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Research on the Intermingling of Intelligent Computing and Traditional Culture to Promote Innovative Talent Cultivation Mode under the Perspective of New Quality Productivity

Shuang Li[1,✉], Sujie Tian[1], Min Ding[1]

[1] *Department of Automobile Engineering, Jining Polytechnic, Jining, Shandong, 272000, China*

ABSTRACT
Taking the perspective of new quality productivity, this study explores the promotion effect of the intermingling of intelligent computing and traditional culture on the cultivation of innovative talents, and constructs an evaluation system containing four primary indicators and 14 secondary indicators of educational activities, student practice, collaborative innovation and teaching resources. The cloud integration model is used to deal with the ambiguity and randomness of the complex system, and the network hierarchy analysis method ANP is used to determine the weights of the indicators and reveal the dynamic association of each element. It is found that: the indicator B2 of student practice category has the highest weight of 0.329, in which the number of awards of C5 innovation competition and the number of C4 students' project participation are the core driving factors, with the weights of 0.103 and 0.078, respectively. the cloud integration model verifies the scientificity of the evaluation system. The evaluation value of the traditional culture innovation talent evaluation system constructed in this paper is 0.798, and the integrated cloud model belongs to "very good" grade. However, the mapping intervals of C14 Resource Library Call Frequency and C13 Teacher Integration Background are low, 0.346 and 0.413 respectively, which need to be adjusted and optimized. The innovative talent cultivation program of colleges and universities constructed in this study can make up for the shortcomings in traditional talent cultivation performance evaluation, has certain practicality and effectiveness, and helps to improve the quality of traditional culture innovative talent cultivation.

Keywords: new quality productivity, innovative talent cultivation, network hierarchy analysis, cloud integration model

1. Introduction

Realizing the high-quality development of the country is the primary task of China's comprehensive construction of a modern socialist country [1]. At present, the society is marching into the era of digital

✉ Corresponding author.
E-mail address: sdlishuang@sina.com (S. Li).
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intelligence, and the deep integration of digital technology and intelligent technology is profoundly changing the mode of production, way of life and way of thinking of human beings [2-3]. In the process of promoting national high-quality development, the development of new quality productivity is the core element, and the key to develop new quality productivity lies in talents, and new quality talents are the important support and key force for the development of new quality productivity [4-6]. Among them, higher education, as the deep integration point of education, science and technology and talents, shoulders the important mission of training and conveying high-quality scientific and technological talents for the development of new quality productivity [7-9]. However, in the current context of the rapid transformation of traditional productivity to new quality productivity, there is a mismatch between the cultivation of new quality talents and the development of productivity in Chinese higher education [10-11]. At the same time, the cultivation of college students' cultural self-confidence is also an indispensable key link in the development and construction of the country in the new era [12]. Under the influence of the traditional teaching mode of higher education, the education of contemporary college students is focused on the teaching of specialized disciplines, which in the long run leads to the unclear cultural cognition of contemporary college students, and the knowledge reserve is limited to the knowledge of disciplines [13-15]. Chinese excellent traditional culture brings together the essence of different disciplines and different industries at all stages [16]. By learning Chinese excellent traditional culture, college students can not only expand their professional knowledge base, improve their learning pattern, and re-examine their professional teaching from the perspective of other humanities fields, but also consolidate their professional knowledge and strengthen their cultural self-confidence [17-20]. In addition, in the process of learning the knowledge of Chinese outstanding culture, college students can understand the contemporary significance of promoting and inheriting Chinese outstanding traditional culture from a more macroscopic level, and strengthen the national identity [21-23]. In this context, we should deeply analyze the current challenges faced by higher education in the process of cultivating new quality talents, and explore the effective strategies for the integration of intelligent computing and traditional culture, so as to accelerate the cultivation of innovative talents that are highly compatible with the development of new quality productivity.

With systematic evaluation method as the core, this study aims to provide scientific basis for the cultivation of innovative talents in colleges and universities through the integration and optimization of multi-dimensional models. The article starts from the critical analysis of the traditional culture innovation talent cultivation model, and gradually builds an evaluation framework adapted to the needs of the intelligent era. It proposes a research method and indicator system that integrates intelligent computing and traditional culture, and constructs an evaluation system that contains four first-level indicators (educational activities, student practice, collaborative innovation, and teaching resources) and 14 second-level indicators. The system covers specific scenarios such as curriculum integration, project practice, and industry-university-research cooperation. Subsequently, the cloud integration model is introduced to deal with the ambiguity and randomness of complex systems. By mapping the uncertainty of qualitative concepts and quantitative values into a cloud model, combined with projection tracing and ordered sample clustering, data dimensionality reduction and objective classification are realized. The cloud integration model takes the expected value, entropy and superentropy as the characteristic parameters to avoid the subjective assignment bias, while the projection direction is optimized by the genetic algorithm, which significantly improves the evaluation accuracy of the complex system. Finally, with the network hierarchy analysis method ANP as the core, the network structure containing target layer, criterion layer and index layer is constructed. The global weights of each indicator are finally determined by two-by-two comparison of judgment matrices and consistency test, combined with Super Decisions software to solve the supermatrix.

2. Construction of a model and evaluation system for training innovative talents in traditional culture

2.1. Innovative Talent Cultivation Model of Traditional Culture

In this section, we first start from the limitations of the traditional talent cultivation model, and systematically analyze the advantages and disadvantages of the knowledge judgment model, comprehensive quality assessment model and fuzzy mathematical evaluation model, and the common defect of these models is that it is difficult to accurately portray the innovative talent cultivation law under the deep fusion of intelligent computing and traditional culture, and there is an urgent need to construct a more scientific evaluation framework.

2.1.1. Knowledge judgment model. According to the definition of undergraduate talent training quality, undergraduate talent training quality is a function of knowledge, ability and quality. In order to make the complex problem can be roughly judged by simplified criteria, firstly, only the factor of knowledge is considered without considering the factor of ability and quality, so the first simple model for evaluating the quality of undergraduate talent training is obtained, which is called the knowledge judgment model. The results obtained from this model obviously cannot meet the demand.

2.1.2. Comprehensive quality assessment model. If we regard colleges and universities as an enterprise and students as products, usually the products have to undergo a series of stringent tests before they are put on the market to ensure the quality of the products. Similarly, colleges and universities can conduct comprehensive quality assessment before students' graduation in order to examine the cultivation results and provide a basis for how to adjust and modify the next step. Comprehensive quality includes the knowledge, ability and quality in the definition of undergraduate talent training quality, just the relatively simple integration of these three together, that is, to get the second evaluation of the quality of undergraduate talent training of a simple model, called the comprehensive quality assessment model, refers to the use of a series of evaluation indexes before the graduation of the students, the students to conduct a comprehensive test, the evaluation indexes mainly include ideological and political qualities, scientific and cultural qualities, post professional quality, physical and psychological quality, etc.

2.1.3. Fuzzy Mathematics-based Evaluation Models. The model tree comprehensive evaluation method developed on the basis of recent fuzzy mathematics provides new ideas for the combination of mainly non-quantitative and quantitative evaluation of graduate quality.

There are also some shortcomings in using the fuzzy comprehensive evaluation method to evaluate the quality of talents:

1) In order to get the evaluation results, the principle of maximum affiliation, which is commonly used in the fuzzy evaluation model, will lose some useful information;

2) In the process of evaluating the quality of graduates, information is often massive, and the use of the fuzzy comprehensive evaluation method requires high performance of the equipment, which affects the popularization and promotion of the system;

3) The formative evaluation of the quality of graduates should be a dynamic process, and the fuzzy comprehensive judgment index system must be required to be matrix, and cannot be graded according to the specifics of demand and evaluation indicators.

The shortcomings of the above various evaluation models not only make the evaluation system produce systematic errors and reduce the credibility and validity of the evaluation, but also fail to comprehensively and correctly describe the basic laws and characteristics of talent cultivation with local colleges and universities, and make it difficult to further systematically analyze the results of the evaluation and provide a decision-making basis for the reform of the corresponding talent cultivation program.

2.2. Construction of Research Methods and Indicator System for Cultivating Innovative Talents in Colleges and Universities

Based on the reflection on the traditional model, this section proposes a research method centered on survey research method, expert interview method, hierarchical analysis method and fuzzy comprehensive evaluation method, emphasizing the multidimensional perspective of "policy support-practice participation-technology empowerment-resource guarantee". Through expert interviews and hierarchical analysis, the evaluation index system of innovative talent cultivation under the new quality of productivity in universities and colleges with the intersection of intelligent computing and traditional culture is constructed.

2.2.1. Research methodology. The evaluation of the training of innovative talents in intelligent computing and traditional culture in colleges and universities not only needs to describe and evaluate the specific support policies and measures, but also needs to analyze and evaluate the results achieved by actual participation from the perspective of students, that is, it is necessary to describe and evaluate the various aspects of the activities of colleges and universities to carry out the training of innovative talents about traditional culture.

In order to carry out scientific analysis and evaluation, this paper adopts the following research methods: first, survey research method. The survey mainly contains two aspects: a survey on the current situation of innovative talent cultivation in colleges and universities, and a statistical analysis of the collected questionnaires; and a survey on the students' subjective willingness to improve their innovative ability and their needs, and an analysis of the cultivation countermeasures from the perspective of colleges and universities, based on the gap between the subjective needs of the students and their actual actions. Second, expert interview method and hierarchical analysis method. Evaluation of innovative talents cultivation in colleges and universities requires scientific evaluation indexes, and evaluation indexes and weights are established through expert interviews and hierarchical analysis method. Third, fuzzy comprehensive evaluation method. Evaluating the current situation of innovative talents cultivation in colleges and universities, some of them cannot be expressed by accurate data, so the fuzzy comprehensive evaluation method should be used.

2.2.2. Construction of evaluation index system. Based on expert interviews and suggestions, this paper studies the establishment of an evaluation index system, including the target level, first-level indexes and second-level indexes. The evaluation index system of traditional culture innovation talents training is shown in Table 1:

Table 1. Evaluation index system of traditional cultural innovation talents training

Target	Primary index	Secondary index
Evaluation on the cultivation of innovative talents of traditional culture	B1: Education Activities Integrating Intelligent Computing with Traditional Culture	C1: The policy strength of the school to support the integration and innovation of intelligent computing and traditional culture
		C2: Proportion of intelligent computing courses in which teachers integrate traditional cultural elements into the classroom
		C3: Frequency of innovative activities combining traditional culture and intelligent computing organized by schools
	B2: Students practice and participate in integrated innovation activities	C4: Number of intelligent computing projects involving students in traditional cultural topics
		C5: Number of winners of Innovation Competition based on traditional culture

		C6: Number of students in the intersection of traditional Culture and Science and technology
		C7: Number of startups using traditional wisdom to solve modern problems
	B3: Collaborative innovation of science and technology activities and traditional culture	C8: Ratio of digital protection of traditional culture to application cases of intelligent technology
		C9: Number of industry-university-research cooperation projects combining traditional technology with modern technology
		C10: Reference Frequency of traditional cultural elements in artificial Intelligence algorithm design
	B4: Integrated and innovative teaching and Resource Assurance	C11: Number of interdisciplinary courses "Intelligent Computing + Traditional Culture" offered
		C12: Number of digital laboratories or research centers for traditional culture built
		C13: Proportion of teachers with both traditional culture and intelligent computing background
		C14: Frequency of traditional cultural resource Library in Innovative Teaching

The specific meanings of the indicators are as follows:

Educational activities integrating smart computing and traditional culture: emphasizing policy support, curriculum integration and activity design, reflecting the deep embedding of traditional culture in smart computing education. The secondary indicators include C1: the strength of the school's policy to support the integration and innovation of intelligent computing and traditional culture, C2: the proportion of intelligent computing courses in which the instructors have integrated traditional culture elements in the classroom, and C3: the frequency of the school's organization of innovative activities combining traditional culture and intelligent computing

Students' practical participation in integration and innovation activities: highlighting students' active application of traditional culture, the indicators include C4: the number of students' participation in smart computing projects with traditional culture themes, C5: the number of awards won in innovation competitions based on traditional culture, C6: the number of students joining student clubs in the cross-cutting fields of traditional culture and science and technology, and C7: the number of entrepreneurial cases that utilize traditional wisdom to solve modern problems.

Synergistic innovation between scientific and technological activities and traditional culture: focusing on specific scenarios in which technology empowers traditional culture, the secondary indicators are C8: the ratio of cases of digitalized protection of traditional culture and the application of intelligent technology, C9: the number of industry-university-research cooperation projects combining traditional crafts with modern science and technology, and C10: the frequency of references to traditional cultural elements in the design of artificial intelligence algorithms.

Teaching and Resource Guarantee for Integration and Innovation: Strengthening the construction of interdisciplinary resources, indicators include C11: Number of interdisciplinary courses on "Intelligent Computing+Traditional Culture", C12: Number of digital laboratories or research centers on traditional culture, C13: Percentage of faculty members with backgrounds in both traditional culture and intelligent computing, and C14: Frequency of calling traditional culture resource library in innovative teaching.

2.3. Talent Training Performance Cloud Integration Evaluation Methods

The establishment of the index system lays the foundation for quantitative evaluation, but in the face of the ambiguity of the complex system and the characteristics of high-dimensional data, it is necessary to further introduce the cloud integration model in order to realize the dynamic and intelligent evaluation and analysis.

2.3.1. Cloud theory:

1) Basic concept of cloud. A cloud is a model of uncertainty in the transformation between some qualitative concept described by linguistic values and its numerical representation, i.e., a model of uncertainty in the transformation between qualitative and quantitative.

Let U be a quantitative domain represented by exact numerical values, and C be a qualitative concept on U, if the quantitative value $x \in U$ and x is a one-time random realization of the qualitative concept C, the certainty of x on C $\mu(x) \in [0,1]$ is a random number with a stabilizing tendency:

$$\mu : U \to [0,\ \mathrm{I}\ ] \forall x \in Ux \to \mu(x) \tag{1}$$

Then the distribution of x over the domain U is called a cloud. The numerical characteristics of the cloud are characterized by three values of expectation E_x, entropy E_n, and hyperentropy H_e, which fully integrates ambiguity and randomness together, constituting a mapping of qualitative and quantitative to each other as a basis for knowledge representation.

2) Review of the Cloud Center of Gravity Critique Method. The cloud center of gravity judgment method is an evaluation method developed on the basis of cloud theory, which reacts to the system state information by measuring the expected value, and is able to organically combine the fuzziness and randomness of the complex system, and is easy to understand and easy to compute, but it also has certain problems, which are mainly manifested in the following four aspects: firstly, the index weight is often subjectively decided by human beings, which reduces the scientific nature of the model; secondly, it is Simply using the weighted deviation degree to judge the difference between the evaluation object and the ideal state, it is difficult to dig deeper into the intrinsic connection between the data, for the complex system, the model data processing capacity, especially for high-dimensional data processing ability is insufficient; Third, it is easy to activate the two rubric values of the cloud object at the same time and the activation degree is not a big difference between the two, which increases the uncertainty of the evaluation results; Fourth, the so-called judging The threshold value given for the difference in activation degree is completely determined artificially, which is too subjective and affects the objectivity of the evaluation results.

2.3.2. Cloud Integration Modeling:

1) The basic idea of cloud integration model. Drawing on the basic idea of the cloud center of gravity evaluation method, and in view of its problems, the cloud integration model is established by using the advantages of projection tracing in data processing and combining with the ordered sample clustering method to improve it. First, the cloud theory is used to find out the center of gravity of clouds in different states; then, the projection tracing method is used to downsize the high-dimensional data; finally, the ordered sample clustering method is used to classify the best projection values to determine the evaluation results. The model not only has the advantage of dealing with high-dimensional data, can be directly based on the data characteristics of the objective assignment, to avoid human subjective interference, and can be based on the objective function for intelligent classification, to exclude human interference, with multiple indicators clustering . The characteristics of temporal division and not destroying the original order of the samples solve the subjective interference of the traditional cloud center of gravity model evaluation. The results are uncertain and the problem of insufficient high-dimensional data processing capacity.

2) Steps of cloud-centered modeling:

(1) The cloud model representation of each indicator.

In the comprehensive evaluation index system of a given complex system, there are both exact numerical type representation and linguistic value to describe. Extracting n groups of expert evaluation results to form a decision matrix A, then n the exact numerical type of indicators can be represented by a cloud model. Among them:

$$E_x = \left(E_{x1} + E_{x2} + \cdots + E_{xn}\right) / n \tag{2}$$

$$E_n = \left(\max\left(E_{x1}, E_{x2}, \cdots, E_{xn}\right) - \min\left(E_{x1}, E_{x2}, \cdots, E_{xn}\right)\right) / 6 \tag{3}$$

At the same time, each linguistic-valued metric can be represented by a cloud model, so that a metric represented by n linguistic values (cloud models) can be characterized by a one-dimensional composite cloud. Among them:

$$E_x = \left(E_{x1}E_{n1} + E_{x2} + E_{n2} + \cdots + E_{xn}E_{nn}\right) / \left(E_{n1} + E_{n2} + \cdots + E_{nn}\right) \tag{4}$$

$$E_n = E_{n1} + E_{n2} + \cdots + E_{nn} \tag{5}$$

(2) A ρ -dimensional integrated cloud is used to represent the state of the system with p evaluation indicators. The ρ evaluation indicators can be inscribed by p cloud model, then the state of the system reflected by p evaluation indicators can be represented by a p dimensional integrated cloud. When the state of the system reflected by p evaluation indicators changes, the shape of this p -dimensional integrated cloud also changes, and then its center of gravity changes accordingly. Since the expected value reacts to the information center value of the corresponding fuzzy concept, i.e., the location of the said cloud center of gravity. Therefore, in this paper, the p -dimensional composite cloud is directly used to represent the cloud center of gravity position, which avoids the problem that the traditional cloud center of gravity evaluation method needs subjective assignment before calculating the cloud center of gravity position.

(3) Construct m cloud centers of gravity for different states and input them into the projection-seeking classification model for comprehensive evaluation. In this paper, the linguistic values of $m-1$ different rubrics are represented by the cloud model according to steps 1 and 2, and the cloud model of the system to be tested is assembled into m different states of p dimensional comprehensive cloud, and in this paper, we directly adopt the p dimensional comprehensive cloud to represent the location of the cloud center of gravity. The cloud center of gravity is input into the projection seeking classification model, and the genetic algorithm is used to solve the optimal projection direction a, and the p -dimensional composite cloud is downgraded to obtain the optimal projection values $z_j, j = 1, 2, \cdots, m$ for m different states, $j = 1, 2, \cdots, m$. The optimal projection values z_j are one-dimensional data that can be sorted from largest to smallest, where it is assumed that $z_1' > z_2' > \cdots > z_m'$. The specific steps of the projection-seeking classification model are described in the literature.

(4) Determine the system evaluation results using ordered sample clustering. The ordered sample clustering method is utilized to classify $\left(z_1', z_2', \cdots, z_m'\right)$$ into the class $K(K < m)$ $\left(G_1, G_2, \cdots, G_K\right)$.

Here define $D\left(G_j\right) = \sum\limits_{z_{j'}, z_{q'}} \in G_j d\left(z_j', z_q'\right)$, $\left(G_1^*, G_2^*, \cdots, G_K^*\right)$ is the optimal classification and satisfies the following optimization problem:

Classify $(z_{1'}, z_{2'}, \cdots, z_{m'})$ into $K(K < m)$ classes $(G_1, G_2, \cdots, G_K)$ using ordered sample clustering method. Error function minimization problem:

$$\min W(G) = \sum_{j=1}^{K} D\left(G_j\right) \tag{6}$$

Constraints:

$$s.t: K = m - 1 \tag{7}$$

Eq. (6) ensures the classification requirement that the points of the same kind are concentrated as much as possible and the points of different classes are dispersed as much as possible, and Eq. (7)

ensures that only the object to be tested will be clustered into one class with the corresponding rubric points without affecting the independence of other rubric points. As a result, the classification based on the sample point projection value z_j has an objective basis, realizing a completely objective and intelligent judgment, thus avoiding the phenomenon of activating two rubric values at the same time, which is easy to occur in the traditional cloud gravity judgment method, and also avoiding the problem of subjective classification.

2.4. Network Hierarchy Analysis

Although the cloud integration model optimizes the data processing capability, the scientific allocation of indicator weights still needs to rely on the network hierarchy analysis method (ANP) to further ensure the systematic and objective nature of the evaluation system.

2.4.1. Construction of ANP network structure. The first step is to determine the decision objectives and decision criteria based on the object of study. At this point, the determined criteria play the role of a bridge, which is subordinate to the goal for the upper part, while for the lower part, it is necessary to control a network structure separately, of course, if the quasi-measurement does not exist in special cases, only the goal needs to be set. The second step is to design the network layer, in which the set of elements in the network layer and the content of the elements are to be determined. This study is for the design of the evaluation system, so the set of elements in this study is the order parameter, and the element of the content is the evaluation index. The next analysis is similar to the AHP, and the use of surveys and other ways to determine the correlation between the elements.

2.4.2. Determination of weights for guidelines. In the process of determining the weights of the indicators, the mutual independence of each criterion leads to the determination of the weights in the same way as ANP, i.e., using two-by-two comparisons to resume the judgment matrix, followed by solving the matrix and normalizing the resulting matrix, and finally testing the consistency of the resulting matrix. Specifically:

1) Now assume that a_{ij} is the original data of judgment matrix, and assume that $\bar{b}_{ij}$ is the data of standard judgment matrix. Normalize the judgment matrix by columns to obtain the standard judgment matrix:

$$\bar{b}_{ij} = \frac{a_{ij}}{\sum_{k=1}^{n} a_{kj}} \tag{8}$$

2) Summing the standard judgment matrix by rows:

$$\bar{W}_i = \sum_{j=1}^{n} \bar{b}_{ij} \tag{9}$$

3) Normalize the resulting sum to find the corresponding weights:

$$W_i = \frac{\bar{W}_i}{\sum_{j=1}^{n} \bar{W}_i} \tag{10}$$

Subsequently, in order to determine the reasonableness of the matrix, the consistency test is to be performed on the matrix obtained, and the process is as follows:

1) Calculate the deviation consistency indicator CI :

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{11}$$

2) Find the random consistency indicator RI ;

3) Calculate the consistency scale factor CR:

$$CR = \frac{CI}{RI} \tag{12}$$

If the CR value is less than 0.1, it means that it passes the consistency test, and vice versa, it means that it does not pass the consistency test, i.e., there is a self-contradiction in the data of the previous judgment matrix, and the judgment matrix should be reconstructed.

2.4.3. Solving the supermatrix, calculating evaluation indicator weights. The next step is to calculate the supermatrix obtained by network hierarchical analysis to obtain the corresponding unweighted supermatrix, weighted supermatrix, and limit supermatrix, and ultimately determine the relative weight of each elemental indicator as well as the overall weight of each element in the whole system, which can be divided into the following steps:

1) Construct the unweighted supermatrix. The judgment matrix that has completed the feature vector normalization and the consistency test in the previous period is integrated, and all the matrices are formed into a large matrix, which is called the unweighted supermatrix. At this point, we assume that the indicators in the network layer is $C_1, C_2, \cdots, C_n$, at this time, the indicator group contains indicator $d_{i1}, d_{i2}, \cdots, d_{in}$, for the analysis of an element group, for example, where d_{jn} is a third-party criterion on the criterion of the criterion group C_i to carry out a two-by-two comparative analysis of the criterion to form a judgment matrix, and then use consistency test to test the judgment matrix, and the normalized eigenvectors, also known as weight vectors, is expressed as $\left(W_{i1}{}^{(jn)}, W_{i2}{}^{(jn)}, \cdots, W_{in}{}^{(jn)}\right)^T$. In the same way, we can Similarly, we can get the eigenvectors of other indicators and obtain a local matrix based on these weight vectors W_{ij}.

$$W_{ij} = \begin{bmatrix} W_{i1}^{(j1)} & W_{i1}^{(j2)} & \cdots & W_{i1}^{(jn)} \\ W_{i2}^{(j1)} & W_{i2}^{(j2)} & \cdots & W_{i2}^{(jn)} \\ \vdots & \vdots & \ddots & \vdots \\ W_{in}^{(j1)} & W_{in}^{(j2)} & \cdots & W_{in}^{(jn)} \end{bmatrix} \tag{13}$$

It is important to point out in this process that when there is no interaction between two groups of elements, at this point W_{ij} is 0. Along with this, all the local weight matrices obtained can be combined to obtain the unweighted supermatrix we are looking for.

$$W = \begin{bmatrix} W_{11} & W_{12} & \cdots & W_{1n} \\ W_{21} & W_{22} & \cdots & W_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ W_{n1} & W_{n2} & \cdots & W_{nn} \end{bmatrix} \tag{14}$$

2) Solve the weighted supermatrix. Similarly, we take an established indicator group as an example of third-party element C_j as a criterion, analyze its impact on other elements to form a judgment matrix, you can get its normalized eigenvectors, that is, the weight vector, assuming that the eigenvectors are expressed as $\left(v_{1j}, v_{2j}, \ldots, v_{Nj}\right)^T$, which also leads to the requested weighting matrix V.

$$V = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1N} \\ v_{21} & v_{22} & \cdots & v_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ v_{N1} & v_{N2} & \cdots & v_{NN} \end{bmatrix} \tag{15}$$

The weighted matrix $\bar{W}_i$ is the result of the multiplication of two matrices thought of as the weighted matrix and the unweighted supermatrix W, when $\bar{W}$ is the weighted supermatrix sought.

3) Limit supermatrix. Limit supermatrix is actually a weighted supermatrix in its own multiplication tends to infinitely many times after the process of obtaining an unchanging convergence limit value, and this limit value is certain not to change. At this point you can get the weighting of the indicators through the calculation of the limit supermatrix solution, that is, we are looking for the overall weight size.

In the process of calculating the super matrix to manage the tedious calculation process, so its manual calculation has a high degree of difficulty coefficient, so in the actual calculation process are through the Super Decisions software to realize the true calculation and solution.

Through the combination of ANP empowerment and cloud integration model, this chapter finally constructs a set of innovative talent cultivation evaluation system with both theoretical depth and practical value, which lays a methodological foundation for subsequent empirical research and policy optimization.

3. Network Hierarchy Analysis ANP model construction and validation

Based on the evaluation index system constructed in Chapter 2, this chapter introduces the network hierarchy analysis method ANP, which quantifies the dynamic association of each index through supermatrix analysis and provides theoretical support for weight allocation.

3.1. Consistency test of judgment matrices in ANP models

Since the two-by-two comparison judgment matrix in ANP is realized by making full use of the experience and judgment of the experts, which mainly depends on the experts' cognitive ability, knowledge and experience, personal preference, etc., which makes it impractical to require complete consistency for the matrix, because in the judgment matrix construction, the human being, as the main user of the data in the judgment matrix, the individual's degree of awareness, the complexity of the objective things and the scale used Limitations of the constructed judgment matrix does not achieve perfect transmission and complete consistency, but the requirement that the judgment matrix has a general consistency should be. There should be no such violation of common sense judgment as A is more important than B, B is more important than C and C is more important than A. Therefore, it is necessary to test the consistency of the judgment matrix. The characteristic root method is the best way to calculate the ranking of factors to derive the weights, but also to test the consistency of the judgment matrix.

According to the expert's judgment on the mutual influence of the indicators and their degree, the judgment matrix is constructed after comprehensive organization and analysis.

Through the calculation, we can get the consistency index of judgment matrix CI=0.006, and find the corresponding average stochastic consistency index RI=0.61, and the average stochastic consistency index of the positive and negative inverse matrices of order 1-10 is given in Table 2.

Table 2. Average random consistency index of 1-10 order matrix

Matrix phase	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49

Therefore, the consistency ratio CR of the judgment matrix:

$$CR = \frac{CI}{RI} = \frac{0.006}{0.52} = 0.011538 < 0.1$$

Therefore, the judgment matrix has satisfactory consistency and is acceptable.

3.2. Construction of ANP network structure and supermatrix analysis

Based on the ANP model structure constructed in Chapter 2, the control layer has no criterion layer only exists the target layer, that is, the goal of performance evaluation of traditional cultural innovative talents training, now we construct the ANP network layer structure about the evaluation index system of traditional cultural innovative talents.

3.2.1. Unweighted supermatrices. The unweighted supermatrix is derived by comparing the interactions of all the elements by two by two after considering the relationships between all the elements, the significance of which is that it can be analyzed how much the elements in a certain set of elements are ranked in terms of their influence on the sub-criteria. Each column in the matrix is the ranking weight of an element as a sub-criterion, i.e., the unweighted matrix is composed of the influence weights of the elements in each element set on the sub-criterion, and the unweighted supermatrix derived from the Super Decision software is shown in Table 3.

Table 3. Unweighted matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C1	0.000	0.167	0.576	0.102	0.062	0.230	0.798	0.212	0.614	0.540	0.091	0.580	0.293	0.048
C2		0.000	0.697	0.066	0.231	0.362	0.071	0.571	0.054	0.516	0.054	0.315	0.318	0.031
C3			0.000	0.634	0.635	0.044	0.013	0.712	0.853	0.138	0.042	0.098	0.366	0.634
C4				0.000	0.063	0.179	0.194	0.476	0.089	0.564	0.214	0.143	0.504	0.619
C5					0.000	0.141	0.237	0.252	0.043	0.011	0.098	0.524	0.073	0.089
C6						0.000	0.399	0.055	0.313	0.231	0.593	0.990	0.017	0.285
C7							0.000	0.399	0.955	0.313	0.231	0.593	0.090	0.017
C8								0.000	0.429	0.068	0.231	0.327	0.490	0.674
C9									0.000	0.162	0.275	0.039	0.096	0.072
C10										0.000	0.645	0.407	0.379	0.202
C11											0.000	0.683	0.252	0.208
C12												0.000	0.164	0.538
C13													0.000	0.263
C14														0.000

3.2.2. Weighted supermatrices. The unweighted supermatrix reflects the weights within the element set only, which requires the unweighted matrix to realize the weights of each element on the whole target by crossing the element sets. The relative importance weights of each element set are derived by comparing the element sets two by two, resulting in the element set weight matrices shown in Table 4. The significance of the element set matrix is to analyze the degree of influence of each element set on the sub-criteria.

Table 4. Weight matrix

	B1	B2	B3	B4	Scenario level
B1	0.307	0.171	0.045	0.307	0.503
B2	0.114	0.307	0.171	0.171	0.234
B3	0.045	0.086	0.307	0.114	0.129
B4	0.171	0.045	0.086	0.045	0.074
Scenario level	0.408	0.408	0.408	0.408	0.000

The weighted supermatrix is derived by multiplying the unweighted supermatrix by the weight matrix, and the weighted supermatrix is shown in Table 5. The significance of the weighted supermatrix is that it can be analyzed across the set of elements to determine the magnitude of the degree of influence of all elements on the parent element.

Table 5. Weighted supermatrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C1	0.000	0.136	0.113	0.097	0.072	0.048	0.025	0.063	0.054	0.069	0.088	0.091	0.084	0.060
C2	0.136	0.000	0.156	0.037	0.055	0.046	0.038	0.021	0.063	0.076	0.051	0.069	0.074	0.088
C3	0.113	0.156	0.000	0.056	0.040	0.129	0.068	0.075	0.119	0.037	0.041	0.063	0.027	0.076
C4	0.097	0.037	0.056	0.000	0.176	0.168	0.125	0.034	0.069	0.030	0.056	0.047	0.028	0.077
C5	0.072	0.055	0.040	0.176	0.000	0.206	0.128	0.031	0.069	0.056	0.020	0.016	0.046	0.085
C6	0.048	0.046	0.129	0.168	0.206	0.000	0.099	0.065	0.032	0.049	0.038	0.021	0.056	0.043
C7	0.025	0.038	0.068	0.125	0.128	0.099	0.000	0.145	0.027	0.078	0.056	0.068	0.064	0.079
C8	0.063	0.021	0.075	0.034	0.031	0.065	0.145	0.000	0.162	0.155	0.073	0.055	0.064	0.076
C9	0.054	0.063	0.119	0.069	0.069	0.032	0.027	0.162	0.000	0.183	0.024	0.059	0.056	0.083
C10	0.069	0.076	0.037	0.030	0.056	0.049	0.078	0.155	0.183	0.000	0.064	0.082	0.062	0.059
C11	0.088	0.051	0.041	0.056	0.020	0.038	0.056	0.073	0.024	0.064	0.000	0.152	0.168	0.169
C12	0.091	0.069	0.063	0.047	0.016	0.021	0.068	0.055	0.059	0.082	0.152	0.000	0.157	0.120
C13	0.084	0.074	0.027	0.028	0.046	0.056	0.064	0.045	0.056	0.062	0.168	0.157	0.000	0.114
C14	0.060	0.088	0.076	0.077	0.085	0.043	0.079	0.076	0.083	0.059	0.169	0.120	0.114	0.000

Table 5 demonstrates the mutual influence weights of each secondary indicator in the weighted supermatrix. The matrix integrates the relative importance of the cross-element set through the ANP method, reflecting the dynamic influence relationship of each indicator on the overall goal of traditional culture innovation talent cultivation.The weight of the C1 school policy support strength on the C2 curricular integration ratio is 0.136, which indicates that the policy support has a significant role in promoting the curriculum design; the weight of the number of awards of the C5 innovation contests on the number of students in the C6 cross-cutting fields is 0.206 , indicating that the results of the competition can effectively motivate students to participate in cross-field practice; the weight of the number of C11 interdisciplinary courses to the number of C12 digital laboratory construction is 0.152, which highlights the synergistic relationship between the curriculum and the construction of hardware resources.

The matrix reveals complex network relationships among indicators, such as the strong correlation between B2 practice indicators and B4 resource guarantee indicators, indicating that student practice needs to rely on the systematic support of teaching resources.

3.2.3. Limit supermatrices. According to the calculation process of limit matrix in section 2.4, it can be seen that the multiple self-multiplication of weighted supermatrix obtains the limit supermatrix, the significance of which is to analyze the global weights of all the elements on the total objective through the column vector of this matrix, and the global weight of each element represents the degree of influence of this element on the total objective. With the help of Super Decision software, the limit matrix about the evaluation of traditional culture innovation talents is derived, and the limit matrix is shown in Table 6. The elements of each row in the table are the same, and the matrix achieves a certain stability.

Table 6. Limit matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
C1	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069
C2	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061
C3	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073
C4	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078	0.078
C5	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103	0.103
C6	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077
C7	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071
C8	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072	0.072
C9	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
C10	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077
C11	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081

C12	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069
C13	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
C14	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047

Table 6 shows the limiting supermatrix, whose column vectors represent the global weights of each secondary indicator on the overall objective. All rows have the same value, indicating that the weight distribution is stable after the model converges. Among them, the global weight of C5 innovation competition winners is the highest, 0.103, indicating that the competition results are the core indicators of innovative talent cultivation; the weight of C11 interdisciplinary courses number is 0.081, and the number of C4 students' project participation is 0.078, which shows the direct impact of curriculum innovation and practical participation on talent cultivation; the weight of C14 traditional culture resource library calling frequency is the lowest, 0.047, which reflecting that the actual utilization rate of the resource library needs to be further improved. The result verifies the validity of the model and shows that the ANP assignment can objectively quantify the contribution of each index in the complex system.

3.3. Performance evaluation index weights of traditional culture innovation talents and result analysis

Through the above steps, the global weights of all elements, local weights, and the weights of each element set relative to the total objective can be derived, and the performance evaluation index system of traditional cultural innovation talents and the results of the assignment are shown in Table 7.

Table 7. Performance evaluation index system and empowerment results

Primary index	Concentration of elements	Secondary index	Local weight	Global weight
B1	0.203	C1	0.340	0.069
		C2	0.300	0.061
		C3	0.360	0.073
B2	0.329	C4	0.237	0.078
		C5	0.313	0.103
		C6	0.234	0.077
		C7	0.216	0.071
B3	0.217	C8	0.332	0.072
		C9	0.313	0.068
		C10	0.355	0.077
B4	0.251	C11	0.323	0.081
		C12	0.275	0.069
		C13	0.215	0.054
		C14	0.187	0.047

Table 7 synthesizes the local and global weights of the first-level indicators and their subordinate second-level indicators. Through the distribution of the weights of the first-level indicators, it can be seen that B2 student practice participation has the highest weight of 0.329, highlighting that students' active practice is the key path to the cultivation of innovative talents; B4 Teaching resource guarantee is next to the second, at 0.251, suggesting that resources such as interdisciplinary courses, digital laboratories and so on are the basis of supporting the practice; B1 Educational activities and B3 collaborative innovation weight 0.203 and 0.217 respectively, suggesting the need to strengthen policy support and industry-university-research cooperation.

Among the secondary indicators, the C5 innovation competition and the C11 interdisciplinary course are the top two, with weights of 0.103 and 0.081, respectively, indicating the importance of "competition to promote learning" and curriculum reform. The weights of the frequency of C3 innovation activities and the quotation of C10 traditional cultural elements were 0.073 and 0.077, respectively, indicating that traditional culture needs to be activated through high-frequency activities and technology integration.

4. Research on the evaluation method of innovative talent cultivation based on cloud modeling

Based on the ANP model to determine the weights of the indicators, Chapter 4 further applies the cloud integration model to verify the scientificity and applicability of the evaluation system through qualitative and quantitative fusion.

4.1. Qualitative Assessment Scale Construction Based on Cloud Modeling

4.1.1. Constructing qualitative assessment cloud scales. Set up a comment set consisting of 11 comments, according to S = {K: extremely poor, J: very poor, I: very poor, H: poor, G: poor, F: average, E better, D: good C: very good, B: very good, A: excellent} will be placed in the same coordinate system of the 11 comments on a continuous scale, and each language value is mapped to the interval of [0, 1], the construction of the cloud scale as shown in Figure 1.

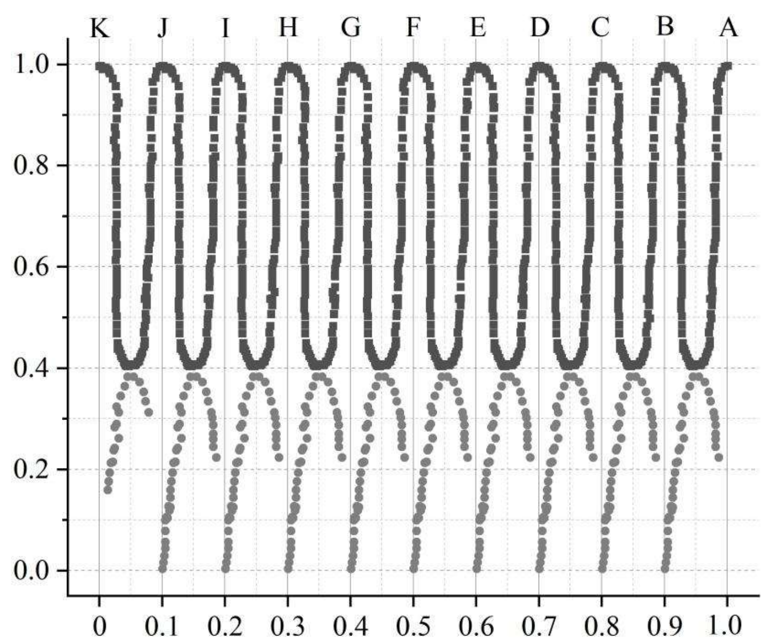

Fig. 1. Qualitative evaluation cloud ruler

4.1.2. Cloud Model Fusion. The cloud models of all evaluation indicators are placed in the same coordinate system to form a cloud cluster that reflects the activation intervals of both qualitative and quantitative indicators.

If there are m assessment messages in the assessment process, m cloud models representing m assessment messages are placed in the same coordinate system and form an m-dimensional cloud cluster reflecting the assessment results. The cloud clusters change as the assessment process changes. At any moment in time, the cloud clusters can activate the corresponding intervals. With multiple inputs at multiple time points, sampling points for different evaluation indicators can be obtained, so that the comprehensive cloud model for each performance indicator can be recovered inversely and compared with the cloud scale to obtain the evaluation results.

4.2. Validation of the effectiveness of the innovative talent evaluation method based on cloud modeling

Based on the constructed cloud scale, this section fuses each secondary indicator cloud model into a comprehensive cloud cluster, and finally realizes the verification of the overall effectiveness of the evaluation system through reverse generation and comparative analysis.

4.2.1. Clouds of secondary evaluation indicators. Placing each indicator cloud model in the same coordinate system, the traditional culture innovation talent evaluation indicator cloud cluster is shown in Figure 2.

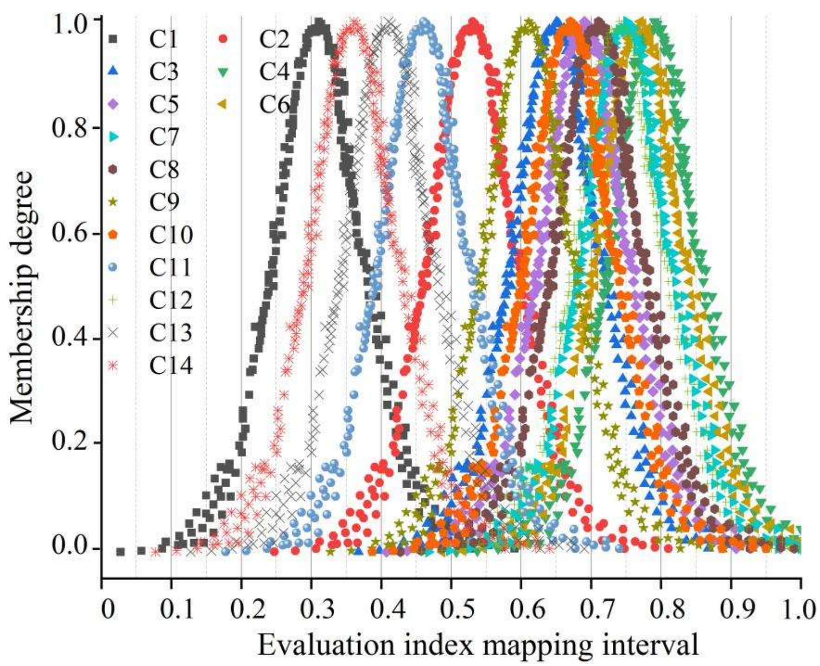

Fig. 2. Traditional culture innovation talent evaluation index cloud cluster

Any one of the indicators in this coordinate system can be activated at any time through multiple inputs at multiple time points to obtain the sampling point of the indicator. From Fig. 2, the mapping intervals of each evaluation indicator are C1 Policy strength of schools to support the integration of intelligent computing and traditional culture in innovation = 0.312; C2 Proportion of intelligent computing courses in which the instructor integrates elements of traditional culture into the classroom = 0.523; C3 Frequency of schools organizing innovative activities combining traditional culture and intelligent computing = 0.658; C4 Number of students' participation in traditional culture-themed intelligent computing projects = 0.823; C5 Number of awards won in innovation competitions based on traditional culture = 0.708; C6 Number of students joining student clubs in the cross-field of traditional culture and science and technology = 0.801; C7 Number of entrepreneurial cases using traditional wisdom to solve modern problems = 0.774; C8 Proportion of cases of digital protection of traditional culture and application of intelligent technology = 0.711; C9 Traditional crafts combined with Modern Technology = 0.610; C10 Frequency of Citation of Traditional Cultural Elements in AI Algorithm Design = 0.694; C11 Number of Interdisciplinary Courses on “Intelligent Computing + Traditional Culture” = 0.461; C12 Construction of Traditional Culture Digitization Laboratories or Research Centers Number = 0.770; C13 Proportion of faculty members with backgrounds in both traditional culture and intelligent computing = 0.413; C14 Frequency of calling traditional culture repositories in innovative teaching = 0.346.

The mapping intervals of C4 number of student project participation, C6 number of students in cross-cutting fields and C7 traditional wisdom entrepreneurial cases are high, respectively 0.823, 0.801 and 0.774, indicating that the effectiveness of student practice participation is significant, verifying B2, the core position of 0.329 weighting of students' practice; the mapping intervals of C14 frequency of resource library invocation, and the proportion of faculty members with dual backgrounds in C13 are low, 0.346 and 0.413, need to strengthen the integration of resources and teacher training; C8 digital preservation cases and C10 algorithm citation frequency show the initial integration of traditional culture and intelligent technology, but need to further expand the application scene.

4.2.2. Comprehensive cloud model for evaluating the indicator system. After analyzing the distribution characteristics of cloud clusters of each indicator, further integrating all cloud drops to generate a comprehensive cloud model, combining with the cloud scale to quantify the evaluation level, and completing the system validation from local to global. The sampling points of all evaluation indicators are regarded as cloud drops, and the numerical features Ex, En, He of the cloud model of the whole evaluation system are recovered in reverse as (0.5, 0.1, 0.2), so as to obtain the integrated cloud model of this evaluation indicator system as shown in Fig. 3.

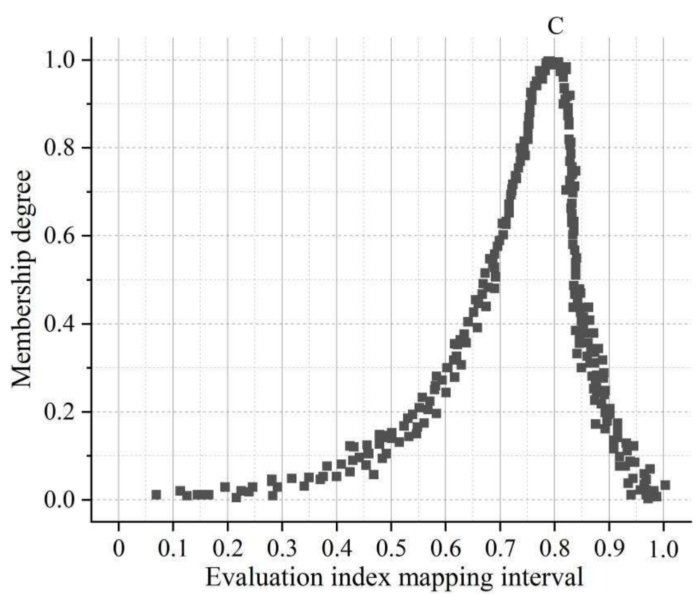

Fig. 3. Comprehensive cloud model for evaluating index system

Comparison of the comprehensive cloud model of the evaluation system with the qualitative assessment cloud scale resulted in an evaluation result: the assessment value of the evaluation system was 0.798, and the corresponding rating was C, which is a “very good” evaluation. However, the discrete distribution of the resource security indicators (C12-C14) suggests the need for targeted optimization to reduce system uncertainty.

5. Strategies for cultivating innovative talents rooted in traditional culture

Based on the construction and validation of the evaluation system of innovative talent cultivation in the previous section, this chapter combines the ANP empowerment results with the analysis of cloud model, and suggests that colleges and universities optimize the path of innovative talent cultivation in the following directions in response to the demand for the in-depth fusion of traditional culture and intelligent computing: firstly, to deepen the mechanism of interdisciplinary curricula and competitions, and to strengthen the practical ability of students; secondly, to promote the construction of digital laboratories by schools and enterprises, and to expand the application scenarios for the technology of traditional culture Third, improve the teacher structure and resource platform to enhance the utilization rate of traditional cultural resources for teaching.

1) Strengthen the interdisciplinary curriculum construction of "Intelligent Computing + Traditional Culture". According to the ANP weighting analysis, it is recommended that colleges and universities set up more cutting-edge courses integrating intelligent computing and traditional culture, combine the insufficient call of teaching resources shown in the comprehensive cloud model of Fig. 3, and simultaneously build a digital traditional culture resource base to enhance the accessibility and practicability of course content.

2) Competition-driven innovation ability enhancement. Based on the fact that C5 has the highest global weight, it is recommended to establish a regular innovation competition mechanism, integrate traditional cultural elements into intelligent algorithm design, digital protection of traditional crafts and other topics, and introduce enterprise propositions through industry-university-research cooperation, so as to form a practical ecology of "promoting learning and creation by competition".

3) Deepen collaborative innovation among industries, universities and research institutes. For the weight of B3 collaborative innovation, universities and enterprises are encouraged to build traditional culture digitization laboratories and promote joint research and development projects combining traditional crafts with modern technology. Combined with the C9 mapping interval in Figure 2, the scale of cooperation needs to be further expanded to improve the efficiency of results transformation.

4) Optimize Teacher Structure and Teaching Resources. In view of the insufficient integration background of teachers and the low frequency of resources, it is recommended to implement the "dual-teacher" teacher training program and develop an intelligent teaching platform to track the usage data of the resource pool in real time and dynamically optimize the allocation of resources.

6. Conclusion

This study constructs a multi-dimensional evaluation system of innovative talent cultivation by integrating intelligent computing and traditional culture elements, and verifies its scientific and practical value. It is found that students' practical participation in B2 has the highest contribution to the cultivation of innovative talents, with a weight of 0.329, among which the number of awards won in C5 innovation competitions, as a core indicator, has a global weight of 0.103, which highlights the importance of the mechanism of "promoting learning through competition". In addition, the synergistic effect of resource guarantee indicators such as C11 interdisciplinary courses and C12 digital laboratory construction, with weights of 0.081 and 0.069 respectively, indicates that teaching resources are the key foundation to support practical innovation.

The evaluation results based on the cloud integration model show that the activation intervals of practice-based indicators such as C4 student project participation and C6 number of cross-field clubs are high, with mapping intervals of 0.823 and 0.801, respectively, which verifies the effectiveness of the practice-oriented cultivation mode; while the indicators of C14 frequency of traditional culture resource library call and C13 ratio of dual background faculty members perform weakly, with mapping intervals of 0.346, 0.413, suggesting the need to strengthen the integration of resources and the cultivation of teachers' compound ability.

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