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Research and exploration on the optimisation of innovation and entrepreneurship education model from the collaborative perspective

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Research and exploration on the optimisation of innovation and entrepreneurship education model from the collaborative perspective

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Abstract: In view of the problems existing in the current innovation and entrepreneurship education model in colleges and universities in China, this paper studies and exploration on the optimisation of innovation and entrepreneurship education model from the collaborative perspective. Firstly, the current overall situation of entrepreneurship in China is analysed, and the key and difficult points in the process of college students' innovation and entrepreneurship are determined; Secondly, a concrete analysis of the problems existing in the innovation and entrepreneurship education is made, such as weak entrepreneurship awareness, backward innovation and entrepreneurship education, and low achievement conversion rate; Finally, focusing on the collaborative perspective, the optimisation of the education model is completed through the design of scientific innovation and entrepreneurship education courses and the strengthening of teacher teams. The experimental results show that the average score of the innovation and entrepreneurship course of this method is 88.

Keywords: collaborative perspective; innovation and entrepreneurship education; model optimisation research and exploration; questionnaire method; scientific innovation; entrepreneurship education courses.

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1 Introduction

As society enters the economic era, science and technology and talents have gradually become the key to national development. The emergence of high-quality innovative talents provides a strong support for social development. Innovation and entrepreneurship

has gradually become an important part of China's economic development in the new era. Therefore, the country increasingly emphasises the cultivation of innovative and entrepreneurial talents. However, due to the late start of innovation and entrepreneurship education (Schaeffer et al., 2021; Liang et al., 2020) in colleges and universities in China, the quality of teachers and education model are extremely backward. Therefore, it is particularly important to propose the optimisation of innovation and entrepreneurship education model.

The method in Zhou and Lin (2021) put forward the research on the optimisation of innovative quality education for postgraduates majoring in graphics, information and archives. This method was based on the needs of domestic archives management professionals, combined with the content analysis method and online research mode, to carry out a detailed analysis of the demand characteristics of the map information archives and the current situation of the cultivation of innovative talents, and to explore the shortcomings of China's innovation and entrepreneurship education mode; Finally, it summarised the current situation of talent demand in China, and put forward optimisation measures from three aspects: resource empowerment, concept innovation and subject construction to complete the optimisation of innovation and entrepreneurship teaching mode. Zhao and Wei (2019) proposed the research on the precise transformation of innovation and entrepreneurship education model in the context of big data. This method first made a specific analysis of the problems faced by the innovation and entrepreneurship teaching mode, such as unclear information sources and backward curriculum, summarised the reasons for the backwardness of the innovation and entrepreneurship teaching mode based on the analysis results, and established a big data platform and related support system in combination with big data technology to complete the optimisation of the innovation and entrepreneurship education mode. Luo and Liu (2020) proposed the research on innovation and entrepreneurship education in colleges and universities based on stakeholders. This method first analysed the enterprise resources, government policies and school functions in the innovation and entrepreneurship education model, established a three-way balanced and complementary system with the government providing policies, enterprises providing resources and students as the protagonists, and established a new scientific innovation and entrepreneurship model system based on the principle of the consistency of rights and responsibilities, to complete the optimisation of innovation and entrepreneurship teaching model.

The above mode optimisation methods fail to analyse the current situation of innovation and entrepreneurship in Colleges and universities in China and obtain the current situation and causes of innovation and Entrepreneurship of college students in China, resulting in the poor quality of innovation and entrepreneurship education in the practical application of the above methods. This paper takes solving the problems of the above methods as the research objective to study and explore the optimisation measures of innovation and entrepreneurship education mode in the collaborative perspective. The core research contents of this paper are as follows:

- 1 Analyse the overall situation of entrepreneurship in China, and determine the key and difficult points in the process of innovation and Entrepreneurship of college students.

- 2 This paper analyses the problems of weak entrepreneurial consciousness, backward innovation and entrepreneurship education and low achievement conversion rate in innovation and entrepreneurship education.
- 3 Focusing on the collaborative perspective, through the design of scientific innovation and entrepreneurship education courses, strengthening the teacher team and other optimisation measures, the innovation and entrepreneurship education mode is optimised, helping students actively carry out innovation and entrepreneurship activities, and helping the efficient development of China's economy.

2 Analysis on the current situation of innovation and entrepreneurship in colleges and universities in China

2.1 Development history of entrepreneurship in China

Since the reform and development in China, a large number of successful entrepreneurs have emerged. In the entrepreneurial activities in various periods in China, the entrepreneurial subjects have gradually changed from a group with low knowledge and culture to a group with high professional quality. The entrepreneurial groups also show a trend of diversity, and the entrepreneurial types have also changed from passive survival to opportunity entrepreneurship.

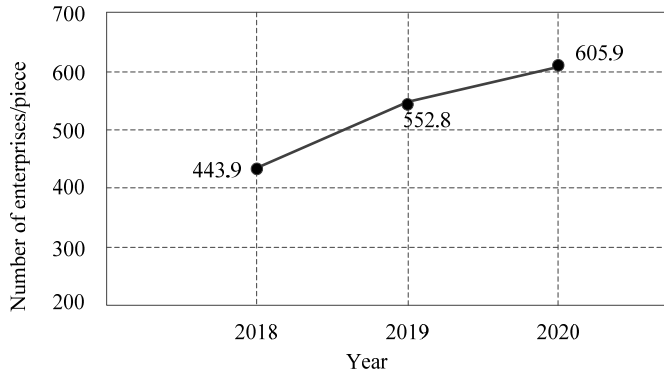
Since the Third Plenary Session of the Eleventh Central Committee, the upsurge of urban self-employed and private enterprises has sprung up. Most of the young people who have not gone to college and have no jobs have joined the ranks of self-employed entrepreneurs. Therefore, in the early 1980s, the number of entrepreneurs increased sharply, leading to extremely active entrepreneurial activities in China. Until 1987, the private economy was recognised by the state. Therefore, 1982–1988 was a period of rapid economic development in China. After 1989, entrepreneurial activities were at a low tide, and successfully entered the socialist economic system in 1992. The economic development momentum was rapid. By 2008, the global economic crisis had hit China's form of employment again, and the internet industry (Zhen, 2021) had come into the public's view. Intelligent, information and virtualisation technologies were integrated with high-end fields such as finance, culture and medical treatment. To sum up, the current employment situation in China is grim, which requires college students to seize the opportunities brought by the economy and society in time and solve the employment problem through independent entrepreneurship.

2.2 Overall situation of entrepreneurship in China

2.2.1 The number of science and technology enterprises increases year by year

With the improvement of the entrepreneurial environment in China, the development of science and technology innovation enterprises has provided favourable conditions for the innovation and Entrepreneurship of college students in China. The increasing number of registered enterprises in China from 2018 to 2020 is shown in Figure 1.

Figure 1 Daily growth of registered enterprises in China from 2018 to 2020

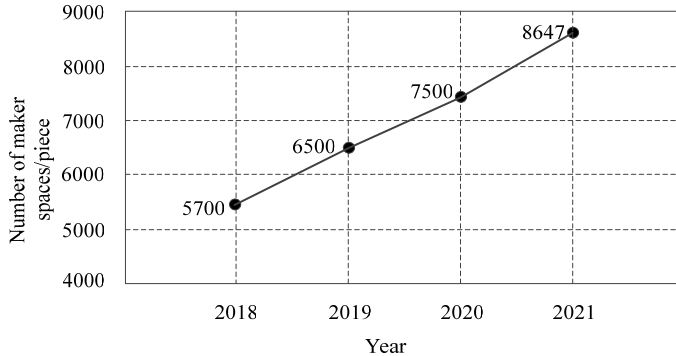


Since 2015, the number of newly registered enterprises in China has been increasing. In particular, in 2020, the number of daily registered enterprises in China directly exceeded 605, and the number of registered enterprises in the first three quarters increased by 26.3% over the previous year. It shows that with the increase of science and technology enterprises, it not only drives the development of the new economic model of the industry, but also contributes an important force to the high-quality development of the economy.

2.2.2 Increase of entrepreneurial carriers

From 2018 to 2021, the growth trend of China’s maker space is shown in Figure 2.

Figure 2 Growth trend of China’s maker space from 2018 to 2021



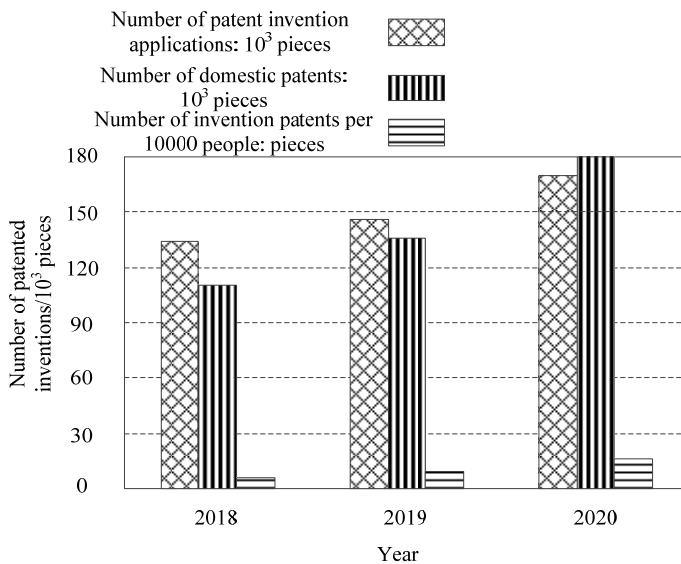
In recent years, China’s economic development has shown a variety of modes, such as media driven, enterprise self-support, industrial chain service, etc. Innovation factories, maker spaces and other maker spaces have been recognised by the public. From 2018 to 2021, maker spaces have developed rapidly. According to the incomplete statistics of the Ministry of Science and Technology, by 2021, more than 8000 maker spaces have been registered in China, and at least nearly 200 of them can give full play to their advantages, promote local scientific and technological innovation, and provide effective special assistance to innovative enterprises.

Not only the number of entrepreneurial carriers is increasing, but also the construction of entrepreneurial incubation carriers is developing rapidly. According to incomplete statistics, in 2021, China’s high-tech zones had about 2500 business incubators, 600 national level enterprises, more than 700 science and technology enterprise accelerators, and nearly 3000 maker spaces. When the construction of innovation carriers accelerates the growth of innovation subjects, it can also effectively promote the expansion of innovation and entrepreneurship talents, and bring a large number of jobs to China.

2.2.3 Increase of innovation patents

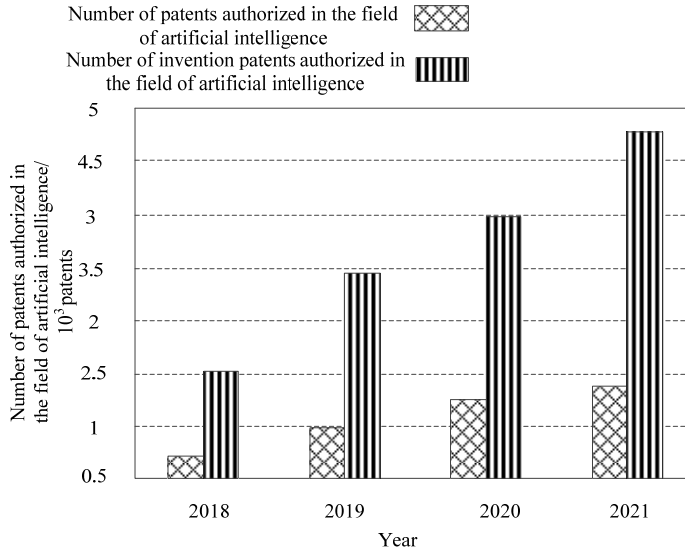
In the process of science and technology entrepreneurship (Egan, 2021), it should not only be creative, but also have the problems of technological breakthroughs and the use of new technologies. Intellectual achievements are the most scientific and core embodiment of scientific and technological innovation. As early as 2016, China has achieved the goal of ‘double one-million’ with the number of domestic invention patents exceeding one-million and the third invention patent in the world exceeding one-million, and the national innovation level has risen sharply. The specific patent ownership is shown in Figure 3.

Figure 3 Map of China’s patent related data from 2018 to 2020



In the field of artificial intelligence in China (Ustun et al., 2021), the number of authorised patents in 2018 alone exceeded 30000. In 2020, 47,800 patents were authorised, 3586 basic hardware patents were authorised, about 2600 basic algorithm patents were authorised, and about 53843 vertical application patents were authorised. Based on the statistical data, the number of invention patents authorised in China exceeded 18000 in 2020, with a year-on-year growth rate of 65.4%, as shown in Figure 4.

Figure 4 Data related to patents in the field of artificial intelligence in China from 2018 to 2021



2.2.4 Rapid growth of science and technology enterprises

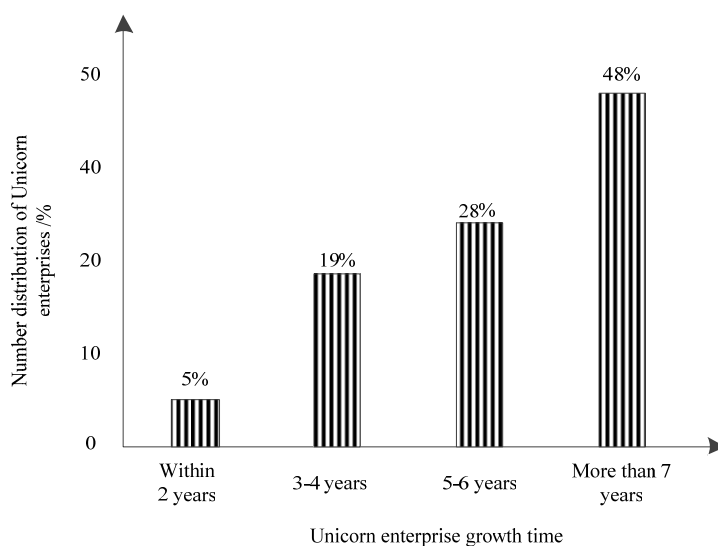
The implementation of the scientific and technological innovation driven development model can not only promote the accumulation of new kinetic energy, but also effectively enhance China’s innovation achievements. By the end of 2020, China’s technology contract turnover has reached 3 trillion yuan, and the contribution rate of scientific and technological progress has exceeded 70%. In the early stage of development, most enterprises relied on the maker space and incubator for growth and development. For example, ant financial, established in 2014, has developed into a super unicorn relying on the maker space in just a few years, becoming a leader in leading the development of the industry. In 2021, relevant research institutes published the unicorn index of the top ten enterprises in Greater China in 2020 through the summary of multiple information sources, as shown in Table 1.

Table 1 Ranking results of unicorn companies in greater China at the end of 2020

<i>Name</i>	<i>Creation time</i>	<i>Location</i>	<i>Valuation/billion</i>	<i>Field</i>
Mayi	2000.10	Hangzhou	13,860	Fintech
ByteDance	2012.3	Beijing	5200	Media and entertainment
Xiaoju Technology	2012.7	Beijing	4000	Car travel
Lufax	2011.9	Shanghai	2700	Fintech
Cainiao Network	2013.5	Shenzhen	2000	Logistics services
Kuaishou Technology	2015.3	Beijing	1980	Media and entertainment
DJI	2006.11	Shenzhen	1660	Hardware equipment
WeBank	2014.12	Shenzhen	1500	Fintech
Bitmain	2013.10	Beijing	970	Blockchain
Cabin Information	2017.11	Tianjin	690	Real estate services

Based on Table 1, among the 251 unicorn enterprises published in the list, the number of super unicorn enterprises increased by 5 compared with 2019, accounting for more than 50% of the valuation. There were 24 unicorn enterprises listed in 2020. From this, we can know that Chinese enterprises have a rapid development speed and an excellent development environment, which is suitable for students to carry out innovation and entrepreneurship. The specific growth time and quantity distribution of unicorn enterprises are shown in Figure 5.

Figure 5 The time-consuming and quantity distribution of unicorn companies in China in 2020



Based on the data in Figure 5, it can be seen that in 2020, the growth time of unicorn enterprises in China is 5% in 2 years, 19% in 3–4 years, 28% in 5–6 years, and 48% in more than 7 years, indicating that the higher the growth time of unicorn enterprises, the more there are.

2.3 Analysis of college students' entrepreneurship

To explore the optimisation of college students' innovation and entrepreneurship education model, we must understand the current situation of college students' entrepreneurship in China in detail according to the analysis results of the current enterprise development environment in China.

2.3.1 The number of college students' entrepreneurship increased significantly

The specific data are shown in Figure 6.

By the end of 2021, the relevant reports showed that the graduation employment rates (Adejumo et al., 2021; Bigos and Michalik, 2020) in 2018, 2019 and 2020 were 91.9%, 92.5% and 92.8% respectively, and the employment status was stable.

The graduation destination of college students is shown in Figure 7.

Figure 6 Data map of college graduates in China from 2018 to 2021

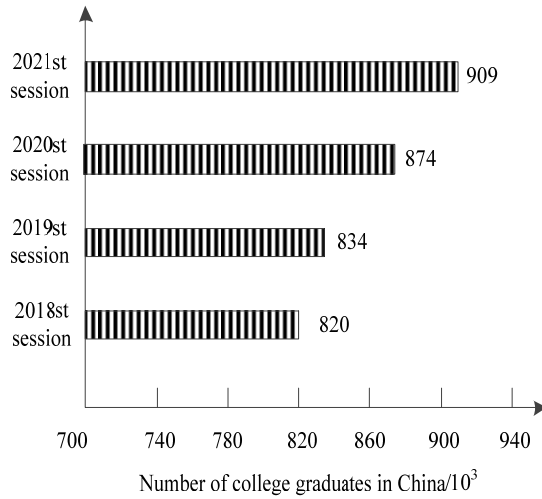
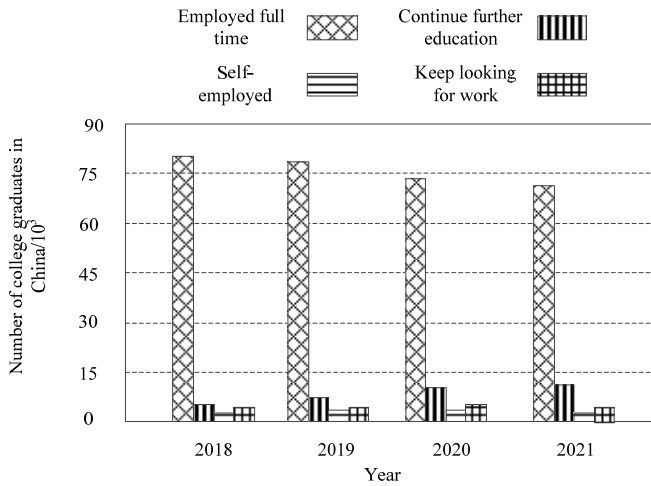


Figure 7 Data chart of the destination of college graduates from 2018 to 2021



It can be seen from Figure 7 that from 2018 to 2021, the proportion of college graduates employed in full-time jobs has decreased year by year, and the proportion of graduates who started their own businesses has increased year by year. The proportion of continuing study and job hunting is relatively stable, and there is no significant increase or decrease.

2.3.2 Improvement of college students' awareness of science and technology entrepreneurship

According to the analysis of the 2021 survey report on Chinese college students' entrepreneurship released by Renmin University of China, the reasons for Chinese college students' entrepreneurship are different. Among them, 33% of the students are

free, and 28% of the students are to make money. The percentage of responding to the national call and serving the society is 2% and 6%, respectively. In general, from 2018 to 2021, the entrepreneurial awareness of college graduates in China is improving year by year.

3 Current situation and causes of entrepreneurship and innovation education for college students

3.1 Survey design

In order to accurately and comprehensively understand the current situation of college students' innovation and entrepreneurship activities in China, based on actual needs, a questionnaire survey and material collection were conducted on the innovation and entrepreneurship activities of college students in 19 colleges and universities nationwide from March to December 2020, and combined with the survey results, the problems and causes of innovation and entrepreneurship activities of college students in China were analysed.

The investigation method is as follows:

A questionnaire (Xiao et al., 2021; Li, 2021) was designed to investigate the innovation and entrepreneurship activities and the development of innovation and entrepreneurship education of college students in China.

A total of 920 questionnaires were distributed, and 75–80 questionnaires were distributed by major universities. 900 questionnaires were effectively recovered, and the effective rate (Liu and Wang, 2021; Chen, 2020) was 97.5%. There were 19 questionnaires for the school, and the recovery rate was 100%. The collected questionnaires were statistically processed, and the statistical results were sampled for questionnaire analysis. The basic information of the survey is shown in Table 2.

Table 2 Sampling survey of innovation and entrepreneurship education in colleges and universities

<i>School</i>	<i>Number of people</i>
Northeast Normal University	78
Northeast Electric Power University	75
Zhejiang University	80
Nanjing University	71
Fudan University	75
Tianjin University	72
Xi'an University of Finance and Economics	75
He Hai University	78
Jilin University	70
Beijing University for Nationalities	76
Xi'an Jiaotong University	70
Wuhan University	80
Total	900

3.2 Problems in innovation and entrepreneurship education model in colleges and universities

3.2.1 College students' awareness of innovation and entrepreneurship is weak and their attitude is not positive

The data of the questionnaire collected above were sorted out to obtain the current innovation awareness and interest data of college students. The results are shown in Table 3.

Table 3 Statistical table of college students' innovation and entrepreneurship awareness and interest

<i>Investigate subject</i>	<i>Number of people</i>	<i>Number of questionnaires</i>	<i>Proportion/%</i>
Entrepreneurship of school students leads to employment	10	900	1.11%
Number of self-employed students	11	900	1.22%
Number of students with self-employment ideas	43	900	4.77%
Do you understand the policies related to entrepreneurship?	163	900	18.11%
Participate in school innovation and entrepreneurship to obtain, and have specific gains	105	900	11.66%
Interested in innovation and entrepreneurship activities organised by the school	46	900	5.11%
Have a complete understanding of innovation and entrepreneurship education	129	900	14.33%
Entrepreneurship is far from itself	393	900	43.66%

According to the sampling survey data of college students' innovation and entrepreneurship awareness, of the 900 questionnaires in the test, only 14.3% of the students have a complete concept of innovation and entrepreneurship activities, 43.66% of the students think that innovation and entrepreneurship are far away from themselves, and the number of independent entrepreneurs is only 1.22%. Based on the survey results, it can be seen that Chinese college students' awareness of innovation and entrepreneurship (Jones et al., 2020; Steinhorst and Beyerl, 2021) is weak and they are not interested in innovation and entrepreneurship activities. Therefore, there is a large deviation between the current situation of innovation and entrepreneurship education and the actual requirements, which is also an important reason for the aging of innovation and entrepreneurship education model.

3.2.2 The professional knowledge and technology content of college students' innovation and entrepreneurship is low

When carrying out innovation and entrepreneurship activities efficiently, we should take students' own majors as the basis, implement innovation activities with professional knowledge and innovation as the main body, and lay a solid foundation for students' knowledge-based entrepreneurship. By analysing the professional knowledge and

technical content of the current innovation and entrepreneurship activities in schools in China through the survey results, we can obtain the realisation of students' innovation and entrepreneurship professional skills when they participate in the innovation activities held by the University, such as the college students' entrepreneurship sand table, the electronic and electrical design challenge cup, etc. The results are shown in Table 4.

Table 4 Statistical results of professional knowledge and technical content of students' innovation and entrepreneurship activities

<i>Research content</i>	<i>Number of people</i>	<i>Number of questionnaires</i>	<i>Proportion/%</i>
Learn about the innovation and entrepreneurship competition for college students	232	900	25.77%
Entries are related to the major they studied	308	900	34.22%
Entries with high technical content	284	900	31.55%
The winning works are the works of the instructor	277	900	30.77%
Access to cutting-edge knowledge	99	900	11%

It can be seen from the analysis in Table 4 that the professional knowledge and innovative technology content in the current innovation and entrepreneurship education for college students are low. Through the questionnaire survey, it can be found that when students participate in innovation and entrepreneurship activities held by colleges and universities, only 34.22% of the students' entries are related to their own professional knowledge, and 30.77% of the award-winning works are teachers' guiding works. In addition to participating in national and provincial competitions, students participate in very few innovation and entrepreneurship activities by themselves.

3.2.3 *Students' entrepreneurial needs cannot be met*

Based on the questionnaire, the statistical results of college students' innovation and entrepreneurship needs are obtained. The specific results are shown in Table 5.

Table 5 Statistical results of college students' demand for innovation and entrepreneurship

<i>Research content</i>	<i>Number of people</i>	<i>Number of questionnaires</i>	<i>Proportion/%</i>
Need sufficient funds	783	900	87%
Need family support	652	900	72.44%
Need practical experience	602	900	66.88%
Need for innovation and entrepreneurship guidance	555	900	61.66%
Need government support	680	900	75.55%
Need to improve knowledge structure	650	900	72.22%

According to the statistical results of the questionnaire survey, up to 87% of the students think that their innovation and entrepreneurship funds are insufficient, 72.22% of the

students think that they do not have the knowledge structure required for innovation and entrepreneurship, and 75.55% of the students think that innovation and entrepreneurship need government support. It can be seen that when college students carry out innovation and entrepreneurship activities, the society, schools and families fail to give students a good innovation and entrepreneurship, resulting in the failure to meet the entrepreneurial needs of students.

3.2.4 Backward innovation and entrepreneurship education in colleges and universities

Tables 6 and 7 show the statistical table on the awareness of innovation and entrepreneurship education in Chinese universities and the survey results on the status of innovation and entrepreneurship education system in universities.

Table 6 Statistical table of awareness of innovation and entrepreneurship education in Chinese universities

<i>Investigate subject</i>	<i>Number of copies</i>	<i>Questionnaire</i>	<i>Proportion/%</i>
Innovation and entrepreneurship education is mainly to solve students' employment difficulties	19	19	100%
Routine technical guidance for innovation and entrepreneurship education	18	19	94.73%
Innovation and Entrepreneurship Education Enables Extracurricular Activities	18	19	94.73%
Innovation and entrepreneurship education is high-end education	14	19	73.68%
Learn about the Innovation and Entrepreneurship Competition	829	900	92.11%

Table 7 Survey results on the status of innovation and entrepreneurship education system in colleges and universities

<i>Investigate subject</i>	<i>Number of copies</i>	<i>Questionnaire</i>	<i>Proportion/%</i>
The teaching courses are simple and unrelated to the major	18	19	94.73%
Disconnected from professional disciplines	16	19	84.21%
Insufficient teachers	19	19	100%
Backward teaching equipment	17	19	89.47%
Innovation and entrepreneurship education courses are optional content	18	19	94.73%
School funding is low	18	19	94.73%

According to the survey results, the innovation and entrepreneurship education in most colleges and universities in China is carried out in the form of extracurricular activities, competitions, business loan consulting, lectures and so on. Most of them are superficial. Entrepreneurship education lacks a substantial education and teaching system and fails to

fully integrate with the talent training system of colleges and universities. As a result, some colleges and universities ignore innovation and entrepreneurship education, lack scientific teaching ideas, and generally deviate from teaching cognition, and regard innovation and entrepreneurship education as a utilitarian activity.

Colleges and universities lack the concept of students' life development and ignore students' entrepreneurial motivation. Some colleges and universities think that innovation and entrepreneurship education is only a simple solution to the problem of students' difficult employment. Under this concept, entrepreneurship and innovation education in schools will inevitably lead to various problems.

From the perspective of education and teaching, the objectives of innovation and entrepreneurship education in colleges and universities in China are not clear, the disciplinary status is marginalised and the positioning is vague, and the professional disciplinary positioning has not been carried out for the time being. When carrying out innovation and entrepreneurship education, some colleges and universities copied the contents of foreign teaching materials to implement indoctrination education for students, resulting in students' inability to clarify their motivation and intention of innovation and entrepreneurship.

3.2.5 The number of students participating in innovation and entrepreneurship practice activities in colleges and universities is small, and the conversion rate of achievements is low

At present, there is no detailed data on the transformation of innovation and entrepreneurship achievements in China. It can only be found from the analysis of the returned questionnaire. The transformation of innovation and entrepreneurship achievements in colleges and universities in China after the integration of the questionnaire is shown in Table 8.

Table 8 Statistical table of transformation of innovation and entrepreneurship achievements in Chinese universities

<i>Investigate subject</i>	<i>Number of copies</i>	<i>Questionnaire</i>	<i>Proportion/%</i>
There is an innovation and entrepreneurship based on campus	120	900	13.33%
Participated in innovation and entrepreneurship practice and training	135	900	15%
Participate in innovation and entrepreneurship activities	42	900	4.66%
Innovative and entrepreneurial projects are adopted and transferred	14	900	1.55%
Connect with enterprises and jointly complete innovation and entrepreneurship projects	3	900	0.33%

According to Table 8, the transformation of innovation and entrepreneurship achievements in colleges and universities is poor. Among the students in colleges and universities in China, most of them are not aware of the importance of innovation and entrepreneurship spirit and entrepreneurial ability to their own development, and lack

personal innovation rational spirit and scientific entrepreneurial cognition. This will not only become an obstacle to the national economic development, but also directly affect their own development prospects.

3.2.6 *The regulations on the management of innovation and entrepreneurship education in colleges and universities are not standardised*

According to the results of the questionnaire survey, there is a lack of innovation and entrepreneurship education management and research departments in China's colleges and universities. School leaders rarely involve in innovation and entrepreneurship education. The lack of innovation and entrepreneurship education management by the educational administration department leads to a disordered situation in the management of innovation and entrepreneurship education. It is difficult for departments to form a good relationship, and it is difficult to complete the vertical development of innovation and entrepreneurship education in colleges and universities.

The failure of communication between colleges and universities and the imperfect management mechanism (Xin et al., 2020; Prokhorova et al., 2021) are the main problems of innovation and entrepreneurship education in colleges and universities in China. The integration results of the questionnaire on innovation and entrepreneurship management in Chinese universities are shown in Table 9.

Table 9 Statistical results of innovation and entrepreneurship management in colleges and universities in China

<i>Investigate subject</i>	<i>Number of copies</i>	<i>Questionnaire</i>	<i>Proportion/%</i>
Universities have specialised innovation and entrepreneurship management institutions	4	19	21.05%
Universities have set up specialised research institutes for innovation and entrepreneurship education	4	19	21.05%
Communication with each school	3	19	15.78%
Interaction between the various disciplines of the university	5	19	26.31%

Based on the above analysis results of innovation and entrepreneurship education for college students, it can be seen that innovation and entrepreneurship education in colleges and universities in China is still in its infancy, and leaders and managers in colleges and universities do not pay enough attention to innovation and entrepreneurship education, and fail to combine it with economic development. The theoretical system of innovation and entrepreneurship education only stays at the research level and cannot be combined with the current education and teaching system in colleges and universities. The form of innovation and entrepreneurship control is backward and the content is scattered, and a systematic theoretical and practical system has not been formed. Therefore, on the basis of the existing innovation and entrepreneurship education system, it is necessary to optimise and reform the innovation and entrepreneurship education model in colleges and universities in China.

4 Optimisation of innovation and entrepreneurship education model in colleges and universities based on collaborative perspective

4.1 Concept of collaborative perspective development

The theme of collaborative perspective is a collaborative innovation perspective based on the sharing of ideas, professional technologies and knowledge. It is a favourable means to maintain students' innovation and supplement their innovation strength.

The process of college students' innovation and entrepreneurship education cannot only rely on school education management. As an important carrier of the collaborative perspective, colleges and universities not only need to bring national support and guidance to students and obtain social encouragement and support, but also need the incubation and collaboration of enterprises, establish a joint training unit among the state, schools and society, develop together under the concept of cooperation and win-win, maximise the integration of resources required for students' innovation and entrepreneurship education, and integrate innovation elements, so as to realise the win-win situation of policy, technology, information, talent and other elements.

Collaborative perspective is the innovation and entrepreneurship concept that college students should establish. Innovation and entrepreneurship is not a student's personal behaviour, but requires team cooperation and development. Good innovation and entrepreneurship projects need to achieve win-win sharing. Through the collaboration between different professional teams, innovation and entrepreneurship are carried out from different angles to improve the overall effectiveness of innovation and entrepreneurship in the society.

Based on this concept, aiming at the above analysis of the innovation and entrepreneurship education mode in colleges and universities, this paper puts forward various optimisation measures to realise the optimisation of the innovation and entrepreneurship education model in colleges and universities.

4.2 Design of scientific education courses

4.2.1 Establishment of science education curriculum system

When constructing a scientific innovation and entrepreneurship education curriculum system, it is necessary to give priority to the combination and penetration between disciplines, desalinate the discipline boundary, and then pay attention to the innovation and practicality of innovation and entrepreneurship education activities, and effectively combine theoretical education with regional actual conditions to establish an education curriculum system with local educational characteristics. Specific optimisation measures are as follows:

1 Strengthening the general education of college students

General education (Tsoli and Babalis, 2021; Genosas, 2021) as an enlightenment education for students' innovation and entrepreneurship, is aimed at all college students. General education mainly includes the specific contents of students' government policy interpretation and innovation and entrepreneurship awareness training, which can effectively stimulate students' passion for innovation and entrepreneurship and enhance students' basic reserves for innovation and entrepreneurship activities.

2 *Integrating innovation and entrepreneurship education with professional education*

Major colleges and universities need to enrich the teaching level of innovation and entrepreneurship according to students' professional expertise, give students technical upgrading, and focus on students' entrepreneurial skills training.

3 *Systematisation of innovation and entrepreneurship teaching model*

Based on the foundation of general education courses, it can establish relevant evaluation mechanisms to evaluate the teaching contents, improve the innovation and entrepreneurship curriculum planning, and build a systematic innovation and entrepreneurship teaching model suitable for colleges and universities.

4 *Adding innovative thinking teaching courses*

In view of the phenomenon of emphasising entrepreneurship education over innovation in innovation and entrepreneurship education in colleges and universities, innovative thinking courses are offered in major colleges and universities in China. The course contents include the cultivation of innovative consciousness, convergent thinking and other thinking abilities, and systematically stimulate students' innovative thinking abilities. The innovative thinking course should use the practical teaching method to stimulate students' innovative enthusiasm and improve students' high-level thinking ability through practice.

4.2.2 *Reasonably increasing the proportion of practical courses in colleges and universities*

Based on the low proportion of practical courses in colleges and universities, combined with the above-mentioned innovation and entrepreneurship education curriculum system, effective social resources, school resources and enterprise resources will be integrated to create an entrepreneurship practice platform with local characteristics.

The first step is to organise a social practice survey, so that students can personally feel the corporate culture and relevant management work of the enterprise, deeply understand the form of social development, and prevent students from blindly carrying out innovation and entrepreneurship activities.

Secondly, the school needs to encourage students to participate in social practice, and provide students with more entrepreneurial practice activities through graduation internship opportunities to improve their innovation and entrepreneurship ability.

Finally, the university needs to play an exemplary role by inviting outstanding graduates and enterprise managers to give experience lectures to the students and teach them entrepreneurial practice experience.

4.3 *Strengthening the construction of education team*

4.3.1 *Improving teachers' teaching ability*

1 *Carrying out teacher theoretical knowledge training*

The theoretical level of teachers can directly affect the promotion level of innovation and entrepreneurship education in colleges and universities. Schools need to improve

teachers' relevant educational ability according to the combination of 'bringing in' and 'going out'. On the one hand, experts, scholars and famous corporate teachers are invited to regularly carry out innovation and entrepreneurship education and training in the school to improve teachers' theoretical literacy; On the other hand, it is necessary to connect with the typical model schools of innovation and entrepreneurship education reform in China, strengthen communication and exchange, use various platforms to organise teachers to go out, learn the current innovation and entrepreneurship education ideas and practice forms, and update their own innovation and entrepreneurship knowledge content.

2 Organising teachers to practice in local enterprises

When teachers have a certain theoretical basis, they need to strengthen their practical ability and experience. The school can regularly organise innovation and entrepreneurship teachers to investigate and practice in local successful enterprises, improve teachers' practical experience, regularly write experience reports, integrate them into daily innovation and entrepreneurship teaching, enrich teaching content and improve teaching effect.

3 Strengthening the training of double qualified teachers

The construction of the teaching staff of innovation and entrepreneurship education in colleges and universities should focus on the diversification and stratification of the teaching staff, strengthen the construction of 'Double Teachers' in colleges and universities, and pay attention to the improvement of teachers' comprehensive quality. Let teachers not only attach importance to theoretical teaching, but also to practical teaching in self-learning, so as to avoid polarisation of students.

4.3.2 Strengthening the reserve of innovation and entrepreneurship teachers

The construction of innovation and entrepreneurship teachers in colleges and universities is relatively long. At present, the innovation and entrepreneurship teachers in major universities in China are mainly transformed by college counsellors. Therefore, at this stage, the school should pay attention to the quality training of counsellors and university workers who are willing to serve as innovation and entrepreneurship education, so that they can find the correct teaching direction and assume the responsibility of training innovation and entrepreneurship talents.

4.4 Optimising the innovation and entrepreneurship environment of college students

Due to the poor entrepreneurial environment of students at this stage, it is necessary to optimise the innovation and entrepreneurship environment. Firstly, within the school, it should establish an efficient service platform to provide students with the application for innovation and entrepreneurship projects and the query of related issues, so as to create a good innovation and entrepreneurship atmosphere in the school. In the society, local governments need to issue relevant entrepreneurship policies according to local actual conditions, establish special entrepreneurship service organisations, orderly guide students to start their own businesses, increase social support and create a good

atmosphere. In terms of family, to foster an innovative family environment, parents need to abandon the traditional work concept, encourage students to carry out innovation and entrepreneurship activities in line with their own actual situation, tolerate the failure of innovation and entrepreneurship, and promote students' bold innovation and entrepreneurship.

4.5 Optimising the allocation of innovation and entrepreneurship education resources in colleges and universities

Based on the above analysis of innovation and entrepreneurship education model, it can be seen that all kinds of educational resources under the current innovation and entrepreneurship education model in colleges and universities are relatively messy, so it is necessary to carry out resource allocation for innovation and entrepreneurship education resource allocation in colleges and universities.

4.5.1 Encouraging social resources to participate in the construction of innovation and entrepreneurship education system in colleges and universities

1 Actively striving for social resources to enter the school

Innovation and entrepreneurship education resources in colleges and universities are mainly divided into social practice resources and social human resources. Social practice resources include innovation and entrepreneurship practice bases established by enterprises and relevant innovation and entrepreneurship experience; Social human resources mainly include enterprise managers and relevant professionals. The involvement of social resources can not only enrich the curriculum content of innovation and entrepreneurship education, but also reduce the pressure on schools and make innovation and entrepreneurship education develop in a diversified way.

2 Actively striving for social capital to enter the school

As the capital problem is the fundamental problem of college students' entrepreneurship, college students' entrepreneurship activities partly rely on family support, and most of them are still in a state of lack of start-up funds. Therefore, the school should actively strive for social capital to enter the school, expand the source of funds, strengthen the connection between social capital and student entrepreneurship projects, and promote students' innovation and entrepreneurship by establishing a sound venture capital mechanism.

4.5.2 Establishing an innovation and entrepreneurship education platform integrating production, learning and research

Enterprises, schools and students participate together to build an innovation and entrepreneurship education platform integrating production, learning and research, and combine enterprise needs with school research and college students' innovation and entrepreneurship to form an intermediary model combining knowledge trading and enterprise development. In a word, the platform aims at technology transfer and

collaborative perspective, holds various forms of docking meetings, and provides a bridge for projects and funds among enterprises, schools and students.

4.6 Strengthening the support of relevant policies of the local government

Through the above-mentioned relevant optimisation measures, the national level has issued guiding policies, and through the perfect support of local governments, a complete policy implementation and supervision system has been established to ensure that local colleges and universities carry out innovation and entrepreneurship education in an orderly manner.

After the policy is issued, it is necessary to establish a relevant supervision system to supervise the policy implementation subject and evaluate the implementation results. The specific supervision process is as follows:

1 Strengthening internal supervision

The government shall lead the establishment of a supervision organisation, quantify the supervision standards, inspect and supervise the innovation and entrepreneurship of local colleges and universities, and ensure that the policies are implemented in place.

2 Joining the public participation and strengthening the supervision of public opinion

It should establish an effective social supervision network, encourage enterprises to participate, and use the form of nationwide supervision to ensure the implementation of policies.

3 Designing scientific supervision contents and procedures

It should quantify the rating indicators of innovation and entrepreneurship education, scientifically design the implementation standards, implement the supervision of the implementation effect of entrepreneurship policies in local universities through the established innovation and entrepreneurship policy supervision and evaluation system, give full play to the guiding role of the supervision mechanism, promote the mutual cooperation of local policies, and effectively complete the optimisation of innovation and entrepreneurship education mode in colleges and universities.

On the basis of the above, in order to further verify the superiority of the methods designed in this paper, relevant case studies were carried out. The method of this paper, Zhou and Lin (2021) method, Zhao and Wei (2019) method and Luo and Liu (2020) method were used as experimental comparison methods to test the application effects of different methods by comparing the comprehensive scores of innovation and entrepreneurship courses of different methods. The highest score is 100 and the lowest score is 0.

By analysing the data in Table 10, it can be seen that with the increase of experimental time, the comprehensive scores of innovation and entrepreneurship courses of different methods show a changing trend, while the average comprehensive scores of innovation and entrepreneurship courses of this method are 88, the average comprehensive scores of innovation and entrepreneurship courses of Zhou and Lin (2021) method are 81, and the average comprehensive scores of innovation and entrepreneurship courses of Zhao and Wei (2019) method are 77, The average

comprehensive score of the innovation and entrepreneurship course in Luo and Liu (2020) method is 74, which indicates that compared with the experimental comparison method, the comprehensive score of the innovation and entrepreneurship course in this method is the highest and the application effect is the best.

Table 10 Comprehensive scores of innovation and entrepreneurship course

<i>Time</i>	<i>Method of this paper</i>	<i>Zhou and Lin (2021) method</i>	<i>Zhao and Wei (2019) method</i>	<i>Luo and Liu (2020) method</i>
3 months	85	81	79	71
6 months	86	82	76	72
9 months	89	81	75	75
12 months	91	80	78	76
Average value	88	81	77	74

5 Conclusion

In essence, the purpose of Cultivating College Students' innovation and Entrepreneurship Education under the collaborative vision theory is to cultivate their ability to adapt to the development of socialism with Chinese characteristics in the new era, so that they can become the builders and reliable successors of the development of the new era in China. Based on this requirement, under the clear guidance of the national strategic height on the reform of the collaborative vision mechanism in China's colleges and universities, the problems in the innovation and entrepreneurship education mode in China's colleges and universities are analysed in detail, and various innovation and entrepreneurship education mode optimisation measures based on the collaborative vision development concept are proposed. The experimental results show that the average comprehensive score of the innovation and entrepreneurship course of this method is 88, which is far higher than the experimental comparison method. It shows that this method can improve the innovation and entrepreneurship course education of students, realise the deep optimisation of the innovation and entrepreneurship education mode of colleges and universities in China, improve the innovation and entrepreneurship ability of students, and lay an important foundation for social and economic development.

References

- Adejumo, O., Asongu, S. and Adejumo, A. (2021) 'Education enrollment rate vs employment rate: implications for sustainable human capital development in Nigeria', *International Journal of Educational Development*, Vol. 83, No. 5, pp.102385–102396.
- Bigos, K. and Michalik, A. (2020) 'Do emotional competencies influence students' entrepreneurial intentions?', *Sustainability*, Vol. 12, No. 23, pp.1–18.
- Chen, S.M. (2020) 'Research on cultivation and development of graduate students' innovation and entrepreneurship consciousness', *Higher Education Studies*, Vol. 10, No. 17, pp.6755–6776.
- Egan, E.J. (2021) 'A framework for assessing municipal high-growth high-technology entrepreneurship policy', *Research Policy*, Vol. 12, No. 6, p.104292.

- Genosas, N.D. (2021) 'Entrepreneurial skills and innovative behavior as determinants on the entrepreneurial performance of business graduate students', *Management Research*, Vol. 9, No. 6, pp.11–26.
- Jones, G., Chace, B.C. and Wright, J. (2020) 'Cultural diversity drives innovation: empowering teams for success', *International Journal of Innovation Science*, Vol. 12, No. 3, pp.323–343.
- Li, J. (2021) 'The revolution of entrepreneurship through E-commerce model: questionnaire-based research in China', *Electronic Research and Application*, Vol. 5, No. 5, pp.9–15.
- Liang, H.J., Liu, J.S., Wang, R., Meng, C. and Qin, Q. (2020) 'Application research of 'Field' theory in the problem of colleges and universities innovation team aggregation', *Mathematical Problems in Engineering*, Vol. 20, No. 5, pp.1–14.
- Liu, L. and Wang, Z. (2021) 'Innovation and entrepreneurship practice education mode of animation digital media major based on intelligent information collection', *Mobile Information Systems*, Vol. 168, No. 4, pp.106437–106446.
- Luo, Z.Y. and Liu, D.Q. (2020) 'Dilemma and path: research on innovation and entrepreneurship education in colleges and universities based on stakeholders', *Heilongjiang Higher Education Research*, Vol. 38, No. 07, pp.101–105.
- Prokhorova, V.V., Zalutskaya, K.Y. and Us, Y.V. (2021) 'Formation of motivational mechanism in strategic management of a diversified enterprise', *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, Vol. 12, No. 1, pp.177–185.
- Schaeffer, P.R., Guerrero, M. and Fischer, B.B. (2021) 'Mutualism in ecosystems of innovation and entrepreneurship: a bidirectional perspective on universities' linkages', *Journal of Business Research*, Vol. 134, No. 1, pp.184–197.
- Steinhorst, J. and Beyerl, K. (2021) 'First reduce and reuse, then recycle! enabling consumers to tackle the plastic crisis – qualitative expert interviews in Germany', *Journal of Cleaner Production*, Vol. 313, No. 22, p.127782-: 127793.
- Tsoli, K. and Babalis, T. (2021) 'Innovation, entrepreneurial skills and ethics: the impact of a pilot program on students in European union aged 13 – 15', *Psychology*, Vol. 12, No. 9, pp.15–29.
- Ustun, T.S., Hussain, S., Yavuz, L., Fischer, H. and Beyerl, K. (2021) 'Artificial intelligence based intrusion detection system for IEC 61850 sampled values under symmetric and asymmetric faults', *IEEE Access*, Vol. PP, No. 99, pp.1–10.
- Xiao, F., Song, B., Liu, K., He, T. and Luo, B. (2021) 'Analysis and research based on method of questionnaire survey and the algorithm of big data analysis', *Journal of Physics: Conference Series*, Vol. 1813, No. 1, pp.012040–012049.
- Xin, Y., Wang, C., Dong, Y., Chen, X. and Hu, L. (2020) 'Management and entrepreneurship management mechanism of college students based on support vector machine algorithm', *Computational Intelligence*, Vol. 15, No. 1, pp.1–13.
- Zhao, F. and Wei, Y.S. (2019) 'Study on the precision transformation of innovation and entrepreneurship education model in the context of big data', *Scientific Management Research*, Vol. 37, No. 5, pp.138–142.
- Zhen, L. (2021) 'Linkage development of sports industry and mobile internet in the internet era', *Journal of Intelligent and Fuzzy Systems*, Vol. 154, No. 4, pp.1–7.
- Zhou, L.X. and Lin, T.H. (2021) 'Analysis on innovative quality education of library-information-archival science based on social needs', *Library and Information Service*, Vol. 65, No. 12, pp.27–37.