Publication Date: 15 May 2024
Archs Sci. (2024) Volume 74, Issue 2 Pages 159-167, Paper ID 2024222.
https://doi.org/10.62227/as/74222

Joint Innovation of Higher Education Management and Student Training Mechanisms Based on the Association Matrix

Zhenfang Yang[1,*]
[1]School of International Business, Jiangsu Vocational College of Tourism, Yangzhou, Jiangsu, 225000, China.
Corresponding authors: (e-mail: jslyswyzf@126.com).

Abstract With the continuous development of the times, the transformation and reform of higher education has brought many problems. In this paper, we carry out research on the transformation of higher education, put forward the educational reform path based on the theory of organizational experiment, improve the higher education management model based on the three-dimensional integration, and construct the campus education management system based on the multilayer network by combining with the needs of campus management. On this basis, an evaluation model oriented to multilayer network is established by using association matrix and probabilistic transformation, which is utilized to evaluate the system, and comparative education management experiments are designed to test the application effect of the constructed system. In this paper, the response time of the educational management system using multilayer network is 0.35 0.80s, which is about 0.45s faster than that of the traditional system, and about 0.26s faster than that of the single-layer network controller.The students using this educational management system have improved their interest cultivation, innovation ability, cooperation ability, and scientific attitudes in comparison with the pre-application ones, which are 3.534, 2.452, 2.721, and 2.51, respectively, 2.721 and 2.51.The higher education management model proposed in this paper can have the ability to improve students' competence level and provides an effective path for the reform of higher education management.

Index Terms organizational test theory, trinity, correlation matrix, assessment model, educational management

I. Introduction

With the current higher education from elite education to mass education, more and more higher education audience groups flock to university campuses. Higher education is an important way to implement the training of talents, but also the main link to cultivate innovative talents, in the rapid development of the times advanced technology and all walks of life to carry out a comprehensive integration of higher education management and student training mechanism innovation has become a necessary way to promote the development of education [1]–[3]. Higher education needs to constantly adapt to the development of the times to innovate the teaching mode, update the teaching concept, and adjust the education and teaching system.

Educational management is a basic content of the management system of higher education institutions, and it is a key factor in determining the comprehensive management level of the school. The level and implementation quality of educational management will not only affect the comprehensive management ability of the school, but also cause obvious impact on the development of the school [4]–[6]. Educational management is a very routine management activity in higher education institutions, but it has a direct connection with the level of school education, development trends, management capacity and other factors. The basic goal of educational management is to realize the innovation of educational management and to give full play to the best performance of educational management, and the effective implementation of educational management can promote higher education institutions to realize the new curriculum reform, effectively promote the work of "assessment to promote the construction, assessment to promote excellence, construction, management, and reform and enhancement", and it has an important value for the school to comply with the development of the times and to improve the comprehensive management ability [7]–[10].

In this case, quantitative expansion and qualitative assurance have become popular topics in the research of education and teaching theory. The correlation matrix method is characterized by the fact that it makes it easy to accept the mathematization of the thinking process of evaluating complex system problems, and simplifies and clarifies the evaluation process by decomposing the multi-objective problem into a comparison of the importance of two indicators [11]–[13]. The correlation matrix method is a combination of quantitative and qualitative methods, which can be used to comprehensively assess the degree of superiority or inferiority of each scheme from a multi-objective system scheme through the weighting factors in the system scheme, and display it in an intuitive numerical way. Correlation matrix method according to different evaluation programs, using the matrix form, determine the evaluation weighting factors and evaluation index system, and then calculate a comprehensive evaluation value for each system program - the evaluation of each system program weighted sum. The one with the highest integrated evaluation value is the optimal alternative among the system programs [14], [15].

The rapid development of information technology and the comprehensive application of modern teaching methods in the process of education has made higher education schools gradually begin to reflect the trend of modernization, and the implementation of education management and student training mechanism innovation is conducive to promoting the further realization of the modernization of school management [16], [17]. Education management informatization is a prerequisite for the construction of education modernization, and modernization is also the inevitable trend of the future development of higher education schools, schools should actively apply network information technology to all aspects of the development and construction process, penetrate into the management and teaching of all parts of the value of information technology to give full play to the value of information technology, to ensure that the modernization of the technology and means of application at the same time to play their own role [18]. The value of information technology is fully utilized to ensure that modern technology and means can be applied and play their own role.

This paper is oriented to the management of higher education, discusses the interactive relationship between the organizational innovation of higher education and the transformation of higher education, and proposes a path for the application of organizational experiment theory in the transformation of educational management. And then according to the mechanism of higher education on student cultivation to build based on the trinity of education management model. Aiming at the safety and management efficiency in campus management, a university education management system based on multilayer network is established. Aiming at the performance of the system, a comprehensive system evaluation model is constructed by utilizing correlation matrix and probabilistic transformation. Finally, through the empirical analysis of the higher education management system and teaching management model constructed in this paper, the actual effect of this paper's method in promoting the transformation of education management and student cultivation is examined, and practical methods and paths are provided for the transformation and development of education management in colleges and universities.

II. Education Management System Based on Student Training Mechanism

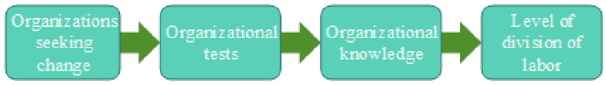

Figure 1: Organization test and organizational change relationship

A. Educational Innovation Paths Based on Organizational Experimentation Theory

The transformation of higher education management is a systematic process involving conceptual change, academic order change, and organizational restructuring, etc., in which the changes of key elements as well as the friction between them are full of uncertainty and heterogeneity, so there is not a theoretically perfect reform logic. Therefore, this paper proposes a new reform method based on the theory of organizational experimentation. The relationship between organizational change and organizational experimentation is shown in Figure 1, the logical line of organizational change or evolution, i.e., in the process of seeking change, an organization needs to generate organizational knowledge about the division of labor information by conducting organizational experimentation, and effective organizational knowledge determines the level of the division of labor, i.e., the direction and success or failure of organizational change. In the relationship between educational management innovation and university transformation in higher education based on the theory of organizational experimentation, organizational transformation is a change in the nature, function and structure of the organization. There are different views on the connotation of change, based on the background, the way of change, and the content. This paper focuses on the context of transformation, emphasizing the "organizational transformation crisis theory", organizational transformation should be a change in response to the crisis state, and in terms of the transformation of local higher education, the dilemma is commonly referred to as the resistance to transformation is too large and is more likely to fall into a cycle of failure.

The interaction between organizational innovation in colleges and the transformation of colleges is shown in Figure 2. In the process of higher education transformation, college organizational innovation in a certain sense has the significance of organizational experimentation that influences the process of college reform. The transformation of colleges and universities inherently includes the renewal of the organization in function and the improvement in structure, and the nature and operation status of the college organization can reflect the degree of realization of the functions of a university and the structural advantages and disadvantages of the university organization system. Thus, the transformation of universities is always directly related to the organizational innovation of colleges at the organizational level. It can be considered that the organizational innovation of second-level colleges can be regarded as the organizational experiment of local universities' transformation in a certain sense, providing organizational

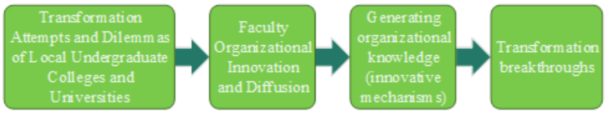

Figure 2: The interaction between organizational innovation and local university transformation

knowledge for the transformation. For the organizational innovation of second-level colleges to gain value recognition and even become a force to promote the transformation of local colleges and universities, it also needs to go through a process from bottom-up autonomy exploration to top-down identity recognition. In this process, the organizational innovation of second-level colleges will trigger the diffusion of innovation, and subject to many factors, the emergence of organizational experiments of different shapes and forms, and at the same time, the scale of organizational experiments on the transformation of the higher education governance system to produce a forcing mechanism to stimulate more organizational innovation experiments, thus accumulating richer organizational knowledge for the transformation of colleges and universities.

B. Higher education training model based on the Trinity

Ideally, the logic of education and industry should be combined in an appropriate way to bring out the best in each other, and in fact, such a state does exist. However, in reality, the relationship between education and industry is not stable. The development of society closely affects the development of college reform, which is directly reflected in the demand for talents and technological innovation, but the mode of education and curriculum of colleges and universities cannot follow the rapid changes of industry, and thus there is a kind of developmental mismatch. In addition, there is also a situation that focuses on the logic of education and alienates the logic of industry, such as focusing on knowledge learning and making skill training a mere formality. Therefore, this paper theoretically explores the structural and operational logic of colleges and universities, i.e., innovations in college organization around knowledge production methods and organizational governance systems. In connection with the principles of industrial colleges, i.e., application-oriented service industry, common construction and sharing, win-win situation, breaking down barriers and resource integration, a college education management model based on the theory of "Trinity" is proposed, and the logic of teaching and training based on Trinity is shown in Figure 3. The logic of teaching and training based on the trinity is shown in Figure 3, i.e., the identity of the concept of cooperation, the adaptability of knowledge production and the coupling of the governance structure.

C. Design of Educational Management System based on Multi-layer Networks

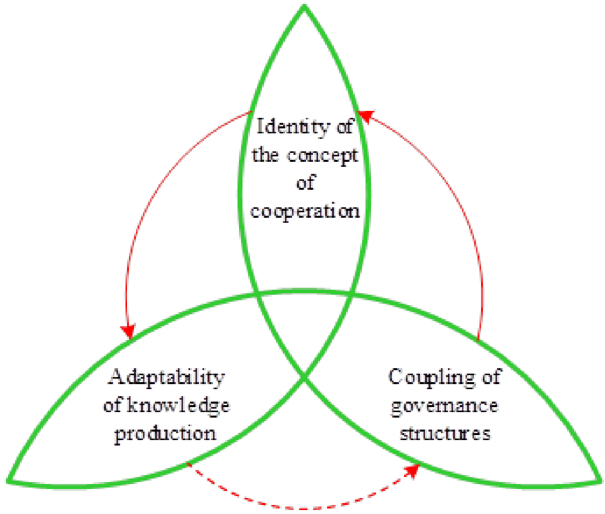

Figure 3: The teaching culture logic based on the trinity

1) Overall Structural Design of the Education Management System

Based on the multilayer network structure, this paper constructs a higher education management system to provide effective support for the reform and transformation of higher education. In the management of higher education, since the system needs to protect user computers, network devices and gateways, and at the same time, it needs to detect abnormal messages in the network and manage and control abnormal users accordingly, it divides the system into five parts: general client, management client, device detection server, summary log server and monitoring summary server. Each part of the system mainly uses C/S to transmit information and issue commands, and the communication content between each part mainly adopts XML format, while the summary log server and the monitoring summary server share data by means of a shared database. The monitoring and summarizing server and the authentication system in the campus intranet need the authentication system to provide the corresponding interface. Through the collaborative operation of the above five parts, the establishment of a multi-level security monitoring system including user computers, two- and three-layer networks, and equipment monitoring can be realized, and a set of simple and effective security solutions for the campus network can be formed in the end. The overall framework of the system is shown in Figure 4. The summary log server can collect and analyze all the network behavior information of users accessing the Internet in the campus network, and analyze and save it in accordance with different protocols, so that when abnormal network behavior occurs, it can quickly locate the problematic users according to the saved access records.

The device detection server can monitor the operation of each network device in real time and detect whether there is any abnormality in the device in time, and if there is any abnormality, it can send the abnormality information to the

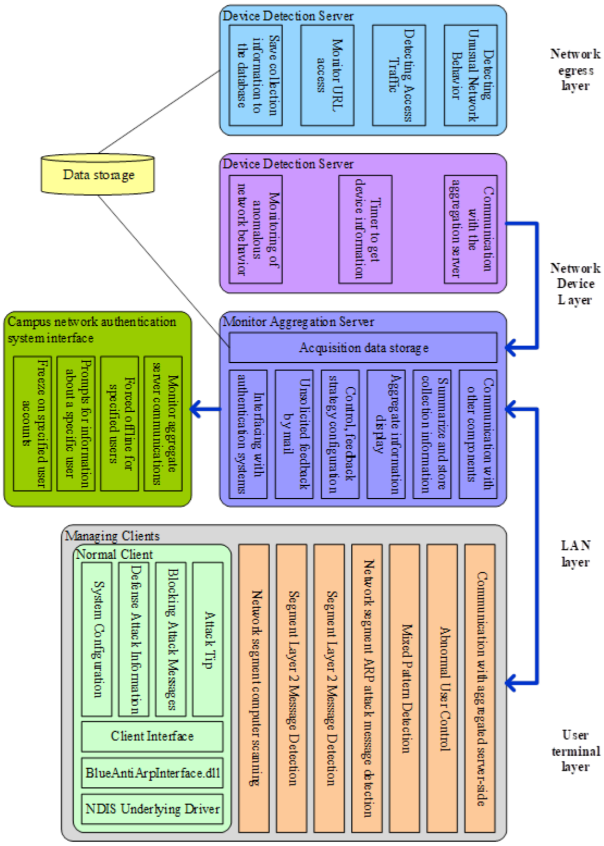

Figure 4: System framework

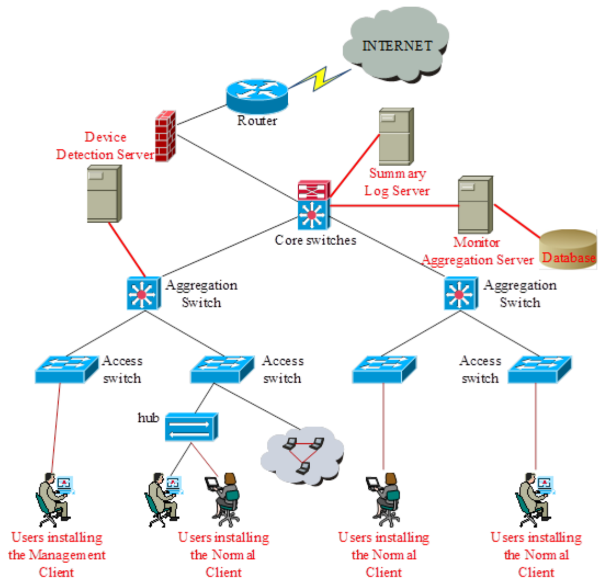

Figure 5: Network department

monitoring and summarizing server in time.

The management client can collect and count the abnormal network behaviors in the broadcast domain while protecting the user computers and upload the results of the simple statistics to the monitoring summary server.

The monitoring summary server can receive and summarize the statistics and abnormal information collected and uploaded by other modules, and through the analysis of such information, it can discover the abnormal network behaviors of users in time. It can also communicate with the campus network authentication system or management client, so as to provide abnormal users with information prompts, account freezing, forced offline and other management measures. At the same time, the monitoring summary server can also send the operation status or abnormal network behaviors of the campus network to network administrators by email or SMS, which helps network administrators to manage the network more conveniently and effectively.

2) Education Management System Network Deployment

The network deployment of the system is shown in Figure 5 Outline Log Server is generally deployed at the egress location of the campus network, and can capture all the data messages of the users accessing the Internet within the campus network by means of spectroscopy or port mirroring. The device detection server can be deployed at any location within the campus network and only needs to ensure that the device can access the internal campus network normally. The monitoring aggregate server can also be deployed in any location within the campus network, but you need to ensure that it can access the internal campus network normally. The normal client is on the user's computer and can provide effective protection for the user's computer. The management client can be installed on a particular computer within each broadcast domain and become a collection probe.

III. Educational Management System Evaluation Model Based on Correlation Matrix

A. *Evaluation Model for Multilayer Networks Based on Correlation Matrices*

The process of constructing a system assessment model for multilayer networks is shown in Figure 6. The multilayer network structure is more complex than the traditional single-layer network structure, and many node importance assessment methods for single-layer complex networks are not applicable in multilayer networks. To address this problem, this chapter proposes a node importance identification model for multilayer networks based on information fusion and association matrix. Its specific process is as follows:

1. Disassemble the multilayer network. According to the structural characteristics and meaning of multilayer complex network, it is disassembled into multiple single-layer networks according to certain rules, so as to facilitate the subsequent work.
2. Construct distance matrix. In the disassembled single-layer network, calculate the distance matrix of each layer one by one. This matrix reflects the difference between two nodes in the network.

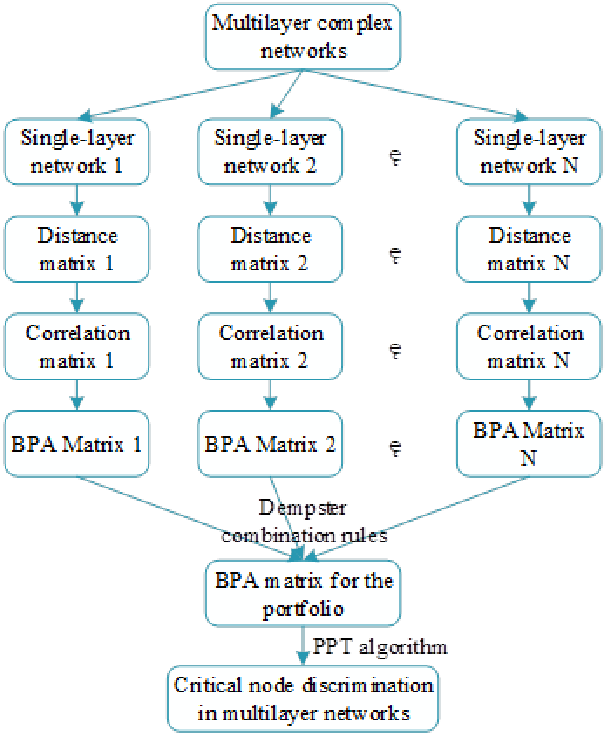

Figure 6: System evaluation model for multi-layer network

3. Construct association matrix. On the basis of the distance matrix, carry out the corresponding operations to obtain the association matrix between the nodes in each layer of the network. This matrix reflects the degree of association between two nodes in the network.
4. Construct the basic probability distribution function. Construct the basic probability assignment function on the basis of the association matrix, and each layer of the network will correspond to a basic probability assignment matrix, which is mainly used in the subsequent fusion work.
5. Fusion of BPA of each layer.The basic probability assignment function matrices of each layer network are fused with information using Dempster combination rule to get the basic probability assignment of the whole multilayer network.
6. Probability conversion and decision making. According to the fused basic probability assignments, convert them into probabilities using the relevant conversion model, and evaluate the importance of nodes in the multilayer network based on the final result.

B. Distance Matrix and Correlation Matrix Construction

In order to assess the node importance of multilayer complex networks, the distribution of node influence in each single-layer network after disassembly should be obtained first. In this paper, the method based on the shortest path between nodes in the network is used to measure the importance of nodes in each single-layer network.

In a single-layer network, if the length of the shortest path between two nodes is smaller, then it means that these two nodes are more relevant. If there exists such a node in the network, which has the smallest sum of shortest path lengths with all the nodes in the network except itself, then it means that it has the largest correlation with other nodes in the network, i.e., this node can reach any node in the network through the shortest distance, in other words, this node is the most important node in this layer of the network. According to this idea, the distance matrix between nodes in the network is defined as follows:

$$D=\begin{bmatrix} d_{11} & \cdots & d_{1j} \\ \vdots & \ddots & \vdots \\ d_{i1} & \cdots & d_{ij} \end{bmatrix}, \tag{1}$$

where d_{ij} represents the distance between node i and node j, i.e., the shortest path length between node i and node j. The distance of node i in the whole single layer network and I_i is:

$$I_i=\sum_{j=1}^{n} d_{ij}. \tag{2}$$

The smaller the distance sum I_i of a node in that layer of the network, the more influential, i.e., the more important, that node is in that layer of the network.

Based on the above equation, the distance matrix D for each single-layer network after the disassembly of a multilayer network can be found as follows:

$$D=\begin{bmatrix} d_{11} & \cdots & d_{1n} \\ \vdots & \ddots & \vdots \\ d_{n1} & \cdots & d_{nn} \end{bmatrix}. \tag{3}$$

Exceptionally, if there exists a network where there is no path connecting node i to node j, it is considered that the distance between the two nodes at this point is equal to the maximum value of the length of the distance of all valid shortest paths in that network $d_{\max}$:

$$d_{\max}=\max\left(d_{ij}\right),(1\le i\le n, 1\le j\le n). \tag{4}$$

In this paper, the correlation matrix can be derived from the distance matrix, and the correlation matrix S between nodes in the network is defined as follows:

$$S=\begin{bmatrix} s_{11} & \cdots & s_{1n} \\ \vdots & \ddots & \vdots \\ s_{n1} & \cdots & s_{nn} \end{bmatrix}. \tag{5}$$

The degree of association s_{ij} between node i and node j in the network is defined as:

$$s_{ij}=1-\frac{d_{ij}}{d_{\max}}, \tag{6}$$

where $d_{\max}$ represents the maximum value in the distance matrix except for the diagonal, when the distance between node i and node j in the network is equal to $d_{\max}$, it represents that the correlation between node i and node j i.e. the correlation is small. When the distance between node i and node j in the network is 1, it represents a high degree of correlation between them.

In order to evaluate the performance of nodes in multilayer complex networks, a basic probability assignment construction method based on the correlation matrix is proposed in this paper, in which the correlation information between nodes in each layer of the disassembled multilayer network is used as the element of the basic probability assignment, and the basic probability assignment that can be effectively used for the subsequent fusion work is constructed. In this process, each element in the correlation matrix will have a corresponding basic probability assignment function.

Given an association matrix S of $n \times n$, where n represents the number of nodes in the network, the framework for recognizing propositions in this research context is defined as:

$$\Omega = \{Y, N\}. \tag{7}$$

The power set of the discriminant frame over the proposition can be obtained from the discriminant frame:

$$2^{\Omega} = \{\{Y\}, \{N\}, \{Y, N\}\}, \tag{8}$$

where, Y means that the two nodes are correlated, N means that the two nodes are not correlated, and Y, N means that it is impossible to determine the correlation between the two nodes.

According to the correlation matrix, the corresponding basic probability distribution function $m_{ij} : 2^{\Omega} \rightarrow [0, 1]$ generated by the correlation between node i and node j is defined as:

$$m_{ij}(Y) = \frac{|S_{ij} - \min(S)|}{Summ}, \tag{9}$$

$$m_{ij}(N) = \frac{|S_{ij} - \max(S)|}{Summ}, \tag{10}$$

$$m_{ij}(Y, N) = \frac{|S_{ij} - (\max(S) + \min(S))/2|}{Summ}, \tag{11}$$

$$\begin{aligned} Summ = &|S_{ij} - \max(S)| + |S_{ij} - \min(S)| + |S_{ij} \\ &-(\max(S) + \min(S))/2| , \end{aligned} \tag{12}$$

where S_{ij} represents the correlation degree between node i and node j in the correlation matrix, $\max(S)$ represents the maximum value in the correlation matrix except for the diagonal, and $\min(S)$ represents the minimum value in the correlation matrix except for the diagonal.

According to the above formula, the basic probability distribution function based on the correlation between any two nodes in the network can be obtained, and thus the basic probability distribution matrix of all nodes in the whole network can be obtained M_{BPA}:

$$M_{BPA} = \left\{ \begin{array}{ccc} m_{11} & \cdots & m_{1j} \\ \vdots & \ddots & \vdots \\ m_{i1} & \cdots & m_{ij} \end{array} \right\}, \tag{13}$$

where and m_{11}, m_{i1}, m_{1j} and m_{ij} 1 are denoted as follows, respectively:

$$m_{11} = [m_{11}(Y), m_{11}(N), m_{11}(Y, N)] , \tag{14}$$

$$m_{i1} = [m_{i1}(Y), m_{i1}(N), m_{i1}(Y, N)] , \tag{15}$$

$$m_{1j} = [m_{1j}(Y), m_{1j}(N), m_{1j}(Y, N)] , \tag{16}$$

$$m_{ij} = [m_{ij}(Y), m_{ij}(N), m_{ij}(Y, N)] . \tag{17}$$

Since the multilayer complex network can be disassembled into several single-layer networks, and each layer will have a basic probability assignment matrix as defined above. The multilayer network can be disassembled into three single-layer networks, and according to the definition of the basic probability assignment function based on the correlation matrix, the basic probability assignment matrices of network a, network b, and network c can be obtained respectively.

The basic probability assignment matrix $M_{BPA}(a)$ corresponding to network a is:

$$M_{BPA}(a) = \left\{ \begin{array}{ccc} a_{11} & \cdots & a_{1j} \\ \vdots & \ddots & \vdots \\ a_{i1} & \cdots & a_{ij} \end{array} \right\}. \tag{18}$$

Among them:

$$a_{ij} = [a_{ij}(Y), a_{ij}(N), a_{ij}(Y, N)] . \tag{19}$$

The underlying probability assignment matrix $M_{BPA}(b)$ corresponding to network b is:

$$M_{BPA}(b) = \left\{ \begin{array}{ccc} b_{1j} & \cdots & b_{1j} \\ \vdots & \ddots & \vdots \\ b_{i1} & \cdots & b_{ij} \end{array} \right\}. \tag{20}$$

Among them:

$$b_{ij} = \{b_{ij}(Y), b_{ij}(N), b_{ij}(Y, N)]. \tag{21}$$

The underlying probability assignment matrix $M_{BPA}(c)$ corresponding to network c is:

$$M_{BPA}(c) = \left\{ \begin{array}{ccc} c_{11} & \cdots & c_{1j} \\ \vdots & \ddots & \vdots \\ c_{i1} & \cdots & c_{ij} \end{array} \right\}. \tag{22}$$

Among them:

$$c_{ij} = [c_{ij}(Y), c_{ij}(N), c_{ij}(Y, N)] . \tag{23}$$

C. Probabilistic Transformations and Decision Making

In order to evaluate the overall situation of multilayer complex networks, the BPA matrix obtained after fusion needs to be converted into an association matrix into the final decision judgment. The most commonly used probabilistic conversion model, the Gambling Probabilistic Transformation (PPT) method of the transferable confidence model, is used for the BPA to probabilistic conversion.The PPT algorithm can be defined as follows:

$$Bet_m(Y) = m(Y) + \frac{m(Y, N)}{|(Y, N)|}. \tag{24}$$

The multilayer network association matrix R_{NON} obtained through the transformation is:

$$R_{NON} = \begin{Bmatrix} r_{11} & \cdots & r_{1j} \\ \vdots & \ddots & \vdots \\ r_{i1} & \cdots & r_{ij} \end{Bmatrix}, \tag{25}$$

where r_{ij} is converted as follows:

$$r_{ij} = BetP_{l_{ij}}(Y) = l_{ij}(Y) + \frac{l_{ij}(Y,N)}{|(Y,N)|}, \tag{26}$$

Finally, based on the correlation matrix R_{NON} of the multilayer complex network, the degree of correlation s_i of each node in the network with each of the other nodes is calculated, i.e:

$$s_i = \sum_{j=1}^{n} r_{ij}, \tag{27}$$

In the model proposed in this paper it is considered that in a multilayer complex network, the greater the sum of the correlation between the node of a node and each of the other nodes, the more important the node is. That is, the greater the value of s of a node, the more important that node is.

IV. Joint Empirical Analysis of Higher Education Management and Student Training

A. System Performance Test Based on Correlation Matrix

Education management system as an important support for higher education, the stability and performance of the system has strict requirements. In order to test this paper's educational management system based on the construction of multilayer network junction of the educational management system can be effectively used in the practical aspects of teaching management, this section utilizes this paper's evaluation model based on the correlation matrix of the higher education education management system of the service controller to perform the performance test according to the algorithmic requirements of the operation. The sampling time is 2 minutes and the number of samples is 500. The system is compared with the conventional system and the teaching system with single layer network and the response rate of the system is compared as shown in Figure 7. The response time of this paper's educational management system using a multilayer network is 0.35-0.80s, which is about 0.45s faster compared to the response time of the traditional system, and saves 0.26s compared to the response time of the single-layer network controller, which shows that the system in this paper has a better response performance and can meet the actual needs of the educational management system.

Comparison of the output performance of the system controller is shown in Figure 8, and it is observed that the control system in this paper reaches 100% output performance in 0.5 minutes, and then gradually stabilizes at about 82%, which is significantly better than other systems. Compared with the traditional system and the single-layer network system the output performance of this system is improved by 14-20%.

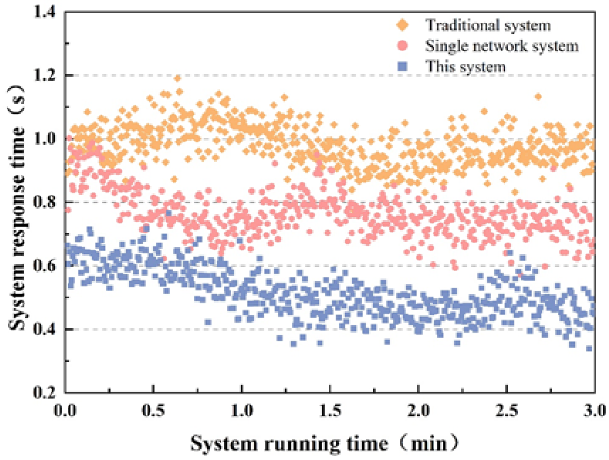

Figure 7: The response speed of the system is compared

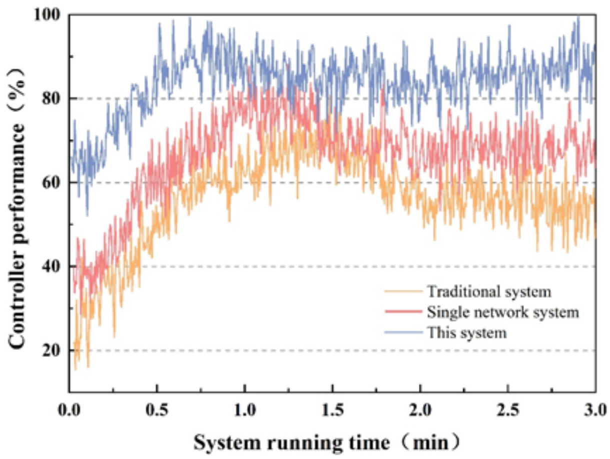

Figure 8: System controller output performance contrast

This indicates that the system in this paper effectively shortens the response time and significantly improves the performance of the system compared to other systems.

B. Empirical Analysis of Education Management Oriented to Student Training

In order to verify the effectiveness of the educational model of this paper, the teaching comparison experiment was conducted in S college as an example, which was conducted by screening 100 students whose ability level difference was within 0.5, and divided into two groups A and B equally. Among them, group A adopts the teaching management mode of this paper, and group B adopts the traditional teaching management mode, and the situation of the students in the two groups is compared and analyzed in the 3-month teaching process.

1) Comparative Analysis of Achievement in Different Educational Models

After a three-month teaching practice, the pre and post-test scores were compared by distributing science knowledge post-test questions to the students of both groups at the end of the teaching experiment. The results of the pre and post-test comparison of the performance of the two groups of students are shown in Table 1. The results show that the correlation coefficients in the pre-test and post-test data of groups A and B are 0.726 and 0.600 respectively, with significance less than 0.05, indicating that there is a positive correlation between the pre and post-test scores of the two groups of students. Through the paired samples t-test, the mean of the difference between the pre and post-tests of the students in groups A and B were 4.457 and 2.786 respectively, with p of 0.000, and the performance of group A was improved by 1.671 compared with that of group B. The performance of the two groups improved after the teaching practice, but the improvement of group A was more obvious, and it had a better teaching effect compared with that of group B, and the students mastered their knowledge in a better way.

2) Comparative Analysis of Competence Development in Different Educational Models

Group A, which uses the educational management system and educational model of this paper, is compared with Group B, which is managed by traditional teaching, and analyzed in five dimensions: interest cultivation, truth-seeking spirit, innovation ability, cooperation ability and scientific attitude, and the results of the comparison of the ability cultivation of the two groups of students are shown in Table 2. According to the data in the table, it can be seen that the difference between students in group A and group B in the spirit of truth-seeking does not show significance ($P>0.05$), and in the four dimensions of competence of interest cultivation, innovation ability, cooperation ability and scientific attitude shows a significant level of variability, and the results of group A are higher than that of group B in each competence. From the overall point of view, the comprehensive score of group A is 95.484, which is 10.914 higher than that of group B, and P is less than 0.05, and there is a significant difference at the level of 5%. It shows that the comprehensive learning ability of Group A based on the education management model of this paper is significantly better than that of Group B, which proves that the education management model of this paper has a better effect on the cultivation of students' ability.

3) Differential Analysis Oriented Towards Capacity Development

To further prove the feasibility of this study, the pre- and post-test proficiency levels of the students in Group A were compared and analyzed. The differences in the proficiency levels of the pre- and post-test students in Group A of the educational model of this paper are shown in Table 3. Through the results of paired-sample t-test on the pre and post-test of group A, the improvement of students in group A in the spirit of truth-seeking is not significant, and its p-value is 0.124. Other than that, the students in group A in the dimensions of interest cultivation, innovation ability, cooperation ability and scientific attitude have improved by 3.534, 2.452, 2.721 and 2.511 compared with that of the pre-test, respectively, and the p-value is less than 0.05, which makes the difference significant. It shows that the educational model in this paper still needs to be improved in cultivating the spirit of seeking truth, but it has significant effect in improving students' learning interest and cooperation ability. Overall, it seems that the comprehensive ability level of students in Group A has increased by 11.880, and P is less than 0.05, and the education management model in this paper helps to cultivate students' ability and promote their comprehensive development.

V. Conclusion

This paper constructs a higher education management training model that combines organizational experiments and the Trinity theory, and establishes a management system with a multi-layer network structure, and evaluates the system using an association matrix, and designs a comparison experiment for verification.

1) Comparing the system of this paper with the traditional system and the teaching system of single-layer network, the response time of the system of this paper is 0.35∼0.80s, which saves about 0.45s compared with the response speed of the traditional system, and it is about 0.26s faster compared with the controller of the single-layer network, and the output performance of the system of this paper improves by 14-20% compared with the traditional system and the single-layer network system. This system ensures stable performance with better response performance, which has obvious advantages over other systems.
2) The correlation coefficients of the pre-test and post-test data of group A of the education management model of this paper and group B of the traditional education model are 0.726 and 0.600 respectively, and the post-test scores of the students in group A and group B have been improved by an average of 4.457 and 2.786 through the paired samples t-test, and the scores of group A have been improved by 1.671 compared with group B. The education management system constructed in this paper has a significant improvement in teaching effect compared with the traditional education management model, and the students' mastery of knowledge is better. Management mode, there is a significant improvement in the teaching effect, and the students have a better mastery of knowledge.
3) In the four dimensions of interest development, innovation ability, cooperation ability and scientific attitude, the performance of group A is higher than that of group B in all abilities. The composite score is 95.484, which is 10.914 higher than that of group B. Moreover, the students of group A improved 3.534, 2.452, 2.721 and 2.511 in the dimensions of interest development, innovation ability, cooperation ability and scientific attitude, respectively, compared with the pre-test. Overall, it seems that the level of general competence of the students in group A has increased by 11.880, and the educational management model in this paper has better

Correlation significance						
Group		N	Correlation index			Sig.
A	Pre-survey and posttest	50	0.726			0.000
B	Pre-survey and posttest	50	0.600			0.000
Significance of difference						
Group		N	Mean	Standard deviation	T	P
A	Pre-survey and posttest	50	4.457	1.648	12.425	0.000
B	Pre-survey and posttest	50	2.786	2.524	7.235	0.000

Table 1: Comparison results of the two groups of students

Ability training	Group	N	Mean	Standard deviation	T	P
Interest culture	A	50	20.627	3.121	2.254	0.015
	B	50	18.012	3.241		
Matter-of-fact attitude	A	50	18.864	2.124	0.352	0.542
	B	50	17.246	2.321		
Innovation ability	A	50	18.051	2.344	2.110	0.025
	B	50	16.843	2.621		
Ability to cooperate	A	50	19.521	2.101	2.134	0.009
	B	50	17.254	1.921		
Scientism	A	50	18.421	2.121	2.671	0.000
	B	50	15.215	2.321		
Comprehensive score	A	50	95.484	5.782	2.974	0.000
	B	50	84.570	6.421		

Table 2: The ability of the two groups to cultivate the comparison results

Ability training	Experimental group	N	Mean	Standard deviation	T	P
Interest culture	Pre-survey and posttest	50	3.534	4.254	3.899	0.000
Matter-of-fact attitude	Pre-survey and posttest	50	0.921	2.514	1.621	0.124
Innovation ability	Pre-survey and posttest	50	2.452	3.214	2.524	0.015
Ability to cooperate	Pre-survey and posttest	50	2.721	3.211	2.987	0.000
Scientism	Pre-survey and posttest	50	2.511	2.358	3.477	0.001
Comprehensive score	Pre-survey and posttest	50	11.880	6.572	5.741	0.000

Table 3: Student ability level difference

results in the cultivation of students' competence and the improvement of their development.

References

[1] Chen, Y., & Wang, W. (2011). A Study of Innovative Entrepreneurial Talents of Business and Management: Knowledge, Ability and Quality Structure. *Higher Education Studies, 1*(1), 46-50.

[2] Antonio-José Moreno-Guerrero, Carmen Rodríguez-Jiménez, Gerardo Gómez-García, & Navas-Parejo, M. R. (2020). Educational innovation in higher education: use of role playing and educational video in future teachers' training. *Sustainability, 12*(6), 2558.

[3] Walder, A. M. (2017). Pedagogical Innovation in Canadian higher education: Professors' perspectives on its effects on teaching and learning. *Studies in Educational Evaluation, 54*, 71-82.

[4] Zhao, D., Zhong, H., Wu, Y., & Zhou, Q. (2020). A study of the impact of internet-based instruction integrated innovation education on university student entrepreneurial team collaboration and strategic innovation. *Frontiers in Psychology, 11*, 1264.

[5] Tyilo, & Nonzukiso. (2017). E-learning as instructional innovation in higher education institutions (hei's): lessons learnt from the literature. *Journal of Communication, 8*(1), 87-93.

[6] Misseyanni, A. (2019). Active learning strategies in higher education: teaching for leadership, innovation, and creativity active learning strategies in higher education: teaching for leadership, innovation, and creativity edited by. *Journal of Philosophy of Education, 46*(1), 14-24.

[7] Chen, L., Lee, M. Y., & Wu, J. (2018). Analysis of higher education and management model based on cognitive anthropology. *Cognitive Systems Research, 52*, 909-916.

[8] Chim-Miki, A. F., Campos, D. B., & De Melo, L. S. A. (2019). Defining Spaces of Creative Educational to Higher Education on Management Through a Value Creation Mechanism. *Administração: Ensino e Pesquisa–RAEP, 20*(2), 345-382.

[9] Zhang, J. L. (2020). The application of human comprehensive development theory and deep learning in innovation education in higher education. *Frontiers in Psychology, 11*, 542279.

[10] Meiju, K., Jani, U., & Kari, N. (2018). How to measure students' innovation competences in higher education: evaluation of an assessment tool in authentic learning environments. *Studies in Educational Evaluation, 58,* 30-36.

[11] Faria, J. R., Wanke, P. F., Ferreira, J. J., & Mixon, F. G. (2018). Research and innovation in higher education: empirical evidence from research and patenting in Brazil. *Scientometrics, 116,* 487-504.

[12] Kuleto, V., P, M. I., Stanescu, M., Ranković, M., Šević, N. P., Păun, D., & Teodorescu, S. (2021). Extended reality in higher education, a responsible innovation approach for generation y and generation z. *Sustainability, 13*(21), 11814.

[13] Reyes, A. (2018). Connecting higher education and innovation to local development. *Futures, 103*, 73-83.

[14] Shengzhong, L. I. U. (2018). Exploration and Practice on the" Internet+" Innovation and Entrepreneurial Talents Cultivation Based on the Internal Entrepreneurship Theory [J]. *Journal of Higher Education, 5*(4), 1-4.

[15] Liu, B., & Yan, N. (2018). Study and practice of graduates' curriculum reform——based on the integration of creativity, innovation, and entrepreneurship. *Journal of Higher Education, 91*(117), 63-86.

[16] Xu, G., Shi, L., Xiao, P., & Zhang, Z. (2021). Exploration of E-Commerce Talents Training Mode Based on CDIO-OBE Concept. *European Journal of Education and Pedagogy, 2*(4), 20-24.

[17] Sidiropoulos, E. (2022). The influence of higher education on student learning and agency for sustainability transition. *Sustainability, 14*(5), 3098.

[18] Ma, C. A., Xiao, R., Chang, H. Y., & Song, G. R. (2022). Founder management and innovation: an empirical analysis based on the theory of planned behavior and fuzzy-set qualitative comparative analysis. *Frontiers in psychology, 13*, 827448.