

Research on The Influence and Countermeasure of University-Enterprise Cooperation on The Cultivation of Students' Innovation and Entrepreneurship Ability Based on SPSS Analysis

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Abstract: In order to research the influence of university-enterprise cooperation on the cultivation of college students' innovation and entrepreneurship ability, This paper first designs an index system of college students' innovation and entrepreneurship ability by data mining technology, combines with expert scoring method and research practice. Secondly, corresponding to the design indicators, the questionnaire is designed by Richter scale method ,including objective and subjective questions about the current situation of innovation and entrepreneurship. Then, by using the topic stratified sampling method, we select some college students in Tianjin in different schools, different majors, different grades, and different genders who participates in university-enterprise cooperation for more than two years and has studied the courses related to innovation and entrepreneurship as the research objects to obtain data. The SPSS software is used for analysis, and the corresponding weight of each ability index is calculated by using the quantitative statistical method. Finally, by analyzing the percent and weight of each indicator, we derive the main factors that affect the college students' innovation and entrepreneurship ability, and puts forward countermeasures on the cultivation of college students' innovation and entrepreneurship ability in the process of university-enterprise cooperation.

Keywords: University-enterprise cooperation; Innovation and entrepreneurship; Index system; Data mining; SPSS Software analysis

1 Research background

The "mass entrepreneurship and innovation" has been raised to a national strategy, and the cultivation of college students' innovation and entrepreneurship ability has become one of the urgent tasks of higher education reform. Guided by the market and social needs, the university-enterprise cooperative education mode changes the traditional single in-school classroom teaching mode, and realizes the open education combining in-class and extra-class, in-school and off-campus, enabling students to apply what they learn in class to practice. At present, there are a large number of literature studies on university- enterprise cooperation. By searching the CNKI periodical data base with the keyword "university- enterprise cooperation", this paper finds that from 1998 to March 2018, there are a total of 16,357 articles related to university-enterprise cooperation, among which 2200 are in core journals,16 are about the connotation of university-enterprise cooperation, and 1909 are about the mode of university-enterprise

cooperation. There are 27 articles on the importance of university-enterprise cooperation, 66 articles on the motivation mechanism of university-enterprise cooperation, and 91 articles on the guarantee mechanism of university-enterprise cooperation ^[1]. It can be seen that most of the literature on university-enterprise cooperation tends to analyze the current situation of university-enterprise cooperation, but the research on the field, type, mechanism, operation, effect, mechanism and other aspects of university-enterprise cooperation is not deep enough. There are relatively few articles discussing the research on university-enterprise cooperation oriented to college students' ability view.

This paper studies the cultivation of college students' innovation and entrepreneurship ability from the perspective of university-enterprise cooperation, explores the influence of university-enterprise cooperation on the cultivation of college students' innovation and entrepreneurship ability through two dimensions of scientific research and reality, using data mining ,SPSS software analysis and other methods, and puts forward countermeasures on the cultivation of college students' innovation and entrepreneurship ability in the process of university-enterprise cooperation.

2 Construction of the Index System of College Students' Innovation and Entrepreneurship Ability

In order to obtain the most cutting-edge and comprehensive research trends of the discipline, this paper uses the LDA (Latent Dirichlet Allocation topic model) method, which is widely used in text mining analysis methods, to analyze the data. By extracting the characteristic elements of college students' innovation and entrepreneurship ability, the system evaluation index of college students' innovation and entrepreneurship ability is constructed. First of all, the research is carried out from two perspectives at home and abroad. And the core journals of CNKI and the core collection of WOS (including SCIE, SSCI, A&HCI, and CPCI databases) are used as data sources to set search keywords for innovation and entrepreneurship, and obtain relevant literature on college students' innovation and entrepreneurship ability. Secondly, data mining technology and data-based literature information are used to collect hidden information that can assist the evaluation of innovation and entrepreneurship ability. Similar features are merged and classified, and the definition and characteristic description of innovation and entrepreneurship ability in all mining features are collected and sorted out; Then, the characteristics of similar or repeated concepts are removed, and the remaining relevant elements are taken as the indicator community for capacity evaluation. The frequency counts the remaining innovation and entrepreneurship ability elements, and initially screens the indicator community. Set the mining frequency of screening indicators to 4, and take the indicators that are greater than the mining frequency as alternative indicators ^[2]. Finally, the expert scoring method is used to screen the candidate indicators for the second time ^[3]. The final indicator system has six dimensions, namely, Seize opportunities, take risks, organize management, resource integration, innovation ability and professional quality. According to the research, the indicators of initiative and adaptability were added ^{[4][5][6]}.

3 Questionnaire and field survey

3.1 Summary of influencing factors based on text mining

Through text mining and based on the results of word frequency statistics, the index system of college students' innovation and entrepreneurship ability formed in this paper has 6 dimensions and 23 indicators. Table 1 for details.

Table 1. Index System of Innovation and Entrepreneurship Ability of College Students

Index System of Innovation and Entrepreneurship Ability of College Students	Seize opportunities	Opportunity identification ability, opportunity assessment ability, opportunity use ability
	take risks	Risk identification ability, risk resistance ability, self-adjustment ability
	organize management	Interpersonal communication ability, team building ability, team operation ability
	resource integration	Resource demand analysis ability, resource evaluation ability, resource utilization ability
	innovation ability	Innovation awareness, technology learning ability and technology realization ability
	professional quality	Self confidence, honesty, toughness, sense of responsibility, dare to question ability, optimism, Mobility, adaptability

3.2 Preparation of questionnaire

Corresponding to the design indicators, this paper adopts the Richter scale method to design the questionnaire [7], and integrates the above indicators into objective and subjective questions. questions to make the questionnaire. The questionnaire consists of three parts: the first part is the basic information of the person (gender, age, major, school category). The second part is single-choice question, which covers the established index system, and each question has five answers, Samples can only choose one of them. The third part is subjective open question, List 1-2 puzzles and difficulties related to innovation and entrepreneurship ability that the Samples have encountered.

3.3 Specific implementation of research

The questionnaire is distributed in the form of questionnaire star. The selection criteria of samples are as follows: ① The samples are selected from those who have participated in university-enterprise cooperation study for more than two years; ② All respondents have studied courses related to innovation and entrepreneurship; ③ The selected objects of the sample are distributed in different schools, different majors, different grades, and different genders.

4 Data collation, reliability and validity

In this survey, 500 questionnaires were released by the questionnaire star, and a total of 475 questionnaires were recovered. After 5 invalid questionnaires were eliminated, 470 valid

questionnaires were obtained. The reliability of the questionnaire data was analyzed by SPSS, namely Cronbach's a reliability coefficient. When $0.70 < a < 0.80$, the questionnaire has a certain degree of reliability and effectiveness, which is usually regarded as a reasonable standard of the questionnaire; When $0.80 < a < 0.90$, the questionnaire has very high reliability and effectiveness, which is the numerical range required for the study.

In order to verify the reliability of correlation coefficients, the Bartlett sphericity test results (Sig.) is used for significance test. Sig. is the P value. When P value < 0.05 , the questionnaire has structural validity. The closer the Sig. value is to 0, the better the fit is.

As shown in Table 2, Cronbach's Alpha value is tested to verify the reliability of 25 items included in the questionnaire. A total of 470 sample size data are tested, and the overall reliability value of the scale is $0.829 > 0.8$, which proves that the reliability of the questionnaire data is good; The results of validity test are shown in Table 3: KMO value $0.911 > 0.9$, which proves that the items in the questionnaire are well correlated; The Bartlett sphericity test result (Sig.) below is $0.000 < 0.05$, indicating that the correlation coefficient between the items is significant, which is suitable for make factor analysis. Therefore, it is verified that the overall reliability and validity of the questionnaire data is good, which provides reliable data support for the analysis of the impact of university-enterprise cooperation on college students' innovation and entrepreneurship ability. In addition, experts from enterprises and universities were invited to hold four round table discussions based on the analysis results of the questionnaire, so as to deeply understand the practical experience of cultivating students of different majors and verify the analysis results of the questionnaire.

Table 2. Reliability statistics

Cronbach's Alpha	Number of terms
.829	25

Table 3. The Bartlett sphericity test result

The Kaiser-Meyer-Olkin measure of sample adequacy		.911
Bartlett's sphericity test	Approximate chi-square	2409534
	df	276
	Sig.	.000

5 Data analysis

Combined with SPSS data analysis and quantitative statistical calculation, this part obtains the corresponding weight of each ability index in the six dimensions, and makes an in-depth analysis of the influence of university-enterprise cooperation on the cultivation of college students' innovation and entrepreneurship ability.

5.1 Study and status analysis of innovation and entrepreneurship

5.1.1 Study of Innovation and entrepreneurship

According to the survey, about 88.69% of university-enterprise cooperation projects have innovation and entrepreneurship education courses; In terms of innovation and entrepreneurship activities, about 85% of university-enterprise cooperation projects provide innovation and entrepreneurship lectures and support for various innovation competitions; In terms of supporting conditions for innovation and entrepreneurship, about 72.09% of university-enterprise cooperation projects provide innovation and entrepreneurship practice bases or innovation centers, information service platforms, etc. about 83.5% of university-enterprise cooperation projects provide guidance from professional mentors, and about 69.72% of university-enterprise cooperation on projects provide entrepreneurship assessment. This shows that the university-enterprise cooperation project pays more attention to the cultivation of college students' innovation and entrepreneurship ability.

5.1.2 Status of innovation and entrepreneurship

According to the survey, 53.85% of the students have the idea of innovation and entrepreneurship but have not taken action; 8.45% of the students have no experience of innovation and entrepreneurship and do not want to start a business; 27.94% of the students had innovation and entrepreneurship experience but failed; 9.76% of the students have experience in innovation and entrepreneurship and have successfully started their own business. This shows that college students who participated in the university-enterprise cooperation project have a strong willingness to innovate and start their own businesses, and the number of successful entrepreneurs is fair.

5.2 Analysis of differences in Innovation and Entrepreneurship Ability

This survey measured the innovation and entrepreneurship ability of college students who participated in university-enterprise cooperation from 6 dimensions and 23 abilities, including opportunities Seizing , Risk taking, organizational management, resource integration, innovation ability and professional quality, and analyzes the differences in their training methods.

5.2.1 Seize opportunities

Three secondary indicators are set in the " Seize opportunities" indicator. According to the calculated weight, the overall score of this indicator is 2.9468, which is relatively weak (Table 4).

Table 4. Survey on Seizing Opportunities ability of college students

Secondary index	Condition of degree					weight
	Very inconsistent	Inconsistent	commonly	Relatively consistent	Very consistent	
Opportunity identification ability	6.83%	15.07%	57.42%	14.76%	5.92%	0.3367

opportunity assessment ability	6.76%	15.63%	55.28%	15.21%	7.12%	0.3385
opportunity use ability	7.52%	19.82%	53.98%	13.76%	6.92%	0.3248

In Table 4, in terms of opportunity recognition ability, 78.1% of the experimental subjects could meet the standard, and the opportunity recognition ability of college students who participated in the university-enterprise cooperation project are basically qualified. In terms of opportunity assessment ability, 77.61% of the experimental subjects could meet the standard, and the college students who participated in the university-enterprise cooperation project have a strong ability of opportunity assessment. In terms of opportunity use ability, 72.66% of the subjects could meet the standard. Compared with the three abilities, the weight of opportunity use ability is the lowest and the ability is weak. Most students do not convert the opportunity of innovation and entrepreneurship into practice.

5.2.2 Take Risks

Three secondary indexes are set in the "take Risks" index. According to the calculated weight, the overall score of the indicator is 3.1413, which is relatively strong (Table 5).

Table 5. Survey on Risk taking ability of college students

Secondary index	Condition of degree					weight
	Very inconsistent	Inconsistent	commonly	Relatively consistent	Very consistent	
Risk identification ability	5.06%	11.98%	55.02%	20.19%	7.75%	0.3311
Risk resistance ability	5.37%	13.63%	58.92%	15.79%	6.29%	0.3158
self-adjustment ability	3.56%	9.72%	53.05%	23.98%	9.69%	0.3531

In Table 5, in terms of risk identification ability, 82.96% of the subjects could meet the standard, and college students who participated in university-enterprise cooperation projects have relatively strong ability in risk identification. In terms of risk resistance, 81% of the subjects can meet the standard. Compared with other abilities, the ability of risk resistance is relatively weak. In terms of self-adjustment ability, 86.72% of the subjects could reach the standard, and the weight is also the highest, indicating that the college students who participated in the university-enterprise cooperation project have a strong ability to adjust their mentality.

5.2.3 Organizational management

Three secondary indicators are set in the "Organization Management" indicator. According to the calculated weight, the overall score of this indicator is 3.2085, which is relatively strong (Table 6).

Table 6. Survey on organizational and management ability of college students

Secondary index	Condition of degree					weight
	Very inconsistent	Inconsistent	commonly	Relatively consistent	Very consistent	

Interpersonal communication ability	3.11%	9.08%	55.18%	24.95%	7.68%	0.3412
team building ability	4.18%	9.59%	57.09%	21.11%	8.03%	0.3325
team operation ability	4.67%	10.58%	55.95%	21.37%	7.43%	0.3263

In Table 6, in terms of interpersonal communication ability, 87.81% of the subjects can reach the standard, with the highest weight. The college students who participated in the university-enterprise cooperation project have significantly stronger interpersonal communication ability. In terms of team building ability, 86.23% of the subjects could meet the standard, and the team building ability of college students who participated in the university-enterprise cooperation project are generally strong. In terms of team operation ability, 84.75% of the subjects can reach the standard with the lowest weight, which is relatively weak compared with the other two abilities.

5.2.4 Resource integration

Three secondary indicators are set in the "resource integration" indicator. According to the calculated weight, the overall score of the indicator is 3.1559, which is relatively strong (Table7).

Table 7. Survey on resource integration ability of college students

Secondary index	Condition of degree					weight
	Very inconsistent	Inconsistent	commonly	Relatively consistent	Very consistent	
Resource demand analysis ability	3.93%	10.75%	54.23%	23.11%	7.98%	0.3365
resource evaluate ability	4.15%	10.92%	57.65%	17.99%	9.29%	0.3326
resource use ability	3.97%	10.57%	60.29%	16.86%	8.31%	0.3309

In Table 7, in terms of resource demand analysis ability, 85.32% of the experimental subjects could meet the standard, and the college students who participated in the university-enterprise cooperation projects have obviously strong ability in resource demand analysis. In terms of resource evaluate ability, 84.93% of the subjects are in the standard state, and 17.99% and 9.29% of the subjects are relatively strong and very strong respectively. College students who participate in the university-enterprise cooperation project have relatively average ability in resource assessment. In terms of resource use ability, 85.46% of the subjects could meet the standard. Compared with the three abilities, the ability to use resources is relatively strong, but nearly 60% of the students' ability is concentrated in the general level.

5.2.5 innovation ability

Three secondary indicators are set in the "innovation capability" indicator. According to the calculated weight, the overall score of this indicator is 3.1663, which is relatively strong (Table 8).

Table 8. Survey on innovation ability of college students

Secondary index	Condition of degree					weight
	Very inconsistent	Inconsistent	commonly	Relatively consistent	Very consistent	
Innovation awareness	3.75%	9.26%	61.16%	18.4%	7.43%	0.3334
technology learning ability	3.48%	9.22%	56.72%	20.56%	10.02%	0.3428
technology realization ability	4.56%	11.29%	58.91%	17.25%	7.99%	0.3238

In Table 8, in terms of innovation awareness, 86.99% of the experimental subjects can meet the standard, and college students who participated in the university- enterprise cooperation project have strong ability in innovation awareness. In terms of technical learning ability, only 12.7% of the objects are in the state of not reaching the standard, and the weight is the highest. It can be seen that college students who have participated in the university-enterprise cooperation project have very strong technical learning ability. In terms of technical realization capability, 15.85% of the objects are not up to standard, which needs to be further improved compared with other capabilities.

5.2.6 professional quality

Eight secondary indicators are set in the "professional quality" indicators, and the overall score of this indicator is 3.3369 according to the calculated weight, which is relatively strong (Table 9).

Table 9. Survey on professional quality of college students

Secondary index	Condition of degree					weight
	Very inconsistent	Inconsistent	commonly	Relatively consistent	Very consistent	
Self confidence	4.01%	12.31%	59.82%	19.47%	4.39%	0.1113
honesty	2.86%	6.61%	44.27%	28.71%	17.55%	0.1337
toughness	2.88%	7.62%	52.15%	24.62%	12.73%	0.1270
sense of responsibility	2.65%	7.42%	45.26%	31.22%	13.45%	0.1306
dare to question ability	3.98%	17.74%	56.92%	14.15%	7.21%	0.1051
optimism	2.67%	5.24%	48.3%	30.2%	13.59%	0.1330
Mobility	2.58%	5.82%	52.11%	29.65%	9.84%	0.1291
adaptability	2.78%	5.99%	51.42%	26.72%	13.09%	0.1302

In Table 9, from the weight value, the weight distribution of the 8 abilities is relatively balanced. In terms of the percentage of data, 83.68% of the subjects could meet the confidence standard, among which 19.47% of the subjects with relatively strong ability and 4.39% of the subjects with very strong ability. It can be seen that the value of confidence is relatively average, and the overall confidence is relatively high. In terms of honesty, 90.53% of the subjects could meet the standard, among which 28.71% of the subjects with relatively strong ability and 17.55% of the subjects with very strong ability could meet the standard. It can be seen that the value of honesty is obviously strong, with good quality of honesty and trustworthiness. In terms of toughness, 89.5% of the test objects can meet the standard, among which 24.62% are relatively strong, and 12.73% are very strong, which shows that the value of toughness is obviously strong. In terms

of sense of responsibility, 10.07% of the subjects failed to meet the standard, which shows that they have relatively strong sense of responsibility. In terms of daring to question, more than 20% of the subjects failed to meet the standard, while 17.74% of the subjects were less competent. It can be seen that the spirit of questioning authority is still relatively lacking. In terms of optimism and positive, 92.09% of the subjects could meet the standard, indicating a high optimism and positive attitude. In terms of Mobility, 91.6% of the subjects could meet the standard, with relatively strong ability as high as 29.65% and very strong ability as high as 9.84%, indicating that the subjects had high walking power. In terms of adaptability, 91.23% of the subjects could meet the standards, indicating that college students who participated in university-enterprise cooperation projects have strong adaptability and can quickly adapt to environmental changes.

6 Conclusions and countermeasures

Through the data analysis of the questionnaire, it can be seen that the weight and proportion of college students who participated in the university- enterprise cooperation in "Opportunity identification ability", "self-adjusting ability", "interpersonal communication ability", "resource use ability", "technology learning ability", "action and adaptability" are relatively high. Through the collaborative education between schools and enterprises, the innovation and entrepreneurship ability of college students is more obvious in the above aspects. However, they are still lacking in "opportunity use ability", "team operation ability", "resource use ability", "technology realization ability", and "dare to question ability".

At the same time, from the subjective open question, we see that Financial and policy support is also important, which influence the cultivation of innovation and entrepreneurship in local Universities. Creating a training system for innovation and entrepreneurship, Creating a campus culture that encourages innovation and entrepreneurship and Strengthen the support from the government and the society, all are the samples expected.

In the future, more efforts should be made in the following aspects in the process of university-enterprise cooperation and collaborative education:

First, improve the ability to use opportunities. Increase the contact between college students and the external social market, and increase the innovation and entrepreneurship experience through the external mutual aid exchange platform. At the same time, we should strengthen the guidance of professional guidance teachers and improve the effective coordination between innovation and entrepreneurship opportunities and external resources ^[8].

Second, enhance the team operation ability. Through continuous improvement and promotion of training programs, college students can not only experience the difficulties of innovation and entrepreneurship, but also realize the importance of teamwork ^[9].

Third, improve the ability to use resources. In the process of building channels and platforms for students to communicate with the outside world, let them know the advantages of surrounding resources, identify the use of resources at different stages, and match, integrate, optimize and use more human, material, financial and other resources.

Last, strengthen the ability to question. In the teaching process, we should strengthen heuristic and situational teaching, mobilize students' enthusiasm and initiative, trigger students' doubts

with an equal and harmonious teaching environment and teacher-student relationship, and stimulate and awaken students to actively seek knowledge and explore ^[10].

In short, in the future education and teaching work, under the principle of "complementary advantages, resource sharing and common development ^[11]", we should constantly strengthen the motivation of universities and enterprises to cooperate in educating people, give full play to the enthusiasm, initiative and creativity of universities and enterprises, improve and perfect the cooperative operation mechanism according to the actual situation of innovation and entrepreneurship education, and build a more stable relationship and more significant collaborative education effect.

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