Dynamics Mechanism of Promoting Labor Education in Higher Vocational Colleges and Universities by Three Parallel Courses

Xiaoqing Li¹,†, Duanjie Li¹, Ling Zhang¹, Feiran Xu¹, Xiaojin Liu¹

¹. Department of Chemical Engineering, Chongqing Vocational College of Chemical Technology, Chongqing, 400000, China.

Abstract

Labor education is a meaningful way to cultivate students’ comprehensive quality and a new requirement for education development in the context of the new era. This study aims to establish a labor education system for higher vocational colleges and universities, using the theoretical support of three-course parallelism and optimizing and integrating labor education resources through system dynamics. On this basis, the study uses a factor analysis model to explore the dynamic mechanisms of this education and a fuzzy comprehensive evaluation method to quantitatively analyze the quality of this labor education approach. In the empirical analysis of higher vocational colleges and universities, the effect of labor education in this paper improves by about 11 points compared with that of traditional education. The average scores of the six indicators of labor education based on the three parallel classes are all above 4 points, which is at the level of "excellent." The optimization of labor education resources in this paper can effectively improve the utilization rate of resources and provide a guarantee for the labor education system based on three parallel classes, thus improving the overall effect of labor education, giving full play to the intrinsic value of labor education, and contributing to the overall development of students.

Keywords: Factor analysis model; Fuzzy comprehensive evaluation; System dynamics; Three-lesson parallelism; Labor education.

AMS 2010 codes: 68T05
1 Introduction

Labor education is a product of combining the Marxist view of labor with the actual education in China. It is an integral part of the socialist education system with Chinese characteristics [1]. The “three parallel courses” labor education system has the theoretical basis of curriculum theory, a rich practical foundation of labor education, and a strong policy orientation. The “three courses” refer to labor education in three curriculum forms, namely, independent curriculum form of labor education, penetration curriculum form of labor education, and expanding curriculum form of labor education [2-4]. China attaches great importance to labor education, and in the new era, labor education has been highly valued for its comprehensive human development value of cultivating morality, increasing intelligence, strengthening the body, and cultivating beauty. Vocational education and labor education have a natural intrinsic connection, and higher vocational colleges and universities have unique values and advantages in carrying out labor education [5].

Higher vocational colleges and universities actively respond to national policy and constantly explore and practice labor education. Still, it is difficult to avoid the problems of “teaching without labor,” “labor without education,” and so on. Under the new background of five-education integration, higher vocational colleges and universities are bound to carry out the reform and practice of labor education according to their advantages and characteristics, which is of great significance to promote the high-quality development of higher vocational education and build a modern vocational education system [6-8].

Strengthening labor education in higher vocational colleges and universities is an inevitable requirement to implement the national policy, strengthen the internal and external adaptability of vocational education, highlight the characteristics of vocational education “type” attributes, and is of great significance to the realization of the high-quality development of higher vocational education and the promotion of the development of modern vocational education system [9]. Chen, explains the phenomenon of the mismatch between the training of the rural labor force and the demand for jobs and points out that the characteristics of the rural labor force population supply will lead to the transfer of labor force training [10]. Xiaolian, L. et al. investigated the reform and innovation of the mechanical engineering technology course, i.e., setting up a task-based teaching method, which effectively facilitated the students’ integration of theoretical knowledge and improved their ability to apply it to real-life production [11]. Scheld, J. examined the returns to tertiary education in the labor market, noting that the returns to tertiary education at this stage have declined at both the time and money levels [12]. Olojuolawe, S. R. et al. explored the fit between tertiary graduates majoring in electrical and job placements and proposed a model for assessing employability skills, which has shown good performance [13]. Brass, T. explains the Marxist theory of semi-feudalism and states that class struggles are all related to the bourgeoisie, including the battle with the landowning class and the socialist movement that hindered the workers [14]. Fodor, S. et al. discuss the importance of education in the development of skills and literacy needed in the labor market and devise a method of job screening, with text mining techniques as the underlying logic, to help the labor market to match labor supply and demand [15]. Alan, M. et al. described positive thinking nursing programs used to assist college graduates new to social work, noting the role of these programs in helping students develop sustainable learning and improve practice [16]. Audrey, R. et al. examined students’ views and attitudes toward social internships and found that students valued social internships as necessary for their future work and professional studies [17]. Szafraniec, K. reveals the maladjustment and disapproval of young people in the labor market in countries such as Poland in the post-World War II period, pointing out that even with increased investments in the field of education and the field of labor training, the results are clearly still unsatisfactory [18].
This paper addresses the demand for labor education in higher vocational colleges and universities, improves labor education under independent course form, permeable course form, and extended course form based on the three-course parallel theory, and integrates and optimizes labor education resources by combining system dynamics. On this basis, a comprehensive evaluation model for the quality of labor education in higher vocational colleges and universities is constructed using the factor analysis model and the fuzzy synthesis model to explore the dynamics mechanism of this education. Finally, the empirical analysis to study the effect, quality, and practical application of the labor education system in this paper as a way to verify the feasibility of this paper’s labor education improvement method based on three parallel classes and to provide a feasible methodological path for the development of labor education.

2 Dynamics of labor education based on three parallel courses

2.1 Labor education system based on the theory of three parallel classes

The framework of the three-course parallel theory labor education system is shown in Figure 1. The “three-course parallel” labor education system is gradually formed in the long-term practice of labor education, and the “three-course parallel” labor education system has both the theoretical basis of curriculum theory and a rich foundation of labor education practice, as well as a strong policy orientation. The “three classes in parallel” labor education system has a theoretical basis in curriculum theory, a rich practical basis in labor education, and a strong policy orientation. The “three courses” refer to three forms of labor education, namely, labor education in the form of independent courses, labor education in the form of infiltration courses, and labor education in the form of extended courses.

The first step is to provide labor education through independent courses. Independent courses are compulsory courses for labor education. Firstly, it is characterized by the “three-pronged education” of the curriculum. The school implements labor education from three levels of “independent course form,” “penetration course form,” and “expansion course form,” and builds “three classrooms.” “to realize the organic unity of the “all-member” of the object and implementation subject of labor education, the whole process and all-round of labor education, and to promote the formation of the mechanism of full participation, joint control and collaborative cultivation of labor education at the level of micro-curriculum, which fully reflects the “three-round cultivation of people” of labor education. The characteristics of labor education are fully embodied in the “three-pronged educating people.” Secondly, the educational function of “comprehensive education” features.

Secondly, labor education can be provided through in-depth courses. Infiltration of the curriculum form of labor education refers to the “curriculum labor education.” This is based on the concept of “curriculum politics” put forward, emphasizing that all courses have the function of educating people, all teachers have the responsibility of teaching and educating people, and the fundamental purpose is to allow every teacher to participate in labor education through the courses they teach, to achieve the “ful” Participation in labor education. This form of labor education must meet three conditions.

Thirdly, labor education through the expanded curriculum. Labor education in the form of expanded courses refers to the second classroom. This is from the diversity of the form of labor education, with the internal and external social practice activities (activity courses) as the carrier, the implementation of vocational colleges and universities in labor education responsibility, the fundamental purpose is to put more social resources effectively used in labor education.
2.2 System Dynamics Theory

System dynamics is based on the interdependence between system behaviors and internal mechanisms to explain and solve problems, and through the process of establishing and operating the corresponding mathematical models, the cause-and-effect relationships behind the changes in the system are gradually explored and obtained. A causal feedback loop diagram is a kind of diagram that qualitatively describes the causal relationship and feedback loop between variables in a system, which is the basis of a system dynamics model. A causal feedback loop diagram consists of a causal chain and a feedback loop, and the causal feedback loop and polarity are shown in Figure 2. The arrows in the chart indicate the causal chain from the original flash to the result, and the arrows indicate that the behavior of the variables in the system is affected by the variables, such as the variables and the variables change in the same direction, i.e., An increase leads to an increase or a decrease leads to a reduction, and the relationship between the two is a positive causal chain. Similarly, between the variable to the variable is negative causality, i.e., Increases cause decreases, or decreases cause increases, and the direction of change between the two is always opposite.

![Figure 2. Causal feedback circuit and polarity](image-url)
The general form of the stock flow diagram is shown in Figure 3. Stock flow is in the typical relationship analysis on the basis of the further distinction between the nature of the variables, which can be more intuitive symbols portraying the logical relationship between the system variables, quantitative data to accurately illustrate the cumulative changes in the system, carrying more information, more precise and in-depth exploration of the system feedback form and control regulation of the structural description. In the structure of social systems, there are basically two types of variables: the nature of stock and flow. The state of the system is represented by stocks, which are numbers or other accumulations of materials. Flows, on the other hand, are the rate of change in the state of the system. System dynamics identifies variables as four types: state variables, rate variables, auxiliary variables, and constants. The state variable describes the cumulative effect of the system, the rate variable describes the speed of change of the cumulative impact of the system, and the auxiliary variable is an intermediate variable in the process of transferring and converting information between the state variable and the rate variable. The constants are the quantities that remain relatively unchanged during the period of the study, and the constants are sometimes referred to as the system’s decision parameters.

Where A1 denotes the source, which is the source of all material inputs to the system from the environment outside the system boundary, and A2 represents the leakage, which is the direction of material outputs from the system to the environment outside the system boundary. B and D denote the rate, which describes the rate of change of the system’s cumulative effect, which is the result of the derivation of the state variables to time and has the characteristic of transience. C is the state variable, which describes the result of material flow or accumulation of the system from the beginning to the current moment and has a cumulative nature. C is the state variable, describing the system from the beginning moment to the current moment of the material flow or accumulation of results, with a cumulative nature. E1, E2, and E3 represent constants that do not change with time or parameters. f is an auxiliary variable used to highlight the system of some key links or essential relationships. It is a necessary means of reflecting the art of modeling design and skill. The modeling process is also often used in the form of auxiliary variables, such as the table function. The table function graphically describes the nonlinear relationship between the system variables, and the table function can usually be used as a correction, relying on the modeler’s experience and skill to determine the functional relationship of the “soft” method.

![Figure 3: Stock flow chart general form and variable](image)

### 2.3 Optimization of labor education resources based on system dynamics

The labor education system’s structure can be seen in Fig. 4. According to system dynamics, the behavior of a system is determined by its structure, and the dynamic behavior of a complex information feedback system is investigated through “structure-function” analysis. In general, the system’s structure consists of all the ways in which elements communicate. In fact, different types of contacts have different effects on the formation and operation of the system. It is not necessary or possible for scientific research to take all the contacts into account. The feasible way is to ignore the
contacts that are irrelevant to the research problem, episodic, and have no rules to follow. Hence, the junction carefree structure here refers to the sum of those relatively stable and specific rules of contact between the elements. The system of quality and user use of educational information resources consists of three main modules: resource development and quality improvement, user use and regional education authorities, and the improvement of resource quality, user incentives, and government funding allocations, all revolve around resource use rates.

![Figure 4. The structure of the labor education system](image-url)

3 Evaluation model of the quality of the three-course parallel labor education reform

3.1 Factor analysis model

The concept of factorization is applied to the study of random variables, and factor analysis is widely used in various other fields. The factor analysis method embodies dimensionality reduction, assuming that there is \( n \) sample and each sample observes \( P \) indicators as \( X_1, X_2, \ldots, X_p \), then the original data array \( X \) is obtained:

\[
X = \begin{bmatrix}
X_{11} & X_{12} & \cdots & X_{1p} \\
X_{21} & X_{22} & \cdots & X_{2p} \\
\vdots & \vdots & \ddots & \vdots \\
X_{n1} & X_{n2} & \cdots & X_{np}
\end{bmatrix} \Rightarrow (X_1, X_2, \ldots, X_p) \quad (1)
\]
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Where \( X_i = \begin{bmatrix} x_{i1} \\ x_{i2} \\ \vdots \\ x_{in} \end{bmatrix} (i = 1, 2, \ldots, p) \).

A linear combination of \( p \) indicator vectors \( X_1, X_2, \ldots, X_n \), using the original data array \( X \), is made:

\[
F_1 = \alpha_{11}X_1 + \alpha_{21}X_2 + \cdots + \alpha_{n1}X_n \\
F_2 = \alpha_{12}X_1 + \alpha_{22}X_2 + \cdots + \alpha_{n2}X_n \\
\vdots \\
F_n = \alpha_{1p}X_1 + \alpha_{2p}X_2 + \cdots + \alpha_{np}X_p
\]

(2)

Abbreviated as \( F_i = \alpha_{i1}x_1 + \alpha_{i2}x_2 + \cdots + \alpha_{ip}X_p \ i = 1, 2, \ldots, p \).

Requirement \( \alpha_{i1}^2 + \alpha_{i2}^2 + \cdots + \alpha_{ip}^2 = 1 \ i = 1, 2, \ldots, p \).

It is worth noting that when the covariance array \( \Sigma \) is unknown, its estimate \( S \) (the sample covariance array) can be used instead.

Let the original information array be \( X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{nn} \end{bmatrix} \).

\[ S = \left( s_{ij} \right) \text{, where } s_{ij} = \frac{1}{n} \sum_{a=1}^{n} (x_{aj} - x_i)(x_{aj} - x_i), \text{ the face correlation coefficient array } R = \left[ r_{ij} \right], \text{ where } \]

\[ r_{ij} = \frac{s_{ij}}{\sqrt{s_{ii}} \sqrt{s_{jj}}} \text{, obviously when the original variable } X_1, X_2, \ldots, X_p \text{ is standardized, then } S = R = \frac{1}{n} X'X. \]

In practice, because the indicators selected for the study often have different dimensions, in order to carry out the correct analysis of the research content, so that different dimensions will not affect the research results, so before the analysis, try to standardize the dimensions of the indicators, \( S \) and \( R \) in the research content after processing have entirely consistent dimensions, for the acquisition of the characteristic root and the characteristic vector of \( R \), you might as well take \( R = X'X \) here, because at this time \( R \) and \( \frac{1}{n} X'X \) are different by a coefficient, obviously the difference between the eigenroots of \( X'X \) and the eigenroots of \( \frac{1}{n} X'X \) is \( n \) times, because the eigenvector does not change, so the calculation of the principal component is not affected.

The steps involved in analyzing the factor analysis method include:
1) Standardization

The difference in the order of magnitude will have an impact on the results of the study, so the way to eliminate the difference in the order of magnitude of the indicators is to carry out standardization. The following formula is utilized for standardization processing in this paper:

\[
X_q^* = \frac{X_{iq} - X_i}{S_i}
\]  

(3)

2) Construct the correlation coefficient matrix after normalization of the measures:

\[
R_{pp} = \begin{bmatrix} r_{ij} \end{bmatrix}_{p \times p},
\]

where \( r_{ij} \) is the correlation coefficient between \( X_i^* \) and \( X_j^* \).

3) Find the eigenvalue \( \lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_p > 0 \) of the correlation matrix \( R \), and the corresponding eigenvector \( u_1, u_2, \ldots, u_p \), where \( u_i = (u_{i1}, u_{i2}, \ldots, u_{ip}) (i = 1, 2, \ldots, p) \).

4) Write the principal components

Substituting the eigenvector \( u_i = (u_{i1}, u_{i2}, \ldots, u_{ip}) (i = 1, 2, \ldots, p) \) and the known data \( (X_1, X_2, \ldots, X_p) \) into the formula yields the \( p \) principal components, where \( F_i (i = 1, 2, \ldots, p) \) is the \( i \) th principal component:

\[
F_i = u_{i1}X_1 + u_{i2}X_2 + \cdots + u_{ip}X_p
\]  

(4)

3.2 Quality evaluation model construction based on fuzzy synthesis

The process of fuzzy hierarchical analysis is shown in Figure 5. The core of fuzzy hierarchical analysis is the construction of a fuzzy consistency judgment matrix. Compared with simple hierarchical analysis, it is more consistent with the decision-making goals, and the process of realizing it is easier and faster.
According to the above flow chart, we can know the specific operation steps of fuzzy hierarchical analysis:

1) Determine the corresponding indicators according to the problem of the research objectives and construct a scientific and reasonable indicator system.

2) Compare the indicators based on the scale, and each level of indicators corresponds to its judgment matrix.

3) Normalize the judgment matrix, calculate the eigenvectors to get the layered weights, and check whether each judgment matrix meets the consistency.

4) Calculate the combination weights according to the layered weights and test their consistency.

5) Determine the weights.

Definition of fuzzy matrix, for matrix $B = (b_{ij})_{mn}$, if it is in accordance with $0 \leq b_{ij} \leq 1 (i = 1, 2, \ldots, m; j = 1, 2, \ldots, n)$, the matrix is said to be a fuzzy matrix.

Definition of fuzzy complementary judgment matrix, when it is known that each factor is qualitative, if you do not use a particular method of pre-processing, you cannot use mathematical tools to calculate, so that the solution of the model cannot be completed. The relationship between the various factors is also complicated to study, so I use quantitative analysis of the factors for pre-processing, mainly to give each factor a degree of importance to fuzzy analysis, at this time it will be a fuzzy matrix.
judgment matrix is obtained \( A = (a_{ij})_{m \times n} \). This matrix is referred to as a fuzzy complementary judgment matrix if it meets the following requirements.

Requirements:

\[
\begin{align*}
    a_{ii} & = 0.5 (i = 1, 2, \ldots, n) \\
    a_{ij} + a_{ji} & = 1 (i = 1, 2, \ldots, n)
\end{align*}
\]  

To establish the weighted judgment matrix, it is necessary to artificially assign weights to each element for the first time. Because it is a human-subjective assignment, errors cannot be avoided. Still, one should try to listen to expert advice and search for enough information before assigning weights to the elements, which can lead to the following fuzzy judgment matrix:

\[
A = \begin{bmatrix}
    a_{11} & a_{12} & \cdots & a_{1n} \\
    a_{21} & a_{22} & \cdots & a_{2n} \\
    \vdots & \vdots & \ddots & \vdots \\
    a_{m1} & a_{m2} & \cdots & a_{mn}
\end{bmatrix}
\]  

By establishing the above judgment matrix using the 1-9 scale method, the relationship between each indicator is obtained. It is easy to find that the matrix has the following mathematical characteristics:

\[
\begin{align*}
    ① & a_{ii} > 0 \\
    ② & a_{ij} = \frac{1}{a_{ji}} \\
    ③ & a_{ij} = 1
\end{align*}
\]

Based on the above properties, it is only necessary to make a judgment about its upper or lower triangular elements. \( a_{ij} \) denotes the importance of comparing elements \( i \) and \( j \).

Eigenvector \( W \) cannot be used directly after being calculated, because it will produce a significant error and violate the scientific principle of modeling, so it also needs to be preprocessed to make it satisfy \( \sum_{i=1}^{n} W_i = 1 \), so that the weight data of each indicator can be obtained accurately. There are many methods to find the eigenvectors, such as geometric mean method, arithmetic mean method, eigenvalue method, and so on. Take the geometric mean method to find the eigenvector \( W \) as an example:

The first step is to calculate the product of each row of the judgment matrix:

\[
(M_1, M_2, \ldots, M_j, \ldots, M_n)^T
\]

In the second step, the value \( Y \) is calculated for the \( n \) nd square root of \( M_j \).
In the third step, normalize the $n$th square root, $W_i = Y_i / \sum_{i=1}^{n} Y_i$ , $W = (W_1, W_2, W_3, ..., W_n)^T$ is the eigenvector obtained, which is the weight of the element.

In the fourth step, the largest eigenvalue is calculated: $\lambda_{\text{max}}$.

Fuzzy comprehensive evaluation steps:

1) It is necessary to determine the factor set of the evaluation object:
   $$U = \{U_1, U_2, U_3, ..., U_n\}$$  
   (9)

2) The judgment set $V = \{V_1, V_2, V_3, ..., V_m\}$ that will evaluate factor set $U$ needs to be determined.

3) The judgment matrix needs to be determined:
   $$R = \begin{bmatrix}
   r_{11} & r_{12} & \cdots & r_{1n} \\
   r_{21} & r_{22} & \cdots & r_{2n} \\
   \vdots & \vdots & \ddots & \vdots \\
   r_{m1} & r_{m2} & \cdots & r_{mn}
   \end{bmatrix}$$  
   (10)

Single-level fuzzy comprehensive judgment, set $U = \{U_1, U_2, U_3, ..., U_n\}$ is the factor set of the evaluation object, $V = \{V_1, V_2, V_3, ..., V_m\}$ is the evaluation set of $m$ grades combined, according to the evaluation set, an objective judgment matrix can be obtained $R_i$:

$$R_i = \begin{bmatrix}
   r_{11} & r_{12} & \cdots & r_{1n} \\
   r_{21} & r_{22} & \cdots & r_{2n} \\
   \vdots & \vdots & \ddots & \vdots \\
   r_{m1} & r_{m2} & \cdots & r_{mn}
   \end{bmatrix}$$  
   (11)

The $r_{ij}$ in the above matrix represents the degree of affiliation of $u_i$ to $v_j$. The total evaluation result is calculated by combining all the influencing factors:

$$B = W \cdot R_i = \left( w_1, w_2, \ldots, w_n \right) 
   \begin{bmatrix}
   r_{11} & r_{12} & \cdots & r_{1n} \\
   r_{21} & r_{22} & \cdots & r_{2n} \\
   \vdots & \vdots & \ddots & \vdots \\
   r_{m1} & r_{m2} & \cdots & r_{mn}
   \end{bmatrix}
   = \left( b_1, b_2, \ldots, b_n \right)$$  
   (12)

In the above equation, $B$ is the fuzzy comprehensive evaluation set and $b_j \ (j = 1, 2, \ldots, n)$ is the fuzzy comprehensive evaluation index.

The specific methods for multilevel fuzzy comprehensive evaluation are as follows:
1) Factor set division

Factor set \( U = \{U_1, U_2, U_3, \ldots, U_n\} \) will be divided into subsets of \( U = \bigcup U_i, U_1 = \{u_1, u_2, u_3, \ldots, u_k\} \) as the first level of factor set, and so on.

2) If \( U_i = \{u_{i1}, u_{i2}, u_{i3}, \ldots, u_{ik}\}(i = 1, 2, 3, \ldots, k; n_1 + n_2 + n_3 + \ldots + n_k = n) \) is a two-level factor set, and each factor in the set is evaluated using the above factor evaluation method, the single-factor judgment matrix can be obtained as:

\[
R_i = \begin{bmatrix}
    r_{i1}^j & r_{i2}^j & \cdots & r_{in}^j \\
    r_{i1}^j & r_{i2}^j & \cdots & r_{in}^j \\
    \vdots & \vdots & \ddots & \vdots \\
    r_{i1}^j & r_{i2}^j & \cdots & r_{in}^j 
\end{bmatrix}
\]  

(13)

Assuming a weight of \( W_i = \{w_{i1}, w_{i2}, w_{i3}, \ldots, w_{in}\} \) for \( R_i = \{r_{i1}^j, r_{i2}^j, r_{i3}^j, \ldots, r_{in}^j\} \), you can thus obtain a judgment of \( B_i = W_i \circ R_i = \{i = 1, 2, \ldots, k\} \).

3) The set \( U = \{u_1, u_2, u_3, \ldots, u_k\} \) is then synthesized and the weight vector of \( U = \{U_1, U_2, U_3, \ldots, U_k\} \) is set to be \( W = \{w_1, w_2, w_3, \ldots, w_k\} \), resulting in the following matrix:

\[
B = (b_1, b_2, b_3, \ldots, b_k)^T \text{ General judgement matrix}
\]  

(14)

4) Finally, the synthesized rubric is obtained as:

\[
B_{k \times n} = W_{k \times n} \circ R_{k \times n}
\]  

(15)

4 Empirical Analysis of Labor Education Reform Based on Three Parallel Courses

4.1 Empirical analysis of labor education based on the system dynamics model

4.1.1 Empirical analysis of system dynamics of labor education effects

Based on the simulation analysis method of system dynamics, and combining with the actual situation of labor education talent cultivation system, selecting S high vocational school as the object of empirical research, combining with the collected data to analyze the substantial relationship between the system variables, and obtaining the development trend of the three-course parallel talent cultivation and labor education through the system simulation, verifying the feasibility of the labor education reform based on the three-course parallelism in this paper.

The primary data and empirical data collected and organized in the process of empirical research are assigned to the variables. The system simulation is run in accordance with the initialization settings of the system. The results of the system operation of labor education carried out in S higher vocational can be obtained. Running the simulation model of the three-course parallel labor education system proposed in this paper in 12 months, and comparing the results of the traditional labor education...
operation without participating in this paper’s system with it, we can get the comparative results about the effect of labor education, and the comparison of the effect of labor education in the two cases is shown in Fig. 6, in which the vertical axis indicates the quantification of the effect of labor education, the higher the score the better the effect is, and the horizontal axis indicates the cycle time, and the comparison of the two cases can be seen by the two kinds of Comparison of the two cases can be seen from the overall comparative analysis, this paper based on three parallel labor education overall effect of the peak of 96 points, the peak of the traditional labor education of 85 points, in the 12-month period, the effect of conventional labor education in the conduct of the three months gradually appeared, compared to this paper’s labor education method is still at a lower level, but with the advancement of time, this paper’s method in the conduct of the 7, 8 months, the overall effect will catch up with the traditional labor education, but the overall effect of this paper’s method in the conduct of the 7, 8 months, the overall effect of the conventional labor education is still in a lower level. However, as time progresses, the overall effect of this paper’s method catches up with traditional labor education in 7 and 8 months. In 12 months, it improves by about 11 points compared with conventional education, which means that the three-lesson parallel labor education system has a more significant role in promoting the overall effect of labor education.

![Figure 6. The labor education effect of the two cases](image)

### 4.1.2 Comparative Analysis of System Dynamics Labor Education Resource Optimization

The optimization of labor resources based on system dynamics in 12 months can get the change in labor education resource utilization and compare it with the shift in traditional labor education resource utilization. The result of the comparison of labor education resource utilization in two cases is shown in Fig. 7, in which the vertical axis indicates the utilization rate of education resources. The horizontal axis indicates the time of the proceeding. From the comparison of the utilization rate of labor education resources in the two cases, it can be seen that the utilization rate of labor education resources after carrying out the optimization of labor education resources in this paper ranges from 0.72 to 0.94. The utilization rate of resources in traditional labor education ranges from 0.51 to 0.75. Compared with the optimization based on system dynamics in this paper, the utilization rate of labor education has increased by 19%-21%, which effectively improves the resources of labor education. Utilization rate for improving labor education.
4.2 **Empirical analysis of labor education quality evaluation**

4.2.1 **Analysis of factors for evaluating the quality of labor education**

This empirical analysis selects S higher vocational colleges and universities to investigate and analyze the quality of labor education in the labor education quality evaluation survey is divided into two parts: basic information and evaluation index system information, evaluation index system part of the design of the problem according to the establishment of the quality of labor education evaluation index system of the six indexes corresponds to the labor education evaluation standards was S1 education effect, S2 learning effect, S3 competence cultivation, S4 Educational Management, S5 Educational Resources, and S6 Educational Recognition. Each question adopts Richter’s five-level scale, which is “very important,” “important,” “unable to judge,” “not important,” “very unimportant,” and assigning each level from high to low, i.e., 5, 4, 3, 2, and 1. A total of 400 questionnaires were collected from S-schools, and 389 questionnaires were verified to be valid. Among these, 300 questionnaires were from students, 64 questionnaires were from teachers, and 25 questionnaires were from school staff. Staff 25 copies. After the limit test of the survey results, factor analysis was conducted on the six indicators of labor education quality, and the variance interpretation of labor education quality is shown in Table 1. The eigenvalues of education effect, learning effect, ability development, education management, education resources, and education recognition are between 1.240 and 2.254. The cumulative percentile of the variance is 98.75%, which indicates that the six indicators explain the quality of labor education in 98.75% of all variables. The 6 indicators of labor education quality are acceptable.

<table>
<thead>
<tr>
<th>Target</th>
<th>Initial eigenvalue</th>
<th>Percentage of variance</th>
<th>Add up (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1 Education effect</td>
<td>2.254</td>
<td>21.24</td>
<td>21.24</td>
</tr>
<tr>
<td>S2 Learning effect</td>
<td>1.987</td>
<td>20.58</td>
<td>41.82</td>
</tr>
<tr>
<td>S3 Ability culture</td>
<td>1.842</td>
<td>18.54</td>
<td>60.36</td>
</tr>
<tr>
<td>S4 Educational management</td>
<td>1.354</td>
<td>13.56</td>
<td>73.92</td>
</tr>
<tr>
<td>S5 Educational resources</td>
<td>1.323</td>
<td>14.98</td>
<td>88.90</td>
</tr>
<tr>
<td>S6 Education approval</td>
<td>1.240</td>
<td>9.85</td>
<td>98.75</td>
</tr>
</tbody>
</table>
4.2.2 Analysis of the results of the dimensions of the comprehensive evaluation of the quality of labor education

According to the six indicators of the quality evaluation of labor education in S higher vocational schools, namely, S1 educational effect, S2 learning effect, S3 competence development, S4 educational management, S5 educational resources and S6 educational recognition, the three-course parallel labor education proposed in this paper was carried out in S higher vocational schools and a questionnaire survey of the quality of labor education was conducted, which had five grades, namely, “excellent”, “good”, “average”, “poor” and “very poor”, with corresponding score values of “good”, “average”, “poor” and “very poor”, “good”, “fair”, “poor” and “very poor”, and the corresponding scores are as follows 5 points”, “4 points”, “3 points”, “2 points”, “1 point”, points”, a total of 550 questionnaires were distributed, including 50 experts, 100 teachers and 400 students, the recovery rate and effective rate of the questionnaires were 100%, and the comprehensive evaluation of the 6 indicators was shown in Figure 8, in which the box plot indicated the range of scores, and the right side was the scoring of the 550 investigators. S Higher vocational colleges and universities based on the paper’s three-courses-parallel labor education of the 6 The average scores of the six indicators are all above 4 points, which is an “excellent” level. Among them, the average score of education resources is 4.59, the highest among the six indicators, which indicates that S-school can effectively use labor education resources in labor education and improve the overall level of labor education and the labor education system based on this paper’s three-lesson parallel labor education system is valuable and excellent in the actual labor education.

![Figure 8. Comprehensive evaluation of various indicators](image)

In order to further verify the effect of this paper based on the three-course parallel labor education system, it is compared with the quality of traditional labor education when S higher vocational did not carry out the method of this paper, and the comparison of the quality of labor education under the two modes is shown in Fig. 9, in which the scores of the indicators of the labor education method of this paper are significantly higher than those of traditional labor education. The quality scores of traditional labor education are not higher than 4, of which only the score of education management is 4, and the gap with the method of this paper is not significant. While traditional labor education scores the lowest score of 3.21 points in educational resources, this paper’s labor education model improves by 1.38 points compared to it. Overall, this paper’s labor education sports based on three concurrent classes improve by 0.19~1.38 points compared to traditional labor education, which further verifies that this paper’s improved labor education system is able to effectively improve the overall quality of labor education.
5 Conclusion

This paper constructs a labor education system based on three classes in parallel, integrates and optimizes labor education resources based on system dynamics, and draws the following conclusions through empirical analysis of labor education:

1) The overall effect of labor education based on three-lesson parallelism in this paper has a maximum score of 96, and the maximum score of traditional labor education is 85. The overall effect of the labor education system in this paper is significantly better than that of the conventional model of labor education, and about 11 points have improved it compared with the traditional education, which indicates that the improved method in this paper can significantly enhance the effect of labor education.

2) In the comparison of the utilization rate of labor education resources, the utilization rate of labor education resources after carrying out the optimization of labor education resources in this paper ranges from 0.72 to 0.94, which improves the utilization rate of resources by 19% to 21% compared with the traditional labor education, which verifies the rationality of the optimization of the dynamic education resources in this paper, and provides an effective guarantee for labor education.

3) In the empirical analysis of the comprehensive evaluation of labor education, the six indicators of labor education evaluation constructed in this paper explain 98.75% of all the variables of the quality of labor education. The average scores of all the indicators are above 4 points, which are improved by 0.19~1.38 points compared with the traditional labor education, which further verifies that the labor education system based on the parallel improvement of the three classes in this paper can effectively and efficiently improve the quality of labor education and Promote the development of labor education.

Funding:

References


