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From Cultural Symbol to Spatial Language: Two-Way Empowerment of Traditional Cultural Innovation Transformation and Talent Cultivation Mode in Architectural Spatial Design Education

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Abstract Current architectural space design education increasingly emphasizes the integration of traditional culture and innovative transformation, and promotes the reproduction of cultural values in the education system. At the same time, facing the complex employment environment and educational restructuring, institutions of higher education urgently need to build a scientific evaluation system and talent cultivation simulation model to realize the two-way synergistic development of cultural heritage and modern education. Taking architectural space design education as an entry point, this study proposes a combined empowerment method integrating AHP and CRITIC to construct a three-level talent cultivation evaluation index system covering resources, mechanisms and performance. At the subjective level, expert scoring and consistency test are carried out by applying the hierarchical analysis method (AHP), and the weight of the indicator “library resources” is extracted to reach 2.352. At the objective level, the standard deviation and correlation coefficient introduced by the CRITIC analysis method emphasize that the information content of the indicator “electronic database resources” is 145.851, which corresponds to a weight of 5.33%. Finally, the results of the two methods are combined by average weighting to derive the combined weights, and system dynamics is introduced to construct a simulation model to simulate the trend of talent output and innovation ability under different educational input conditions. The simulation experiment found that students' innovation ability showed faster exponential growth after the introduction of external knowledge sources. The results show that composite empowerment and dynamic modeling can effectively improve the scientific decision-making and cultivation efficiency of architectural space design education.

Index Terms AHP method, CRITIC analysis, system dynamics, architectural education, talent evaluation, innovation ability

I. Introduction

With the rapid development of urbanization, the demand for architectural space design talents is increasing, in this case, the educational model of architectural background provides a strong support for this [1], [2]. As the art design profession is a special discipline of technology and art, which should cultivate both rigorous logical thinking ability and creative thinking ability of students, the talent cultivation orientation of the art design profession in the context of architecture has become a new challenge [3]-[5]. Reasonable setting of art design professional teaching mode can fully stimulate the potential of students, give full play to their creative thinking ability, and provide new ideas for the human environment to solve social problems [6], [7].

Art design not only analyzes and solves specific environmental design problems through technical means, but also should solve the design problems of human habitat environment through the analysis of political, economic and cultural aspects. Traditional cultural symbols have a deep historical origin and cultural heritage, and are an important part of historical and cultural heritage and human civilization development [8], [9]. The development and change of architectural space design constantly promotes the innovation and evolution of traditional cultural symbols, while the richness and colorfulness of traditional cultural symbols provide a constant stream of inspiration and creativity for architectural interior design, and the two complement each other and jointly promote the process of cultural inheritance and the development of the times [10]-[13]. Therefore, it is important to explore the application of traditional cultural symbols in architectural space design, analyze its significance and specific application, in order to create a living space rich in cultural connotations and individual characteristics for people, and also strengthen the cultivation of architectural space design talents [14]-[17].

Under the background of accelerated reconstruction of global education structure, the education system of architectural space design, as a cross-discipline integrating art, humanities and technology, faces unprecedented challenges. The modern transformation of traditional culture is not only the process of content reconstruction, but also the innovation of methods and mechanisms. Higher education institutions not only need to incorporate cultural symbols in the teaching content, but also need to realize systematic upgrading in the system, resource allocation and talent assessment. Currently, the evaluation and feedback mechanism mostly relies on empirical judgment and lacks data-driven and structured logic, making it difficult to accurately identify shortcomings in the cultivation process. Therefore, the construction of quantifiable and simulatable talent cultivation model will become a key breakthrough in optimizing resource allocation and improving the quality of training in architectural education. Based on this research logic, this paper firstly applies the AHP method to construct a subjective hierarchical model, extracts key indicators from the three dimensions of resources, mechanism and performance, and ensures the reliability of the judgment results through consistency test. Second, the CRITIC method is applied to give objective weights to each indicator, fully considering the differences and conflicts of indicators. Third, the combination weights are derived by combining the two methods to construct a complete comprehensive evaluation model. On this basis, the principle of system dynamics is further introduced to establish a six-flow simulation system centered on “student flow, capital flow and knowledge flow” to predict and analyze the results under different cultivation strategies in the next three years. The study not only focuses on data evaluation, but also on structural linkage, and strives to establish a systematic feedback loop between mechanism optimization and talent innovation, so as to provide scientific support for the reform of architectural education.

II. AHP-CRITIC-based evaluation methodology

II. A. Calculation of Subjective Weights - AHP Hierarchical Analysis

First of all, the indicators to be evaluated are divided into a number of levels, and then according to the decision makers based on experience to judge, so as to give the indicator quantification, determine the relative importance of each factor in each layer of the relative importance of the weight coefficients, and finally calculate the relative weight of each indicator layer, so as to give the order of superiority and inferiority.

(1) Constructing hierarchical models

Firstly, the indicators are defined, and then the structure is divided according to the target layer, criterion layer and indicator layer, so as to construct the tree structure modeling system.

(2) Construction of judgment matrix

According to the relationship between the upper and lower levels, the indicators are scored in turn, with a score interval of 1-9 points. Thus, the judgment matrix B is established, see the following formula:

$$B=\{B_1,B_2,\cdots B_n\} \tag{1}$$

A matrix B was constructed based on the subjective judgment results, as shown in the following equation:

$$B=(b_{ij})_{n\times n}=\begin{bmatrix} b_{11} & b_{12} & \cdots & b_{1n} \\ b_{21} & b_{22} & \cdots & b_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ b_{n1} & b_{n2} & \cdots & b_{nn} \end{bmatrix} \tag{2}$$

When assigning a scale, only the importance indices of the two indicators are compared, and the results of the comparison need to check the table to determine the specific value.

(3) Verify consistency

Create matrix B as a judgment matrix. When matrix B meets the principle of consistency, the following formula will be satisfied:

$$\lambda_{\max=n} \tag{3}$$

Where n - the order of the matrix B.

In the study, the C.I. and order n are used to determine whether the study is consistent or not, see the following equation:

$$CI=\frac{\lambda_{\max}}{n-1} \tag{4}$$

The judgment matrix may have the existence of inconsistency in practical applications, and the error needs to be controlled within a certain range in practice [18]. The average random consistency indicator R.I. is used to judge.

The introduction of the indicator random consistency ratio C.R., see the following formula:

$$C.R.=\frac{C.I.}{R.I.} \tag{5}$$

(4) Subjective weight value calculation

Superimpose the results of each layer from top to bottom and multiply the corresponding weights of each layer to get the result.

Finally, the consistency testing step should not be ignored.

$$z_i=\frac{(\Pi_{j=1}^{n}b_{ij})^{1/z}}{\sum_{k=1}^{n}(\Pi_{r=1}^{n}b_{ij})^{1/z}} \tag{6}$$

When the matrices all satisfy the consistency test results, the weight vector Z is obtained:

$$Z_i=(z_{i1},z_{i2},z_{i3},\ldots,z_{in})^T \tag{7}$$

II. B.Objective weight calculation-CRITIC analysis method

CRITIC analysis is one of the methods for determining the objective weights of indicators.CRITIC analysis determines the objective weights based on the magnitude of changes and conflicts within the indicators. The standard deviation is used to indicate the difference of the same indicator, and the larger the standard deviation, the larger the weight [19]. The smaller the correlation coefficient is, the smaller the weights are.The CRITIC method takes into account the intensity of comparison between samples and the conflict between the indicators in the sample, so the results of the CRITIC method are more realistic.

The method performs weight assignment according to the following steps. First, assuming that there are a total of m samples, n indicators, the evaluation matrix can be expressed as:

$$B=\begin{bmatrix} b_{11} & b_{12} & \cdots & b_{1n} \\ b_{21} & b_{22} & \cdots & b_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ b_{n1} & b_{n2} & \cdots & b_{nn} \end{bmatrix} \tag{8}$$

The weights of the indicators in the CRITIC method are calculated as follows:

The indicators are normalized.

For the larger and better indicators by formula (9):

$$c_{ij}=\frac{b_{ij}-\min_j(b_{ij})}{\max_j(b_{ij})-\min_j(b_{ij})} \tag{9}$$

For the smaller is better indicator via equation (10):

$$c_{ij}=\frac{\max_j(b_{ij})-b_{ij}}{\max_j(b_{ij})-\min_j(b_{ij})} \tag{10}$$

The normalization matrix C is obtained through the normalization process.

Calculate the mean a_j and standard deviation s_j :

$$\bar{b}=\frac{1}{m}\sum_{i=1}^{m}b_{ij} \tag{11}$$

Calculate the coefficient of variation:

$$\sigma_j=\frac{s_j}{b_j} \tag{12}$$

Calculate the correlation matrix:

$$\rho_{ij} = \frac{\mathrm{cov}(b_k, b_l)}{s_k s_l}, k = 1,2,...,n; l = 1,2,...,n \tag{13}$$

Calculate the amount of information contained in each indicator:

$$\eta_j = \sigma_j \sum_{k=1}^{n} (1 - \rho_{ij}), j = 1,2,\ldots,n \tag{14}$$

Determine the objective weights of the indicators and form a weight matrix:

$$\beta_{ij} = \frac{\eta_{ij}}{\sum_{i=1}^{n} \eta_{ij}}, j = 1,2,\ldots,n \tag{15}$$

$$W = [\beta_1, \quad \beta_2, \quad \cdots, \quad \beta_n] \tag{16}$$

II. C.Determination of composite weights for indicators

In order to reflect the subjective and objective weights at the same time, the AHP method is used for the subjective approach and the CRITIC method is used for the objective approach to model the variance coefficients so as to determine the coefficients in the combination weights, where $w = aw' + aw''$ and α, β are the coefficients to be determined to satisfy: $\alpha, \beta \geq 0, \alpha + \beta = 1$ [20].

The combined weight coefficients of the indicators are determined using the difference method as follows: $\alpha = [n/(n-1)]T'$ where T' is the coefficient of variation of the components of w' and $T' = \frac{2(1P_1 + 2P_2 + \cdots + nP_n)}{n} - \frac{n+1}{n}, P_1, P_2, \cdots P_n$, is a rearrangement of the components in the subjective weight vector w' from the smallest to the largest, with n being the indicator number of indicators, then $\beta = 1 - \alpha$, and substituting $w = aw' + aw''$, we obtain the composite weight vector w for each indicator.

III. Establishment and experimentation of talent training evaluation system

III. A. Design of indicators

According to the analysis of the system model, the evaluation index system is constructed for the system operation as a whole, and the first-level indexes mainly include the resource support subsystem of cultivation, the mechanism guarantee subsystem, and the cultivation performance and evaluation subsystem.

Resource support can be specific for human, material, financial, information resources, technical resources, cultural resources, etc., while human input mainly includes: student source, teacher structure, etc., and manpower is the main body of energy driving the system and the object of cultivation. Physical resources can be specific for teaching equipment, book resources, electronic book database, and related network platform resources, etc. Financial resources can be mainly specific for cultivation funds, per capita cultivation funds, etc. Information can be specific for demand information, network information and policy information.

Mechanism guarantee mainly includes three aspects: incentive guarantee, system guarantee and supervision guarantee. Incentive is one of the driving forces to promote the development of the system. Institutional guarantee includes: system and planning in teaching, management, evaluation, training, incentive and supervision. Supervision guarantee is a condition to guarantee the effective operation of the cultivation process, which can be specified as some specific guarantee measures. The comprehensive evaluation index system is shown in Table 1.

Table 1: Comprehensive evaluation index system

Primary indicator	Secondary indicator	Tertiary index
Resource subsystem	Source condition (AA)	Source adequacy (AA1)
		Admission of excellent students (AA2)
		Study abroad (AA3)
	Teacher status (AB)	Specific teacher proportion (AB1)
		Dedicated teacher age (AB2)

		Professional title (AB3)
		Special teacher degree (AB4)
		A teacher with a composite ability (AB5)
		Normal ratio (AB6)
	Material resources (AC)	Teaching equipment (AC1)
		Book resources (AC2)
		Electronic database technology and resources (AC3)
	Financial resources (AD)	Training fund (AD1)
		Per capita culture fund (AD2)
	Yield and study conditions (AE)	Cooperation with research unit (AE1)
		National or local key laboratory (AE2)
		Innovation center (AE3)
		School enterprise training base (AE4)
Mechanism subsystem	Incentive guarantee (BA)	Psychic motivation (BA1)
		Material excitation (BA2)
	Institutional security (BB)	Development planning (BB1)
		Implementation plan (BB2)
		Operational planning (BB3)
		Culture concept (BB4)
		Evaluation scale (BB5)
	Supervision and assurance (BC)	Government oversight (BC1)
		Social supervision (BC2)
		Enterprise supervision (BC3)
		Campus supervision (BC4)
Performance subsystem	Student (CA)	Student composite quality evaluation (CA1)
		Superior proportion (CA2)
		Student employment (CA3)
		Student awards (CA4)
	Teacher (CB)	Teacher's education (CB1)
		Participate in high-level academic discussion (CB2)
		Expert team situation (CB3)
		Academic achievements and awards of teachers (CB4)
	Teaching (CD)	Material quality (CD1)
		Feedback on teaching (CD2)
	The results and social influences of the production and research (CE)	Major project participation (CE1)
		The number of awards above the provincial level (CE2)
		Iconic results (CE3)

III. B. Comprehensive evaluation index system based on the combination of AHP and CRITIC assignment method

III. B. 1) AHP method weights

The results of the weights of the hierarchical analysis method are shown in Table 2. From the table, it can be seen that the maximum eigenvalue is 47. AC2 has the highest weight share of 2.352, which shows the perceived importance of library resources in talent development.

Table 2: The weight of the hierarchy process

Term	Eigenvector	Weight value (%)	Maximum eigenvalue	CI value
AA1	1.036	2.192	47	0
AA2	1.029	2.177		
AA3	1.069	2.281		
AB1	107%	2.28		
AB2	1.054	2.261		
AB3	1.071	2.25		
AB4	1.091	2.318		
AB5	1.072	2.258		
AB6	1.067	2.271		

AC1	1.094	2.298		
AC2	1.114	2.352		
AC3	0.756	1.602		
AD1	1.04	2.207		
AD2	1.012	2.161		
AE1	0.356	0.76		
AE2	0.936	1.986		
AE3	1.044	2.228		
AE4	1.044	2.212		
BA1	1.041	2.211		
BA2	1.058	2.261		
BB1	0.219	0.46		
BB2	1.041	2.197		
BB3	1.058	2.256		
BB4	1.106	2.345		
BB5	1.062	2.283		
BC1	1.034	2.202		
BC2	0.893	1.914		
BC3	1.065	2.262		
BC4	1.076	2.303		
CA1	1.067	2.277		
CA2	1.063	2.264		
CA3	0.996	2.123		
CA4	1.065	2.262		
CB1	1.062	2.261		
CB2	1.008	2.109		
CB3	1.038	2.212		
CB4	0.974	2.053		
CD1	0.989	2.103		
CD2	0.979	2.092		
CE1	0.988	2.11		
CE2	1.031	2.203		
CE3	1.062	2.254		
CE4	1.016	2.173		
CE5	1.049	2.219		
CE6	1.012	2.162		
CE7	1.014	2.161		
CE8	1.024	2.17		

The randomized consistency RI is shown in Table 3.

Table 3: Stochastic consistency RI

n-stage	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RI value	0.4998	0.8675	1.1306	1.2445	1.3591	1.4123	1.4791	1.507	1.5242	1.5368	1.5517	1.582	1.6005	1.5965
n-stage	17	18	19	20	21	22	23	24	25	26	27	28	29	30
RI value	1.6075	1.6129	1.6181	1.6486	1.6305	1.6381	1.6468	1.6356	1.6761	1.6558	1.6432	1.6628	1.6681	1.6587
n-stage	31	32	33	34	35	36	37	38	39	40	41	42	43	44
RI value	1.657	1.6983	1.6862	1.6852	1.6774	1.6979	1.6907	1.6936	1.6699	1.6973	1.7137	1.6817	1.6836	1.6761
n-stage	45	46	47	48	49	50	51	52	53	54	55	56	57	58

RI value	1.681	1.7172	1.7126	1.6965	1.7367	1.7094	1.7277	1.7153	1.7309	1.6943	1.7078	1.6906	1.7154	1.6963

The results of the consistency test are summarized in Table 4.

Table 4: Consistency test results

Maximum characteristic root	CI value	RI value	CR value	Consistency test results
47	0	1.709	0	pass

III. B. 2) CRITIC method weights

The results of the CRITIC weight calculations are shown in Table 5.

Table 5: The calculation of the weight calculation

Term	Index Variability	Index Conflict	Information	Weighting (%)
AA1	2.669	25.073	66.238	2.31
AA2	2.704	23.623	62.6	2.25
AA3	2.687	24.62	65.315	2.26
AB1	2.583	24.384	61.667	2.25
AB2	2.443	21.394	53.392	2.02
AB3	2.453	21.96	54.546	1.93
AB4	2.289	23.673	55.369	2.06
AB5	2.326	27.202	63.715	2.45
AB6	2.248	24.211	54.833	1.93
AC1	2.546	22.777	56.989	2.15
AC2	2.531	24.194	61.183	2.05
AC3	3.453	42.666	145.851	5.33
AD1	2.58	25.103	63.891	2.38
AD2	2.473	27.616	67.973	2.57
AE1	1.303	44.6	57.397	2.13
AE2	2.974	29.956	88.931	3.23
AE3	2.411	23.879	57.141	1.95
AE4	2.502	22.844	57.526	1.95
BA1	2.514	20.179	50.436	1.93
BA2	2.41	23.134	55.128	1.83
BB1	0.433	39.686	17.895	0.64
BB2	2.691	22.693	60.147	2.17
BB3	2.648	21.274	56.148	2.17
BB4	2.546	22.471	56.526	2.08
BB5	2.529	19.792	49.619	1.72
BC1	2.454	22.554	55.638	1.9
BC2	2.724	29.528	80.201	2.68
BC3	2.431	21.723	52.878	1.91
BC4	2.449	19.741	47.116	1.62
CA1	2.565	21.234	54.478	1.81
CA2	2.372	22.549	53.344	1.84
CA3	2.322	23.324	54.081	2.1
CA4	2.51	21.414	54.192	1.99
CB1	2.548	18.814	47.417	1.82
CB2	2.457	22.445	54.145	1.9
CB3	2.478	22.907	56.512	1.99
CB4	2.6	24.546	63.677	2.33
CD1	2.484	21.594	53.231	2.06
CD2	2.479	24.81	62.446	2.22
CE1	2.442	21.466	51.444	1.88
CE2	2.504	21.307	52.87	1.83
CE3	2.523	21.738	54.436	1.87
CE4	2.456	22.067	54.79	1.94
CE5	2.471	20.88	51.735	1.95
CE6	2.497	23.824	59.659	2.12

CE7	2.398	25.241	60.774	2.24
CE8	2.526	24.985	63.197	2.26

III. B. 3) Combined AHP and CRITIC based assignment method weights

In this study, the weighted summation method is utilized to sum up the weights based on the AHP method and CRITIC method respectively according to the formula: weight = (AHP weight + CRITIC weight)*0.5, and the results of the weights of the combined assignment method are shown in Table 6. Then the comprehensive evaluation score can be expressed by the following formula: F=AA1*2.25%+AA2*2.21% ......CE8*2.22%.

Table 6: Combined empowerment

Variable	Weighting	Variable	Weighting
AA1	2.25	BC1	2.05
AA2	2.21	BC2	2.30
AA3	2.27	BC3	2.09
AB1	2.27	BC4	1.96
AB2	2.14	CA1	2.04
AB3	2.09	CA2	2.05
AB4	2.19	CA3	2.11
AB5	2.35	CA4	2.13
AB6	2.10	CB1	2.04
AC1	2.22	CB2	2.00
AC2	2.20	CB3	2.10
AC3	3.47	CB4	2.19
AD1	2.29	CD1	2.08
AD2	2.37	CD2	2.16
AE1	1.45	CE1	2.00
AE2	2.61	CE2	2.02
AE3	2.09	CE3	2.06
AE4	2.08	CE4	2.06
BA1	2.07	CE5	2.08
BA2	2.05	CE6	2.14
BB1	0.55	CE7	2.20
BB2	2.18	CE8	2.22
BB3	2.21		
BB4	2.21		
BB5	2.00		

IV. Simulation study of talent training model based on system dynamics

IV. A. Principle of Talent Cultivation Mode Simulation Modeling

The simulation model of talent cultivation mode in architectural space design education is mainly based on the principle of system dynamics, which integrates the behaviors and decision-making rules of enrollment, talent cultivation, specialty setting and employment into a network of talent cultivation mode, and then establishes a system simulation model with open information feedback. The simulation model takes student flow, capital flow, equipment flow, knowledge flow, material flow and information flow as the basic flow, and finds out the reasons for the change of knowledge structure and skill structure of talents by changing the network structure composed of cultivation decision rules, and then finds out the reasons for the structural difference between talent cultivation and employment demand. The basic structure design of the simulation model is shown in Figure 1.

IV. B. Simulation Model of Talent Cultivation Mode in Architectural Space Design Education

IV. B. 1) Principles of simulation model design based on system dynamics

The simulation model of talent cultivation mode based on system dynamics is to establish a talent cultivation system model by taking professional enrollment, talent cultivation and graduate employment as sub-systems, which is a systematic simulation method that combines the behavioral decision-making of talent cultivation with the intrinsic mechanism of education for talent cultivation. The simulation model will simulate a set of closely related behaviors and decision-making rules of education and labor market to form a network, find out the complex causal relationship between college enrollment, talent training and graduate employment by changing the input data flow of the simulation system, and find out the characteristics and weaknesses of the current professional teaching, so as to guide the deepening of the reform of the professional education, teaching and management, and combine with the characteristics of the development of the society and the employment to cultivate qualified graduates who are suitable for the social needs and the needs of enterprises and institutions. In addition, it can cultivate qualified physical education professionals who are suitable for the social demand and the demand of enterprises and institutions.

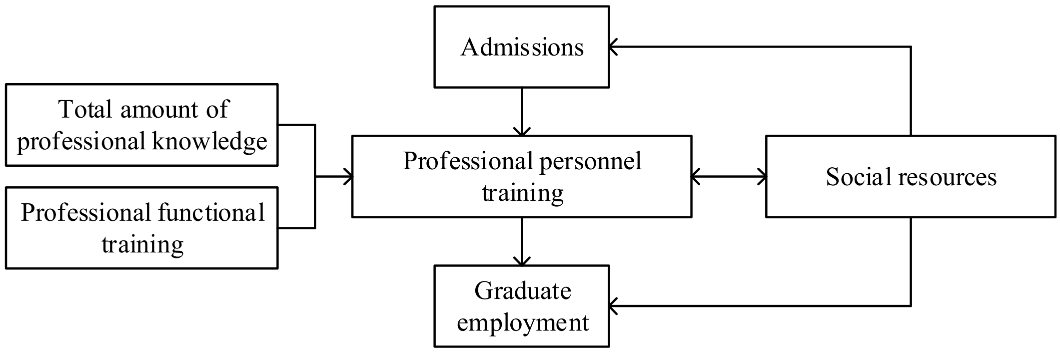


Figure 1: Schematic diagram of the basic structure design of the simulation model

IV. B. 2) Talent cultivation mode simulation model system

The key to establish the simulation model of talent cultivation mode based on the principle of system dynamics is to establish an appropriate simulation model system. According to the characteristics of talent cultivation mode in architectural space design education, the model system combining social capital and employment market contains six basic flows, which are student flow, capital flow, equipment flow, knowledge flow, material flow and information flow.

IV. B. 3) Simulation Modeling Algorithm

The ultimate purpose of establishing the simulation model based on system dynamics is to apply the computer simulation results of the process of talent training strategy and behavioral strategy of college sports professionals to obtain coordinate images and two-dimensional icons. According to the operation mechanism of the simulation model to design the basic DYNAMO equation of the model, the level equation (L equation) of the simulation model is specifically formulated as follows:

$$L_1 \cdot K = L_1^* J + DK^* (R_i \cdot JK - R_o \cdot JK) \tag{17}$$

In Eq. (17), the level variable L is the cumulative quantity variable, the rate variable R is the cumulative quantity variable, the

DK and JK are auxiliary variables.

The rate equation (R equation) of the simulation model is specified as follows:

$$R_1 \cdot KL = f(L_1 \cdot K, A_1 \cdot K, \ldots) \tag{18}$$

In Eq. (18), the level variable L and the rate variable R are product variables, and K and A are auxiliary variables.

The auxiliary equation (A equation) of the simulation model is specified as follows:

$$A_1 \cdot K = g(L_1 \cdot K, A_2 \cdot K, R_1 \cdot JK, \ldots) \tag{19}$$

The initial value of C is assigned to 47 and the initial value of L_1 is 31 based on the actual enrollment and employment in architectural space design education.

The basic steps for running the simulation model built based on system dynamics are as follows:

Step 1: Input the program and input the raw data.

Step 2: Calculate and output the number of physical education students graduating in the next three years according to the initial parameter design values.

Step 3: Adjust the enrollment coefficient and the social resource coefficient of colleges and universities to observe the changes in the number of students graduating in the next three years.

Step 4: Adjust the coefficient of total college knowledge and the coefficient of professional skill training to observe the change in the number of students graduating in the next three years.

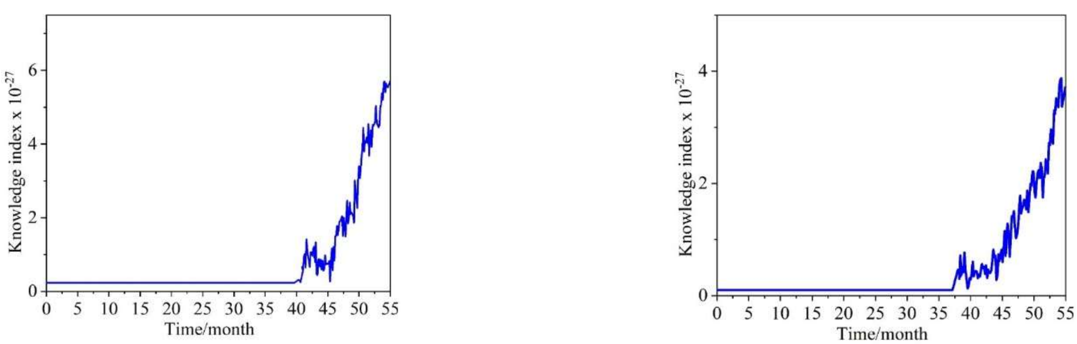
Step 5: Determine the target value of the number of students graduating in the next three years, adjust the coefficients of each product and observe the change in results.

Step 6: Repeat the cycle of Steps 3 to 5 until the simulation obtains the best BRF value, and formulate a reasonable strategy for social resource utilization and talent cultivation in colleges and universities.

IV. C. Simulation Experiments

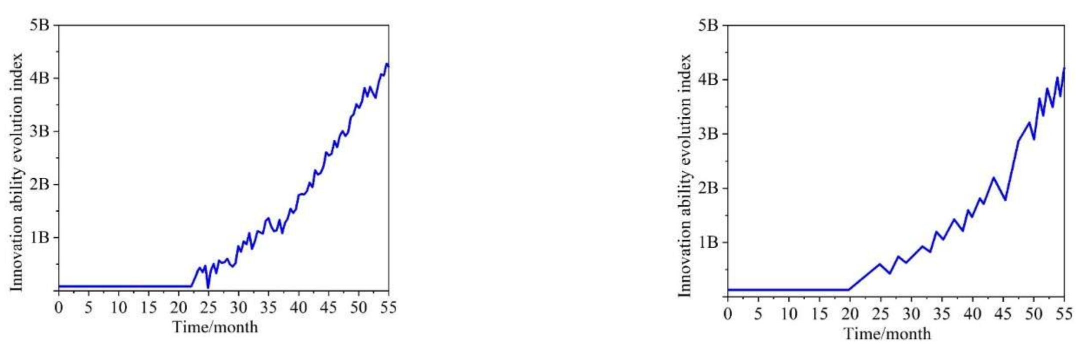
In this section, we select the employment data of students in social education of architectural space in a school from 2020 to 2023 and complete the simulation experiment using VENSIM software. If the students' research knowledge reserve is 0, the model's innovative ability and knowledge base development trend is relatively smooth, and there is no significant difference from the innovative ability and knowledge base development trend in the conventional value condition. The evolution of innovation ability is more sensitive to changes in the diversification level of external shared knowledge sources, and increasing the diversification level of external knowledge sources can effectively enhance the rate of innovation ability.

The comparison of knowledge accumulation under external knowledge sources and normal values is shown in Figure 2 (Figure a is with external knowledge sources and Figure b is normal values). The comparison of the evolution of innovation capability under external knowledge source and normal value is shown in Fig. 3 (Fig. a is with external knowledge source and Fig. b is normal value). As shown in Figures 2 and 3, as the external knowledge source approaches 0, the rate of innovation capability improvement slows down significantly, but still maintains the exponentially increasing correlation to the ephemeral accumulation of knowledge. Compared to innovation ability, the impact of diversified external shared knowledge sources on ephemeral accumulation of knowledge is significantly characterized as lower than that on innovation ability, precisely demonstrating the intrinsic dynamic association between students' knowledge accumulation and innovation ability.



(a) It has an external knowledge source (b) Normal value

Figure 2: The comparison of knowledge and knowledge accumulation under normal value



(a) It has an external knowledge source (b) Normal value

Figure 3: The external knowledge and the innovation ability of the normal value to evolve contrast

The schematic diagram of the tendency of the evolution of the innovative ability of talents is shown in Figure 4. From the figure, it can be seen that the evolution of students' innovation ability shows a typical exponential growth characteristic. Innovative ability will increase with the increase of knowledge accumulation level, and has a critical scale effect. Innovative ability increases at a faster rate compared to the growth rate of knowledge accumulation level, that is, the response of knowledge accumulation over time to innovative ability shows an incremental marginal contribution. Under the premise of learning in the key laboratory and the continuous enhancement of knowledge base and innovation ability, students utilize the knowledge internal and external sharing mode to explore knowledge and get more new knowledge, which highlights the substantial role of this paper's methodology in the cultivation of innovative talents. Generally speaking, the theory of cultivation mode in this paper can well simulate the operation mode of cultivation mechanism and quickly obtain more accurate cultivation results, which is of great practical significance.

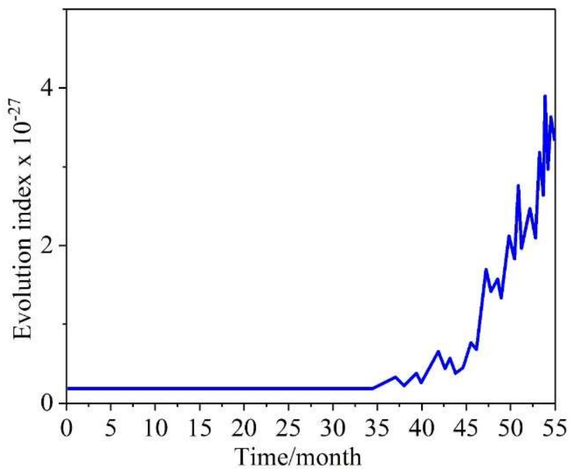


Figure 4: The development of talent innovation is a schematic

V. Conclusion

The weight of library resources in this study amounted to 2.352, showing that they are at the center of the training system. The simulation experiment further shows that after increasing the knowledge reserve correlation coefficient while keeping the enrollment coefficient unchanged, the number of students graduating rises significantly, with a three-year average growth rate of 14.6%. After the introduction of external knowledge sources, the growth rate of students' innovation ability index is about 19.3% higher than that under the condition of no external input, which reflects the significant effect of the sharing mechanism on the improvement of talent quality. In addition, the CRITIC analysis shows that the information volume of electronic database resources is 145.851, with the highest degree of index conflict, indicating that it has significant differences in practical teaching applications and is an important direction for optimizing resource input. The finally constructed simulation model accurately simulates the dynamic relationship between students' knowledge accumulation and innovation ability, with high practical operability and prediction ability. The results show that the dual-core path based on the combination of the AHP-CRITIC composite empowerment method and the system dynamics model can effectively identify the priority improvement points in the educational structure, and enhance the scientific, prospective and systematic nature of the cultivation of architectural design talents.

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