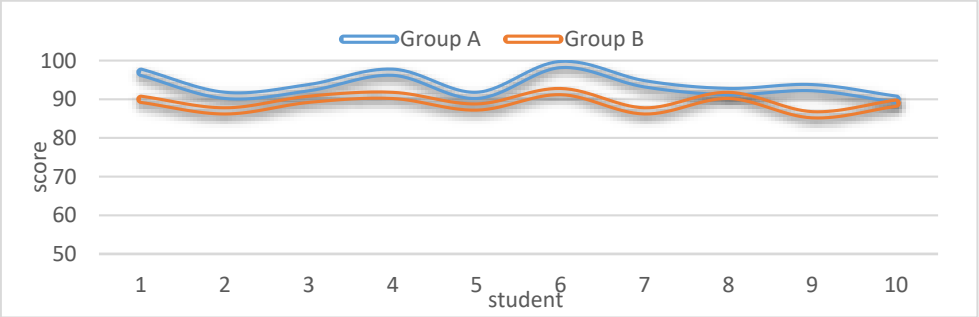


Figure 5 Comparison of two groups of professional knowledge levels

As shown in Figure 5, it can be seen that the curve of Group A was always distributed above the curve of Group B, indicating that most of the students in Group A had higher grades than Group B. Even three students in Group A scored more than 95 points, indicating that students who had been exposed to public health emergencies and crisis management generally had a strong ability to master knowledge. On the other hand, in Group B, the highest score was only about 92 points, and most of the students' scores were distributed around 90 points, which was much lower than that of Group A, but the curve of Group B had been floating up and down around 90, showing that Group B was more stable than Group A. After calculation, the average score of Group A was about 93.7 points, and the score of Group B was about 89.1 points. The score of Group B was about 5.16% higher than that of Group A.

The above three sets of data were comprehensively weighted to explore the effectiveness of IPE in colleges and universities under public health emergencies. In order to facilitate comparison, the knowledge level data was converted into data within 10. The data of Group A was 9.37, and the data of Group B was 8.91. The overall comparison result is shown in Figure 6.

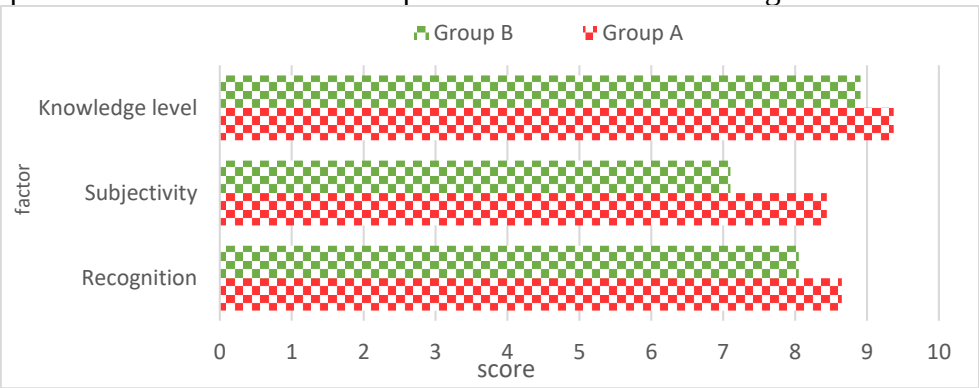


Figure 6 Overall comparison of the two groups

As can be seen from Figure 6, the performance of Group A was better than that of Group B in terms of recognition, subjective initiative and cognitive level. Among them, the difference in subjective initiative was the largest, showing that only by combining theory and practice can IPE play the greatest role in public health emergencies, improve students' awareness of emergency prevention, and enhance students' awareness of active participation. After calculation, the average

score of Group A was about 8.82, and the score of Group B was about 8.02. Therefore, in the context of public health emergencies, college students were more willing to integrate theoretical knowledge into practical life to learn and improve the effectiveness of IPE.

## 5. Conclusions

In the face of the rapidly developing 5G artificial intelligence technology and in combination with the development needs and characteristics of the ideological and political education in the new era, strengthening the ideological and moral construction of students and improving their ideological quality have become the primary task of school moral education. The establishment of an effective evaluation system can give full play to the self-regulation function of students and strengthen the cultivation of students' self-realization awareness and sense of self-worth, in order to enhance their understanding of the effectiveness of IPE under the current situation, and promote the healthy development of IPE in colleges and universities. This paper starts with the formation of students' values and cognitive changes under the influence of the current public health emergencies, and analyzes the main problems in using relevant knowledge to deal with the background of the intelligent age. In response to these problems, corresponding countermeasures and suggestions were put forward, and the impact of emergencies on the effectiveness of college students' IPE was verified through experiments, which can provide some reference for relevant researchers.

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