



The Grey Correlation Algorithm is Used to Evaluate the Quality of Independent Innovation Talents Training in Universities

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Abstract. The quality evaluation of college students' innovation and entrepreneurship education is very important. This paper constructs a quality evaluation index system of innovation and entrepreneurship education for college students with 5 dimensions and 21 sub-indexes, establishes an evaluation model based on grey relational degree algorithm, and makes an empirical study of 8 universities in N City, and puts forward corresponding suggestions. The quality evaluation of college students' innovation and entrepreneurship education is very important. This paper constructs a quality evaluation index system of innovation and entrepreneurship education for college students with 5 dimensions and 21 sub-indexes, establishes an evaluation model based on grey relational degree algorithm, and makes an empirical study of 8 universities in N City, and puts forward corresponding suggestions. Grey relational degree algorithm is one of the grey system analysis methods. It is a method to measure the degree of correlation among factors according to the similarity or dissimilarity of the development trend among factors, namely "grey relational degree" [3]. In this paper, the grey relational algorithm is used to determine the evaluation index system, establish the quality evaluation model of college students' innovation and entrepreneurship education, and make an empirical evaluation.

Keywords: grey relational algorithm · College students · Innovation and entrepreneurship education

1 Introduction

"Young people are the pillars of the country and the spirit of the society. They should be innovation-oriented, entrepreneurship-oriented, social and economic development, and improve people's livelihood. Young college students are full of creativity and creativity and are creative and creative talents" [1]. The innovative spirit of college students has developed from the initial exploration to a new period of detailed stratification and diversified development. Therefore, it is of great practical value to carry out the quality evaluation of "innovation" education and promote reform by evaluation for the establishment of "innovation" colleges and universities. Grey relational degree is a grey relational evaluation method based on the similarity or difference of the development of each factor.

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Using grey correlation method, this paper constructs the evaluation index of independent innovation and entrepreneurship ability of colleges and universities, and makes an empirical analysis of it. The evaluation index system of innovation and entrepreneurship education conditions, innovation and entrepreneurship education courses and activities, innovation and entrepreneurship education channels, innovation and entrepreneurship education situation and school innovation and entrepreneurship education effect are five dimensions and 21 sub-indexes. Taking 8 universities in N city as research samples, 34 students from School A, 52 students from school B, 76 students from School C, 297 students from School D, 45 students from school E, 37 students from School F, 52 students from School G, and 190 students from School H are respectively selected according to a certain ratio. The satisfaction of college students' innovation and entrepreneurship education is investigated. The statistical analysis method of sociology was used to score the scores of "very satisfied", "satisfied", "average", "dissatisfied" and "extremely satisfied" of the questionnaire. The results were: 100, 80, 60, 40 and 20.

2 Establishment and Experience Analysis of the Assessment Method of College Students' Entrepreneurial Quality Based on Grey Correlation

2.1 Establishment of Index Sequence and Reference Evaluation Standard Sequence

Based on the satisfaction data of college students' innovation and entrepreneurship education in 8 universities in N City, the index data sample and reference evaluation standard series are determined, and each index is normalized.

2.2 Calculate the Grey Correlation Coefficient

Based on the grey correlation coefficient calculation formula, the corresponding correlation coefficient of each index and the reference series $\xi_i K(i=1, 2, \dots, 6; k=1, 2, \dots, 11)$, forming a matrix $\xi_{6 \times 11}$.

2.3 Calculation of Correlation Degree

The weights of different indicators at all levels, i.e. WAB, WB1C, WB2C, WB3C, WB4C, WB5C. Using the formula:

$R = (r_i)_{1 \times m} = (r_1, r_2, \dots, r_m) = WET$, calculate the correlation degree of each level index:

$RB1 = WB1C \times ETB1C = (0.0077, 0.0148, 0.0212, 0.0125, 0.0609, 0.0764, 0.0793, 0.0152)$;

$RB2 = WB2C \times ETB2C = (0.0049, 0.0114, 0.0153, 0.0073, 0.0386, 0.0222, 0.0575, 0.0103)$;

$RB3 = WB3C \times ETB3C = (0.0084, 0.0168, 0.0140, 0.0116, 0.0471, 0.0695, 0.1100, 0.0166)$;

$RB4=WB4C \times ETB4C = (0.0396, 0.0546, 0.0534, 0.0607, 0.5058, 0.2044, 0.3583, 0.0602)$;

$RB5=WB5C \times ETB5C = (0.0125, 0.0264, 0.0260, 0.0165, 0.1308, 0.0545, 0.1026, 0.0206)$.

In the above equation, EB1C, EB2C, EB3C, EB4C and EB5C are the matrix composed of corresponding data in the correlation value table respectively. Finally, the correlation degree of target layer – index R is calculated:

$RA=(r1, r2, r3, r4, r4)=WAB(RB1, RB2, RB3, RB4, RB5) (0.0262, 0.0389, 0.0388, 0.0397, 0.3177, 0.1408, 0.2411, 0.0411)$.

According to the correlation degree of RA, the correlation degree order of innovation and entrepreneurship education quality of college students in 8 universities can be determined as: $E > G > F > H > D > B > C > A$.

2.4 Analysis of Empirical Results

Among the eight universities, the correlation between E and ideal school is the highest, which is 0.3177 respectively, and E is the best. G (correlation degree 0.2411), F (0.1408) and H (0.0411) are Grade 2. The correlation between four universities was significantly greater than that between four universities. 4 colleges and universities: Class D (correlation 0.0397), Class B (0.0389), Class C (0.0388), Class A (0.0262). Interpretation mode BASIC, Visual Basic, VBScript, Java, JavaScript, etc. are all interpreted and executed languages. C, C++, etc. are the processing procedures of language compilers that need to be compiled. Source program object program executable code library compiler linker.

First, we need to address the root causes. We will thoroughly study and grasp the Party's 20 major spirits, use the Party's innovative theories to solidify our hearts and cast our souls, and fully implement the fundamental task of cultivating virtues and cultivating people. We should grasp the basic and strategic supporting role of education, science and technology, and human resources in building a modern socialist country in an all-round way, publicize and explain the importance of education, effectively combine study with practice, and better advance our work and cause development.

Second, focus on key points. We will focus on promoting fairness and improving quality. We will raise the quality of independent training of personnel in all respects, make breakthroughs in training personnel in basic disciplines, outstanding engineers, and philosophy and social sciences, strengthen organized scientific research in colleges and universities, and contribute to the development of world-class talent centers and innovation centers at a faster pace.

Third, reform. We should firmly grasp the mission and tasks of a new era and a new journey, respond to major national and regional strategic needs and social development and changes, enrich the supply of policies, establish a new evaluation system, better play the role of education in serving the development of economic and social regions, promote opening-up at a higher level, and accelerate the strategic actions for digitization of education.

3 Grey Proximity Correlation Algorithm

Collaborative filtering is a method in which peer users evaluate a particular product and use it as a recommendation method to make the method more acceptable to the user. This method mainly includes: finding other users with the same preference, namely the so-called “nearest neighbor”, and finally determining several items that the object is most concerned about by weighting and classifying the utility value of the object. It can be seen that the core problem of collaborative screening is to find its neighbor relation, that is, how to solve the association relation.

This paper focuses on the problem of collaborative search algorithm based on fuzzy clustering theory in solving user similarity and studies it. Because of the rapid development of e-commerce, the number of users and the number of projects has exploded. For example, in the user-item score matrix shown in Table 1, user A and user B have the same score item I1, both of which are 4, while user A and C have the same score in four items. If three traditional similarity measurement methods are used for similarity calculation, the results show that user A’s nearest neighbor is user B, and the results are obviously lack of credibility.

Therefore, the traditional similarity measurement method will cause the calculation of the nearest neighbor set is not accurate enough, and ultimately affect the recommendation algorithm

Accuracy.

Calculate the similarity of other users to the target user’s UID in the cluster sUID, and initialize the original data first.

According to the input formula, the grey proximity γ between the users is calculated. Finally, it is obtained by the gray proximity correlation degree

To construct the user similarity matrix:

$$\text{sim} = \begin{cases} R_{11}R_{12} \cdots R_{1n} \\ R_{21}R_{22} \cdots R_{2n} \\ \vdots \\ R_{m1}R_{m2} \cdots R_{mn} \end{cases} \quad (1)$$

γ_{ij} refers to the gray proximity correlation degree of user i to user j .

This article found in the experimental process, nelson put forward the grey when calculating the Γ close to the degree of correlation algorithm, if the original data is opposite bigger, can lead to $|S_i - S_j|$ value is too large, the close degree of grey value ultimately Γ is too small, in comparison

It is difficult to identify the user similarity calculation based on grey proximity correlation

Table 1. User-item scoring matrix

User/Project	I1	I2	I3	I4	I5	I6
A	4	2	2			4
B	4			2	5	
C	3	2	2			4

Input: User-project rating form within the same project cluster;

Output: User similarity matrix sim.

Steps:

(3). Take the new sequence as the reference sequence and repeat steps (2)–(3) to obtain the grey proximity correlation degree of all the reference sequences.

(4). The grey proximity correlation between users is taken as the similarity, and the user similarity matrix sim is output.

In this paper, the user similarity refers to the grey close correlation between users unless otherwise specified. In order to convenient said, we will be the similarity comparison method based on the gray close correlation analysis model for LCGA method. Suppose the user's rating is on a scale of 1 to 5, from very dissatisfied to very satisfied. The project scoring matrix of four users A, B, C and D in the same cluster is given, and the null value represents no interaction and no scoring. If user A is taken as the target user, the score sequence of A is set as the reference sequence, $Y_A = \{2, 1, 1, 1, 1, 1, 2, 1, 2, 1\}$, and the corresponding comparison sequence is $Y_B = \{5, 4, 5, 5, 4, 5, 5\}$, $Y_C = \{5, 5, 3, 4, 2, 4, 1, 4, 2, 3\}$, $Y_D = \{2, 1, 2, 2, 1, 1, 2, 2, 1\}$. According to the first step of algorithm 3, the original user-item rating scale is initialized to obtain the matrix X:

4 Recommendations

The characteristics of this empirical research include: first, junior college is higher than undergraduate college; Second, comprehensive colleges are higher than science and technology colleges, and science and technology colleges are higher than medicine colleges. Third, private colleges are higher than public colleges, and finance colleges are higher than science and technology colleges and applied colleges.

4.1 Attach Equal Importance to Both Theory and Practice: Improve Theoretical Classroom Teaching and Strengthen Practical Classroom Construction

In the process of college students' innovation and entrepreneurship, we should treat two problems correctly: one is the integration of innovation and entrepreneurship. It is necessary to break through the traditional thought frame of "attaching importance to entrepreneurship and neglecting to create" and infiltrate the "innovative" teaching activities into the whole teaching activities. On this basis, the main innovation projects in China – expansion innovation method, the international mainstream TRIZ innovation method, into the enterprise entrepreneurship teaching. The second is the interaction between "study style" and "practice". The problem of "emphasizing theory rather than practice" in college students' innovation and entrepreneurship education should be solved. The research shows that the satisfaction degree of vocational college graduates is higher than that of ordinary college graduates, which in a sense indicates that colleges and universities should strengthen the practical teaching of innovation and entrepreneurship. It is necessary to strengthen the construction of "practical training" and "practical training base" with "innovation center", "campus physical store", "innovation studio", "start-up town" and "mass maker space" as carriers.

4.2 Coupling Linkage: Leveling the “Two Skins” of Innovation and Entrepreneurship Education and Professional Education

The teachers of creative entrepreneurship do not know their own career, and the college students trained are more involved in non-professional creative and creative entrepreneurship. Vocational education lacks creativity and fails to effectively carry out creative entrepreneurial activities with the support of its own expertise. There are “two skins” in student innovation and vocational teaching in higher vocational colleges. Creative entrepreneurship and vocational training are intrinsically closely related and highly consistent. They coexist in an era and have common resources to explore. How to make the interaction and combination between them is a practical problem that needs further discussion. Therefore, it is necessary to give full play to the synergistic effect of the two in terms of team, environment, carrier and resources, so as to promote the development of innovation and entrepreneurship education, and promote the development of vocational education with innovation and entrepreneurship education.

4.3 Integration and Embedding: Innovation and Entrepreneurship are Integrated Into Ideological and Political Education to Realize the Transformation from “Minority” to “Mass”

Build a new corporate culture, make it from “minority” to “mass”. The combination of innovative spirit and ideological and political work fundamentally guarantees the innovative spirit of the “masses”. On the basis of “elementary theory”, the author establishes a course with Chinese characteristics – the application of extension Research in ideological and political courses; Use “extension modeling” to model textbooks, play with notes, and evaluate historical figures; The whole process of small class learning with “actuating technology”; Using “extensible conflict mode” to deal with actual conflicts; By using the “extensible innovation method”, the students have obtained 8 teaching activities, 8 school science and technology innovation, 2 Zhejiang Province “Challenge Cup” science and technology papers first prize and second prize, 2 Zhejiang Province “Young Science and Technology Talent Project”, 2 national college students innovation training projects, and 1 science and technology innovation team. In addition, seven institutions, including Ningbo Sociological Society and Ningbo Jiangdong District Community Service Center, affirmed the research results of the project. It is the mission of universities, especially “double first-class” universities, to improve the quality of independent training of talents. As the national team, which is the main force of cultivating basic research talents and the key core technology of “bottleneck”, the majority of colleges and universities should continuously deepen the understanding of the law of the development of talent cause, and enhance the consciousness and confidence of cultivating top-notch innovative talents by themselves. We should be fully aware of the need for independent training of high-level personnel, take the initiative to meet the needs of the development of the Party and the country, focus on the major strategic needs of the country, combine the development of science and technology as the first productive force, the training of human resources as the first resource, and the enhancement of innovation as the first driving force, promote the joint development of high-quality personnel training and high-level scientific and technological innovation, and work in the same direction.

To improve the quality of independent training of talents, colleges and universities should attach great importance to the development of basic disciplines, make all-round plans for the cultivation of basic disciplines, and cultivate high-level compound talents. Throughout the current development of science and technology, the development of key core technologies often depends on the accumulation and breakthrough of basic research. We should pay more attention to and invest in basic disciplines and basic research, encourage students to keep their curiosity and thirst for knowledge, and give more development space to basic research talents. Only in this way can we attract more outstanding talents to devote themselves to basic disciplines, improve the development level of basic disciplines, and enhance the original innovation ability of “from 0 to 1”.

To improve the quality of independent training of talents, universities should actively strengthen cross-integration and collaborative innovation. In the face of future competition, the high-level talents in line with the national needs should be compound, applied, innovative and international talents with an international vision, which requires colleges and universities to make good use of the “catalyst” of interdisciplinary integration, elaborate talent training programs with more scientific design and more flexible mechanism, break disciplinary barriers, and provide cross-platform. Improve the height and breadth of talents’ vision, and fully stimulate the enthusiasm, initiative and creativity of talents to continue to advance in the breadth and depth of science and technology.

4.4 Publicity and Publicity: Make Multiple Examples and Expand the Social Influence of Innovation and Entrepreneurship Education

Through the research of college students’ creative entrepreneurship activities, it can be seen that college students’ creative entrepreneurship teaching performance is better, but the satisfaction degree of college students is poor, which is because colleges pay more attention to college students’ creative entrepreneurship activities. To do: first, “there is activity, there is vitality”, we should actively carry out college students’ creative entrepreneurship, and cultivate college students’ creativity and creativity. The second is to set up innovation model, establish entrepreneurship model, strengthen the education and guidance of college students, with students’ thoughts to influence students, with life to infect life. Third, we should have the concept of “news is hot”. We should establish the idea of news publicity and carry out education of creative entrepreneurship through official and unofficial channels to attract attention and increase visibility.

5 Conclusions

With the rapid development of the Internet, especially after the 21st century, people have stepped into an age of large amount of information. In a large amount of Internet information, it is difficult for people to find the information they need accurately, and too much information will become a burden. So, there’s a recommendation system. With the extensive research and application at home and abroad, collaborative screening technology has been developed rapidly, and many scholars are constantly improving and perfecting it. However, the problem of data scarcity has not been effectively solved. Through the investigation of relevant literature at home and abroad, the correlation theory

based on grey correlation degree is adopted to solve the problem of inaccuracy caused by scarce data. Firstly, the grey relational degree clustering method is used to classify the project, in order to reduce the project area of the object, reduce the sparsity of the data, and shorten the time required for searching the neighboring users. By categorizing the same items, you can effectively improve the accuracy of the search results. Finally, we compare the correctness of the method with the simulation test.

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