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Research on Strategies for Improving the Quality of New Productivity Talent Cultivation in Higher Vocational Colleges in the Context of Digital Transformation

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Abstract This study focuses on enhancing the quality of talent cultivation for new-type productive forces in higher education institutions, establishing six dimensions to assess the adaptability of talent cultivation strategies. To obtain quantitative values for the six dimensions, a survey questionnaire on the adaptability of talent cultivation strategies was designed. This questionnaire demonstrated excellent reliability and validity, ensuring the credibility of the data. Based on this, single-factor analysis of variance, correlation tests, and multiple linear regression analysis were employed to deeply interpret the mechanisms underlying the adaptability of talent cultivation strategies. Through data analysis, it was found that the regression equation for the adaptability of talent cultivation strategies is 0.084 + 0.105 × matching degree + 0.119 × compatibility degree + 0.123 × compatibility degree + 0.109 × responsiveness degree + 0.093 × adjustment degree + 0.106 × synergy degree, demonstrating the influence relationship between the dimensions of the adaptability of talent cultivation strategies in higher education institutions, thereby further enhancing the quality of new-type productive forces talent cultivation in higher vocational colleges.

Index Terms single-factor variance method, correlation test method, multiple linear regression method, adaptability

I. Introduction

New-quality productive forces are not merely a simple upgrade of traditional productive forces; they encompass technological innovation, transformations in productive tools, and even profound impacts on labor force structure, industrial structure, and other areas [1]-[3]. Against this backdrop, higher vocational colleges face the challenge of not only cultivating students with solid professional skills but also nurturing composite, innovative talents who can quickly adapt to—and even lead—future productive force transformations [4]-[6]. Traditional educational models have often emphasized theoretical instruction, with students required to master foundational knowledge and technical skills. However, under the influence of new-quality productivity, mere knowledge transmission is no longer sufficient [7], [8]. This shift in mindset necessitates that educators integrate more practical exercises and case analyses into their teaching processes to cultivate students' innovative capabilities and problem-solving skills [9]-[11].

In the digital context, digital transformation has become a new trend in societal development, bringing disruptive impacts across all industries. The cultivation of new-quality productivity talent in higher vocational colleges also faces significant challenges and opportunities [12]-[15]. Literature [16] outlines the opportunities and challenges that digital transformation presents for vocational colleges, highlights the advantages and differences in digital capabilities among vocational colleges, and, based on game theory and the boxed pig game model, offers recommendations for talent cultivation in vocational colleges. The talent cultivation model for new-quality productive forces in vocational colleges requires in-depth research and practice under the backdrop of digital transformation to adapt to the changes of the times and meet societal demands [17], [18]. First, interdisciplinary integration: The digital era demands talent with interdisciplinary capabilities, requiring the cultivation of individuals with knowledge across multiple fields and interdisciplinary thinking abilities [19]. Literature [20] examines the current state and challenges of interdisciplinary translation talent cultivation and proposes recommendations for cultivating such talent. Vocational colleges can establish interdisciplinary research centers, encourage collaboration and exchange between different disciplines, offer interdisciplinary course offerings, and encourage students to participate in project-based learning [21], [22]. Second, open sharing of educational resources: Digital technology has made the open sharing of educational resources possible. Vocational colleges can utilize internet platforms to establish open online courses and share high-quality educational resources with students worldwide [23]-[25]. Literature [26] emphasizes the importance of educational resource sharing, pointing out that utilizing vocational education resource

sharing systems can maximize the integration and aggregation of educational resources in vocational colleges, thereby increasing interaction between teachers and students. Third, innovative teaching methods: In the context of digital transformation, vocational colleges need to explore innovative teaching methods. Literature [27] highlights the importance of innovative teaching methods in educational work and outlines popular innovative teaching methods, such as situational learning. Additionally, by introducing virtual reality and augmented reality technologies, students can be provided with richer and more immersive learning experiences. Online learning platforms can be used to offer self-directed learning courses, allowing students to independently choose their learning content and methods [28]-[30]. Literature [31] analyzes the practical experience and achievements of digital transformation in higher vocational colleges from the perspectives of digital teaching resource creation and application, as well as the enhancement of teachers' and students' digital capabilities. Through the analysis of typical cases, it outlines the best practices for digital transformation in vocational education and provides recommendations. Literature [32] examines the design and implementation of teaching methods for computer courses in higher vocational colleges, arguing that under the backdrop of digital transformation, innovation in teaching philosophy, content, and modes, coupled with the formulation of effective strategies, is a crucial pathway to enhancing the quality of talent cultivation. Literature [33] analyzes the optimization of talent cultivation strategies in higher vocational colleges to adapt to the digital transformation of the apparel industry, emphasizing that establishing a “digital + fashion” talent cultivation model and constructing digital teaching facilities are essential steps in building a talent cultivation system to cultivate digital talent for the apparel industry. Literature [34] explores the issues facing technical services in Chinese higher vocational colleges under the backdrop of societal digital transformation, and proposes research pathways to enhance the level of technical services in higher vocational colleges through school-enterprise collaboration and the construction of digital technical service platforms, aiming to promote the internationalization and specialization of Chinese higher vocational colleges.

This study is based on relevant theoretical frameworks and identifies six dimensions of adaptability in higher education talent cultivation strategies. To clearly illustrate the adaptability of higher education talent cultivation strategies, an empirical research plan for the dimensions of adaptability in higher education talent cultivation strategies has been developed. First, a random sampling method was used to select 300 students from vocational colleges in Region A as the research sample. Subsequently, through data collection and discussion-based exploration, a survey questionnaire on the adaptability of university talent cultivation strategies was completed. The questionnaire was then officially distributed to obtain the research data. Finally, with the support of SPSS software, an in-depth analysis of the adaptability of university talent cultivation strategies was conducted.

II. Exploring Talent Cultivation Strategies for Higher Vocational Colleges

II. A. Strategies for Improving the Quality of Talent Cultivation

II. A. 1) Optimizing Course Offerings

Optimizing the curriculum is one of the key strategies for enhancing the quality of talent cultivation at higher vocational colleges. By optimizing the curriculum, colleges can ensure that students receive knowledge and skills training closely aligned with societal needs. Higher vocational colleges should prioritize improving the quality of core professional courses, which entails conducting a comprehensive assessment of existing courses to ensure their content aligns with the latest industry trends and technical requirements. Additionally, colleges should strengthen communication and collaboration with enterprises and industry experts to promptly understand the latest industry demands and incorporate them into curriculum design. Introducing course content related to emerging fields is another important aspect of optimizing curriculum design. As science and technology continue to advance and society evolves, new knowledge and skill requirements emerge in emerging fields. Vocational colleges should promptly adjust and update course content to incorporate knowledge and skill development related to emerging fields, thereby meeting students' future career development needs.

II. A. 2) Strengthening the teaching staff

Improving the quality of talent cultivation in higher vocational colleges is a complex and important task, and strengthening teachers' professional training and academic exchanges is an important strategy. Faculty members are the core force in talent cultivation at vocational colleges, and their professional competence and teaching standards directly impact students' learning outcomes and overall development. Strengthening faculty professional development is the foundation for improving talent cultivation quality. Vocational colleges should establish a comprehensive faculty training system, including regularly organizing faculty to participate in various professional training courses and academic seminars, providing them with opportunities for in-depth learning and knowledge updates. These training activities can cover areas such as teaching methods, curriculum design, and teaching evaluation, helping faculty continuously enhance their teaching capabilities and professional competence. Enhancing academic exchange among teachers is an important means of improving the quality of talent cultivation.

Vocational colleges and universities should encourage teachers to actively participate in academic conferences, academic forums, and other academic exchange activities, engaging in in-depth academic discussions and collaborative research with peers. Through academic exchange, teachers can stay informed about the latest developments in their fields, broaden their academic horizons, and enhance the cutting-edge and practical nature of their teaching content.

II. A. 3) Strengthening Industry-Academia Collaboration

To improve the quality of talent cultivation in higher vocational colleges, strengthening industry-academia collaboration is an important measure. Establishing industry-academia collaboration bases is an effective way to provide students with practical opportunities. Schools can collaborate with relevant enterprises to jointly establish industry-academia collaboration bases. These bases can be training centers, innovation laboratories, or production internship bases, among others, aimed at providing students with practical opportunities. The bases should be equipped with advanced facilities and technology to meet students' practical needs. Schools and enterprises can jointly develop practical projects, allowing students to engage in hands-on activities and enhance their ability to solve real-world problems. Establishing industry-academia collaboration bases provides a platform for students to interact with enterprises, enabling them to communicate and collaborate with professional staff from enterprises, gain insights into industry demands, and understand technological trends.

II. B.Adaptability of talent cultivation strategies

II. B. 1) Adaptability

From a psychological perspective, there are numerous interpretations of adaptability. Research on this topic has progressed from simple human perception, cognitive learning, and social behavioral adaptation to more complex areas. The definitions and applications of the concept of adaptability within the field of psychology also exhibit varying degrees of complexity. Psychology, intelligence, and thought do not originate from innate maturity or acquired experience, but rather from the actions of the subject. The essence of these actions is the subject's adaptation to the object. The subject's adaptation to the object through action is the true cause of psychological development. He believes that every psychological response of an individual, whether it is an external action or an internalized mental action, is a form of adaptation. The essence of adaptation lies in achieving balance between the organism and the environment. Adaptation is achieved through two forms: one is assimilation, which involves incorporating environmental factors into the organism's existing schemas or structures to strengthen and enrich the subject's actions. The other is accommodation, which involves altering the subject's actions to adapt to objective changes, such as transitioning from breastfeeding to eating solid food. This requires modifying the original bodily actions and adopting new actions to adapt to the environment. Thus, the individual achieves balance between the organism and the environment through these two forms of adaptation. If the organism and environment lose balance, behavioral changes are necessary to restore equilibrium. This continuous process of balance-imbalance-balance is the process of adaptation, which constitutes the essence and cause of psychological development.

II. B. 2) Adaptability of talent cultivation strategies

The adaptability of talent development strategies refers to their ability to respond to and adapt to changes in both internal and external environments, with the core focus on ensuring that these strategies enhance individuals' adaptability. The adaptability of talent development strategies can be divided into six dimensions: the alignment of talent development strategies with socio-economic development needs, the compatibility of talent development strategies with the characteristics of vocational education, the compatibility of talent development strategies with regional development differences, the responsiveness of talent development strategies to individual student capabilities, the dynamic adjustability of talent development strategies to environmental changes, and the reverse synergy of talent development strategies with social development. These are abbreviated as alignment, compatibility, adaptability, responsiveness, adjustability, and synergy.

III. Study Design

Through an exploratory analysis of the adaptability of talent cultivation strategies, six dimensions of the adaptability of talent cultivation strategies in higher education institutions were identified. To further delve into the adaptability of talent cultivation strategies in higher education institutions, a corresponding empirical research design was developed. The specific design is outlined below:

III. A. Research subjects

The research subjects of this paper are college students (excluding adult education students), and all samples are from universities in Region A. This study used simple random sampling to select 300 samples. The research

subjects came from various majors, including management, sports, art, engineering, and computer science. For the convenience of statistical analysis, the majors were divided into liberal arts and science.

III. B. Research Steps

This study will be conducted in five steps, as described below:

(1) Data collection phase. Through the collection and analysis of data from CNKI, SDOS, master's and doctoral theses, and academic journals, a theoretical foundation and basis for the study will be established. Literature on the meaning of the adaptability of university talent cultivation strategies and the adaptability of university talent cultivation strategies will be searched to prepare for the development of a questionnaire for evaluating the adaptability of university talent cultivation strategies and the overall questionnaire.

(2) Questionnaire design phase. Based on the literature analysis, an open-ended questionnaire will be designed, supplemented by interviews, to collect general information related to this study. The focus will be on collecting the items needed for the questionnaire evaluating the adaptability of university talent cultivation strategies. Based on the analysis results, relevant items will be deleted or modified to form a comprehensive closed-ended questionnaire containing the evaluation system for the adaptability of university talent cultivation strategies.

(3) Prediction stage. A small-scale prediction was conducted using the overall questionnaire containing the items for evaluating the adaptability of university talent cultivation strategies formed in the second stage. Through item analysis and exploratory factor analysis, the items were repeatedly screened and modified to obtain the constituent factors of the questionnaire for evaluating the adaptability of university talent cultivation strategies, and the formal survey questionnaire for evaluating the adaptability of university talent cultivation strategies was finally determined.

(4) Formal Administration Phase. A large-scale sample was collected from higher vocational colleges in Region A, and the formal questionnaire was used as the survey tool to administer the test to students. The principal investigators were graduate students specializing in this field.

(5) Data Processing Phase. A database was established using the results from the valid questionnaires, and relevant statistical analyses were conducted using SPSS statistical software.

III. C. Research Methods

This study primarily employs a combination of qualitative and quantitative research methods, including literature analysis, interviews, questionnaire surveys, and comparative analysis.

Literature analysis: This paper comprehensively searched for academic literature related to adaptability, student career planning and guidance, and the adaptability of higher education talent cultivation strategies both domestically and internationally through the digital libraries of higher vocational colleges in Region A, Shushengzhi Jia, Fangzheng Apabi Digital Books, CNKI, Wanfang, VIP, PQDD Postgraduate Thesis Database, as well as Baidu and Google search engines. This was done to prepare for the literature review, questionnaire survey, and theoretical analysis.

Interview Method: This paper is based on an open-ended questionnaire survey, supplemented by interviews with students from different grades, to gain an initial understanding of their perceptions and views on the research content. During the research process, in-depth interviews were conducted with a small number of students to collect the necessary research data, providing a certain level of assurance for the in-depth analysis of the survey results.

Questionnaire survey method: This study first employed an open-ended questionnaire survey to collect data on the adaptability of university talent cultivation strategies, improvement measures, and other information, gaining an initial and general understanding of the situation. Based on the results of the open-ended questionnaire survey and previous literature, a closed-ended questionnaire was designed for a comprehensive and in-depth investigation.

Comparative analysis method: This study primarily compares and analyzes the adaptability of university talent cultivation strategies to identify more effective and targeted cultivation measures and strategies.

III. D. Research Tools

The primary research tool used in this study is the self-developed “Survey on the Adaptability of Talent Cultivation Strategies in Higher Education Institutions.” This questionnaire was developed based on literature analysis, open-ended questionnaires, and interviews, and was finalized after undergoing pilot testing, reliability and validity testing, and revisions. The questionnaire includes a self-assessment section on the adaptability of talent cultivation strategies in higher education institutions, aimed at understanding the current state of adaptability in talent cultivation strategies. Additionally, it includes six dimensions of adaptability in talent cultivation strategies. The questionnaire primarily uses a five-point Likert scale as its main question type, supplemented by open-ended questions.

III. D. 1) Questionnaire Development

The development of questionnaires should draw on theoretical findings from previous studies on the adaptability of higher education institutions' talent cultivation strategies, and should strive to include evaluation questionnaires that assess the adaptability dimensions of such strategies, with the aim of establishing a comprehensive and practical set of adaptability questionnaires. Specific considerations are as follows:

(1) When evaluating the adaptability of higher education institutions' talent cultivation strategies, it is important to select items that can directly or indirectly reflect how individuals will respond or perform when faced with the adaptability of such strategies.

(2) The various sub-dimensions of the adaptability of university talent cultivation strategies should comprehensively reflect the requirements of talent cultivation strategies on college students' adaptability from different perspectives. Additionally, the test items they contain should also differ from the adaptability manifestations of the six dimensions of matching degree, compatibility, responsiveness, adjustability, and coordination.

(3) To test the stability of participants' responses, a certain number of repeated items and a certain number of reverse-scored items should be included in the test.

Based on reliability and validity tests, the structure and content of the questionnaire should be adjusted and modified to formally establish the questionnaire. The formal closed-ended survey questionnaire consists of two parts: the first part is the participant's basic information, and the second part is the six dimensions of adaptability to university talent cultivation strategies.

III. D. 2) Questionnaire distribution

The “Survey Questionnaire on the Adaptability of Talent Cultivation Strategies in Higher Education Institutions” for formal investigation was completed in early May 2023. From May to July 2023, a questionnaire survey was conducted on higher education institutions in Region A using random sampling. A total of 300 questionnaires were distributed, and 300 were returned, with a return rate of 100%. Among them, 300 were valid questionnaires, with a validity rate of 100%.

III. E. Data statistical analysis methods

The research data obtained from the survey questionnaire was imported into SPSS 20.0 software. Using one-way analysis of variance, correlation tests, and multiple linear regression, the research data was further analyzed to demonstrate the adaptability of talent cultivation strategies in higher education institutions.

III. E. 1) Single-factor variance

Data analysis in SPSS often involves various T-tests, but T-tests can only compare differences between two groups of data. Among these, the one-sample T-test compares the difference between a single group of data and a single data point. The one-way analysis of variance (ANOVA) requires that the groups be independent, but it differs from the independent samples t-test in that the latter is only applicable for comparing two independent groups, while one-way ANOVA is applicable for comparing differences among three or more independent groups.

Let the single-factor A have r levels, denoted as $A_1, A_2, \cdots, A_r$ respectively, and at each level $A_i\left(i=1,2,\cdots,r\right)$, the indicator to be examined can be seen as a population $X_i\left(i=1,2,\cdots,r\right)$ and $X_i \sim N\left(\mu_i, \sigma^2\right)$, level $A_i\left(i=1,2,\cdots,r\right)$, n_i independent trials, sample denoted as X_{ij}, $i=1,2,\cdots,r$, $j=1,2,\cdots,n_i$, $X_{ij} \sim N\left(\mu_i, \sigma^2\right)$ and independent of each other.

(1) Establish the hypothesis

The hypothesis test is $H_0: \mu_1 = \mu_2 = \cdots = \mu_r$, and the alternative hypothesis is $H_1: \mu_1, \mu_2, \cdots, \mu_r$ are not all equal.

Since $X_{ij} - \mu_i = \varepsilon_{ij}$, let $\mu = \frac{1}{n}\sum_{i=1}^{r} n_i \mu_i$, $n = \sum_{i=1}^{r} n_i$, $\alpha_i = \mu_i - \mu$, $i=1,2,\cdots,r$, then the mathematical model is:

$$\begin{cases} X_{ij} = \mu + \alpha_i + \varepsilon_{ij}, i=1,2,\cdots,r, j=1,2,\cdots,n_i \\ \sum_{i=1}^{r} n_i \alpha_i = 0 \\ \varepsilon_{ij} \sim N\left(0, \sigma^2\right), \begin{matrix}\text{Each } \varepsilon_{ij} \text{ is independent, and } \mu_i \\ \text{and } \sigma^2 \text{ are unknown}\end{matrix} \end{cases} \tag{1}$$

Therefore, the original hypothesis is rewritten as:

$$H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha_r = 0 \tag{2}$$

(2) Constructing the statistic

To construct the statistic for testing hypothesis (1), we first need to identify the cause of the variation in X_{ij}. From $X_{ij} = \mu + \alpha_i + \varepsilon_{ij}$, we can see that if hypothesis (1) is true, the variation in X_{ij} is purely due to randomness [35]. If hypothesis (1) is false, then the variation in X_{ij} is caused by both the i th level and randomness. Therefore, we need to construct a measure to characterize the variation in X_{ij} and represent the two causes of variation using two additional measures. This is the sum of squares decomposition method in analysis of variance. Let:

$$\bar{X}_{i.} = \frac{1}{n_i}\sum_{j=1}^{n_i} X_{ij} \tag{3}$$

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{r}\sum_{j=1}^{n_i} X_{ij} \tag{4}$$

Introduction:

$$\begin{aligned} S_T &= \sum_{i=1}^{r}\sum_{j=1}^{n_i}(X_{ij} - \bar{X})^2 = \sum_{i=1}^{r}\sum_{j=1}^{n_i}(X_{ij} - \bar{X}_{i.})^2 + \sum_{i=1}^{r}\sum_{j=1}^{n_i}(\bar{X}_{i.} - \bar{X})^2 \\ &= S_E + S_A \end{aligned} \tag{5}$$

Also because:

$$S_A = \sum_{i=1}^{r} n_i\left(\bar{X}_{i.} - \bar{X}\right)^2 = \sum_{i=1}^{r} n_i\left(\alpha_i + \overline{\varepsilon_{i.}} - \bar{\varepsilon}\right)^2 \tag{6}$$

$$S_E = \sum_{i=1}^{r}\sum_{j=1}^{n_i}\left(X_{ij} - \bar{X}_{i.}\right)^2 = \sum_{i=1}^{r}\sum_{j=1}^{n_i}\left(\varepsilon_{ij} - \overline{\varepsilon_{i.}}\right)^2 \tag{7}$$

If H_0 holds, S_A only reflects random fluctuations; if H_0 does not hold, S_A also reflects the different level effects α_i of A. From a purely numerical perspective, when H_0 holds, $\frac{S_A/(r-1)}{S_E/(n-r)} \approx 1$, while when H_0 does not hold, this ratio will be much greater than 1. It can be proven that: $S_T/\sigma^2 \sim \chi^2(n-1)$. $S_E/\sigma^2 \sim \chi^2(n-r)$. $S_A/\sigma^2 \sim \chi^2(r-1)$, and S_E and S_A are independent of each other. Therefore, the constructed statistic is:

$$F = \frac{(n-r)S_A}{(r-1)S_E} \sim F(r-1, n-r) \tag{8}$$

III. E. 2) Correlation test

The Pearson correlation coefficient, also known as the Pearson product-moment correlation coefficient, is a statistical parameter generally used to quantitatively measure the correlation between variables. Its formula is:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\left(\sum X^2 - \frac{\left(\sum X\right)^2}{N}\right)\left(\sum Y^2 - \frac{\left(\sum Y\right)^2}{N}\right)}} \tag{9}$$

In the equation, the variable X is the set of all points' x coordinates. The variable Y is the set of all points' y coordinates. N denotes the total number of points.

The larger the absolute value of the Pearson correlation coefficient, the stronger the correlation between the variables [36]. When the correlation coefficient approaches 1 or -1, it indicates a stronger correlation. When the correlation coefficient approaches 0, it indicates a weaker correlation. When the correlation coefficient is greater than 0, it indicates a positive correlation. When the correlation coefficient is less than 0, it indicates a negative

correlation. Typically, the strength of the correlation between variables can be determined by the range of values of the absolute value of the correlation coefficient.

III. E. 3) Multiple linear regression

Regression is the process of predicting the target value of another numerical variable using a set of known data [37]. In mathematics, the term “linear” typically refers to a linear mapping, which is a function (or mapping) that satisfies both additivity and homogeneity. Linear regression is a type of regression analysis, indicating that there is a linear relationship between the independent variable and the dependent variable. Regression analysis examines the quantitative relationships between variables, describes these relationships using specific mathematical equations, and uses these equations to estimate the values of certain variables while providing the reliability of such estimates. The linear regression equation is:

$$y = m_1 x_1 + m_2 x_2 + \cdots + m_n x_n + b \tag{10}$$

For the known array $\left(x_{ij}, y_j\right)$ where $i = 1 \cdots n, j = 1 \cdots k$, we have:

$$\begin{bmatrix} x_{11} & x_{21} & \cdots & x_{n1} & 1 \\ x_{12} & x_{22} & \cdots & x_{n2} & 1 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ x_{1k} & x_{2k} & \cdots & x_{nk} & 1 \end{bmatrix} \begin{bmatrix} m_1 \\ m_2 \\ \cdots \\ m_n \\ b \end{bmatrix} = \begin{bmatrix} y_1 \\ y_2 \\ \cdots \\ y_k \end{bmatrix} \tag{11}$$

Let matrix $M = \begin{bmatrix} x_{11} & x_{21} & \cdots & x_{n1} & 1 \\ x_{12} & x_{22} & \cdots & x_{n2} & 1 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ x_{1k} & x_{2k} & \cdots & x_{nk} & 1 \end{bmatrix}$, $Y = \begin{bmatrix} y_1 \\ y_2 \\ \cdots \\ y_k \end{bmatrix}$ be:

Then equation (11) is:

$$M \begin{bmatrix} m_1 \\ m_2 \\ \cdots \\ m_n \\ b \end{bmatrix} = Y \tag{12}$$

M^T is the transpose matrix of M, then:

$$\begin{bmatrix} m_1 \\ m_2 \\ \cdots \\ m_n \\ b \end{bmatrix} = \left(M^T M\right)^{-1} \left(M^T Y\right) \tag{13}$$

(1) Goodness of fit R^2

Formula (14) is as follows:

$$R^2 = Q_1 / S_{yy} \tag{14}$$

where, $S_{yy} = \sum (y_i - \overline{y})^2$ is the total sum of squared deviations of y, which is the sum of the squares of the deviations of each observation value y_i from its mean value $\overline{y}$.

$Q_1 = \sum (\tilde{y}_i - \overline{y})^2$ is the regression sum of squares for y, which is the sum of the squares of the deviations of each calculated value $\tilde{y}_i$ from the mean $\overline{y}$.

R^2 is a decimal less than 1; the closer it is to 1, the better the model fits.

(2) Significance test

T test: Used to test the linear significance of a particular independent variable $(x_1,\cdots,x_n)$ for y. If a particular x_i is not significant, it means that this variable can be removed from the model to make it more concise. The result of the T test is determined by the P-value.

F test: Used to test the overall linear significance of all independent variables $(x_1,\cdots,x_n)$ on y. The F test looks at the Significant F value. The P-value and Significant F value are generally required to be less than 0.05, with smaller values indicating greater significance.

IV. Empirical Research Analysis

IV. A. Sample Characteristics Analysis and Descriptive Statistics

IV. A. 1) Sample characteristic analysis

A questionnaire survey was conducted on universities in Region A using random sampling. A total of 300 questionnaires were distributed, and 300 were returned. Using SPSS statistical analysis software, a statistical analysis of the sample characteristics was conducted. The results of the sample characteristic analysis are shown in Table 1. The results indicate that in terms of gender, there were 164 male students and 136 female students, accounting for 54.67% and 45.33%, respectively. In terms of major, the number of science majors (171) was greater than the number of liberal arts majors (129), with a difference of 14.00% in the proportion of the two groups. In terms of party membership, the majority of the research subjects were non-party members (153), with a small difference between non-party members and party members, approaching 50.00%. In terms of student leadership roles, 131 students held such positions, while 169 did not, with respective proportions of 43.67% and 56.33%. Regarding employment, 88 students had secured employment, while 212 had not, reflecting the challenges in the employment trends among students. Through the analysis of sample characteristics, the distribution of the study sample's characteristics can be understood, providing important theoretical foundations for subsequent differential analyses.

Table 1: Results of sample feature analysis

Project	Content	Number of people	Percentage
Gender	Female	136	45.33%
	Male	164	54.67%
Professional	Liberal arts	129	43.00%
	Science	171	57.00%
Party member	Yes	147	49.00%
	No	153	51.00%
Urban and rural areas	City	119	39.67%
	Country	181	60.33%
Whether one is a student cadre or not	Yes	131	43.67%
	No	169	56.33%
Whether the work has been implemented	Yes	88	29.33%
	No	212	70.67%

IV. A. 2) Descriptive statistical analysis

This study employs the Likert five-point scale to assign scores to the scale options, with “completely disagree” scored as 1 point, “somewhat disagree” as 2 points, ‘neutral’ as 3 points, “somewhat agree” as 4 points, and “completely agree” as 5 points. The theoretical average score is 3. The higher the option score, the more adaptable the strategy. A score of 4 or higher indicates that the university's talent cultivation strategy is highly adaptable. Descriptive statistical analysis was conducted on the quantitative values of the six dimensions of the adaptability of university talent cultivation strategies. The results of the descriptive statistical analysis are shown in Table 2. As shown in the table, the average scores for the dimensions of the adaptability of university talent cultivation strategies, arranged from highest to lowest, are: compatibility (3.892 ± 0.711) > adjustability (3.814 ± 0.603) > responsiveness (3.742 ± 0.712) > Alignment (3.625 ± 0.716) > Coordination (3.619 ± 0.638) > Matching (3.531 ± 0.789). The highest score was for Compatibility, at 3.892 ± 0.711, while the lowest score was for Matching, at 3.531 ± 0.789. From the average values, the compatibility aspect of university talent cultivation strategy adaptability performed relatively well, while the average values for fit, coordination, and matching were below the overall average (3.704). This indicates that university talent cultivation strategy adaptability requires further efforts in fit, coordination, and matching to enhance its overall adaptability.

Table 2: Descriptive statistical analysis results

Dimension	Quantity	Max	Min	Average value	Standard deviation
Matching degree	300	1.00	5.00	3.531	0.789
Fit degree	300	1.00	5.00	3.625	0.716
Compatibility	300	1.00	5.00	3.892	0.711
Response degree	300	1.00	5.00	3.742	0.712
Adjustment degree	300	1.00	5.00	3.814	0.603
Synergy degree	300	1.00	5.00	3.619	0.638

IV. B. Differential Analysis

IV. B. 1) Analysis of Differences Between Different Majors

A one-way analysis of variance (ANOVA) was conducted to assess the adaptability of university talent cultivation strategies across various dimensions for different majors. The results of the analysis of differences between majors are presented in Table 3. As shown in the statistical results of Table 3, significant differences were observed between liberal arts and science students, indicating that science students exhibit greater adaptability than liberal arts students. In particular, the differences in responsiveness (T = -1.715, P = 0.007) reached a significant level, and compatibility, fit, adjustment, and coordination also showed significant differences. Only matching did not show significant differences. The table also reflects that liberal arts students are more inclined to seek employment assistance, and the differences in the adaptability of talent cultivation strategies between majors are clearly evident.

Table 3: Analysis results of differences among different specialties

Dimension	Liberal arts (129)		Science (171)		T-Value	P-Value
	M	SD	M	SD		
Matching degree	2.866	0.624	2.883	0.633	-0.795	0.057
Fit degree	2.507	0.748	3.848	0.681	-0.997	0.025
Compatibility	2.672	0.608	3.694	0.677	-1.355	0.016
Response degree	2.777	0.752	3.988	0.652	-1.715	0.007
Adjustment degree	2.819	0.684	3.835	0.662	-0.854	0.022
Synergy degree	2.717	0.763	3.735	0.671	-1.784	0.034

IV. B. 2) Analysis of gender differences

A one-way analysis of variance (ANOVA) was conducted on the adaptability of higher education talent cultivation strategies across various dimensions, stratified by gender. The specific results are presented in Table 4. As shown in Table 4, there are significant differences in the adaptability of talent cultivation strategies between male and female college students, with all six dimensions exhibiting significant differences ($P < 0.05$). Male students generally demonstrate higher adaptability to university talent cultivation strategies than female students. The current employment environment, coupled with numerous job openings that explicitly or implicitly prioritize male candidates, and the fact that female students tend to set higher standards for themselves compared to male students, results in lower adaptability to talent cultivation strategies among female students.

Table 4: Analysis of Gender differences

Dimension	Female (136)		Male (164)		T-Value	P-Value
	M	SD	M	SD		
Matching degree	2.856	0.616	3.663	0.693	2.752	0.002
Fit degree	2.715	0.611	3.761	0.641	1.561	0.008
Compatibility	2.703	0.746	3.766	0.721	2.178	0.01
Response degree	2.779	0.799	3.814	0.732	1.807	0.004
Adjustment degree	2.559	0.796	3.719	0.673	1.536	0.006
Synergy degree	2.784	0.604	3.702	0.793	3.249	0.01

IV. B. 3) Analysis of Differences Among Students from Different Regions

A differential analysis was conducted on the adaptability of university talent cultivation strategies across various dimensions based on different regions of origin. The specific results are shown in Table 5. As can be clearly seen from Table 5, students from urban areas generally scored lower on talent cultivation strategy adaptability than those

from rural areas, indicating that students from rural areas exhibit greater adaptability in talent cultivation strategies than those from urban areas. Due to relatively underdeveloped family conditions and surrounding living environments, college students from rural areas bear heavier responsibilities and face higher expectations from their families, their psychological resilience is relatively weaker, and during the job-seeking process, there are fewer people around them who can provide assistance, leading to lower adaptability of talent cultivation strategies. Additionally, there are significant differences ($P < 0.05$) between urban and rural students across the six dimensions of adaptability.

Table 5: Analysis of the Differences among Different Student Origins

Dimension	City (119)		Country (181)		T-Value	P-Value
	M	SD	M	SD		
Matching degree	3.629	0.751	2.539	0.772	2.659	0.006
Fit degree	3.509	0.602	2.807	0.655	3.132	0.004
Compatibility	3.774	0.685	2.673	0.605	1.774	0.006
Response degree	3.526	0.749	2.792	0.694	1.851	0.002
Adjustment degree	3.835	0.746	2.656	0.741	3.445	0.007
Synergy degree	3.612	0.711	2.777	0.775	1.086	0.003

IV. B. 4) Analysis of differences between class leaders

According to whether college students are class officers, a one-way analysis of variance was conducted on various dimensions of the adaptability of talent cultivation strategies. The specific results are shown in Table 6. Table 6 shows that there is no significant difference between college students who are class officers and those who are not in terms of the adaptability of talent cultivation strategies. None of the six dimensions reached the level of significance ($P > 0.05$), indicating that whether or not a student is a class officer has little effect on the adaptability of talent cultivation strategies.

Table 6: Whether it is a differential analysis of class cadres

Dimension	Yes (147)		No (153)		T-Value	P-Value
	M	SD	M	SD		
Matching degree	2.782	0.765	2.622	0.668	3.192	0.114
Fit degree	2.727	0.655	2.504	0.689	2.396	0.251
Compatibility	2.691	0.685	2.853	0.783	3.416	0.259
Response degree	2.617	0.713	2.519	0.764	1.584	0.124
Adjustment degree	2.718	0.644	2.703	0.657	2.615	0.113
Synergy degree	2.655	0.654	2.698	0.638	2.469	0.287

IV. B. 5) Analysis of Differences in Employment Status

Using one-way analysis of variance, we investigated the differences in adaptability between students in different employment statuses and talent cultivation strategies. The results of the difference analysis are shown in Table 7. Based on the data in the table, it can be seen that there is little difference between the adaptability values of unemployed students and employed students, and there is no significant difference between the two ($P>0.05$).

Table 7: Results of differential analysis

Dimension	Yes (88)		No (212)		T-Value	P-Value
	M	SD	M	SD		
Matching degree	2.622	0.719	2.707	0.625	1.915	0.264
Fit degree	2.504	0.676	2.674	0.754	1.683	0.198
Compatibility	2.853	0.636	2.654	0.786	1.517	0.245
Response degree	2.519	0.692	2.576	0.639	2.635	0.238
Adjustment degree	2.703	0.678	2.781	0.773	1.998	0.123
Synergy degree	2.698	0.625	2.609	0.744	3.231	0.112

IV. B. 6) Analysis of differences between Party members and non-Party members

Using one-way analysis of variance, we investigated whether being a Party member had an impact on the adaptability of talent cultivation strategies. The specific analysis results are shown in Table 8. The data shows that whether college students are Party members has little impact on the adaptability of talent cultivation strategies, and there is no significant difference in the numerical values (P>0.05).

Table 8: Analysis of whether it is a Party member's difference

Dimension	Yes (131)		No (169)		T-Value	P-Value
	M	SD	M	SD		
Matching degree	2.502	0.604	2.759	0.626	2.133	0.188
Fit degree	2.855	0.619	2.733	0.773	2.197	0.226
Compatibility	2.768	0.604	2.838	0.798	1.768	0.163
Response degree	2.781	0.742	2.598	0.754	1.512	0.114
Adjustment degree	2.882	0.642	2.786	0.675	2.285	0.299
Synergy degree	2.677	0.612	2.504	0.629	3.324	0.281

IV. C. Correlation testing and regression analysis

The preceding section demonstrated the impact of sample characteristics (control variables, also known as external conditions) on the adaptability of talent cultivation strategies through an analysis of differences in adaptability. This subsection will use Pearson's correlation coefficient and multiple linear regression analysis to explore the relationship between the internal dimensions of talent cultivation strategy adaptability. The specific analysis process is as follows:

IV. C. 1) Correlation test

Before conducting an adaptive regression analysis of talent development strategies, it is advisable to first briefly analyze the correlations among the variables and dimensions. This study employs Pearson's correlation coefficient to assess the correlations between variables. The results of the correlation tests are presented in Table 9, where PC, Sig, and N represent the Pearson correlation coefficient, significance level, and sample size of the study subjects, respectively. Based on the data in the table, it can be observed that the Pearson correlation coefficients for all dimensions are above 0.2, and the corresponding significance values are all less than 0.05. This can be summarized as follows: the six dimensions set in this study have significant correlations, which also ensures the validity of the subsequent talent development strategy adaptive regression analysis. The following sections will provide an in-depth analysis of the regression analysis results.

Table 9: Correlation test results

Dimension		Matching degree	Fit degree	Compatibility	Response degree	Adjustment degree	Synergy degree
Matching degree	PC	1	0.312	0.472	0.291	0.402	0.366
	Sig	0	0.007	0.007	0.001	0.006	0.003
	N	300	300	300	300	300	300
Fit degree	PC	0.312	1	0.268	0.323	0.491	0.483
	Sig	0.007	0	0.002	0.008	0.005	0.008
	N	300	300	300	300	300	300
Compatibility	PC	0.472	0.268	1	0.293	0.245	0.398
	Sig	0.007	0.002	0	0.005	0.004	0.001
	N	300	300	300	300	300	300
Response degree	PC	0.291	0.323	0.293	1	0.427	0.356
	Sig	0.001	0.008	0.005	0	0.003	0.001
	N	300	300	300	300	300	300
Adjustment degree	PC	0.402	0.491	0.245	0.427	1	0.213
	Sig	0.006	0.005	0.004	0.003	0	0.008
	N	300	300	300	300	300	300
Synergy degree	PC	0.366	0.483	0.398	0.356	0.213	1
	Sig	0.003	0.008	0.001	0.001	0.008	0
	N	300	300	300	300	300	300

IV. C. 2) Regression Analysis

Based on the correlation analysis conducted in the preceding section, it can be concluded that the six dimensions of adaptability in higher education talent cultivation strategies established in this study are suitable for regression analysis. The dimensions of compatibility, alignment, compatibility, responsiveness, adjustability, and coordination are set as independent variables, while the adaptability of higher education talent cultivation strategies is set as the dependent variable. After setting the research variables, a multiple linear regression algorithm was employed to explore the influence relationships among the internal dimensions of the adaptability of university talent cultivation strategies. The results of the regression analysis are shown in Table 10. Based on the data in the table, the regression equation for the adaptability of university talent cultivation strategies is: Adaptability = 0.084 + 0.105 × Matching + 0.119 × Compatibility + 0.123 × Compatibility + 0.109 × Responsiveness + 0.093 × Adjustability + 0.106 × Synergy, which explains the interactive relationships among the six dimensions of the adaptability of university talent cultivation strategies. For example, when the quantified value of matching increases by 1 unit, the quantified value of the adaptability of university talent cultivation strategies increases by 0.105 units. The remaining five dimensions follow the same principle, with the regression equation serving as the primary reference basis.

Table 10: Regression analysis results

Model			Standardized coefficient Beta	T-Value	Sig.
Constant	0.084	0.023		12.074	0.004
Matching degree	0.105	0.025	0.099	7.052	0.008
Fit degree	0.119	0.018	0.102	0.935	0.003
Compatibility	0.123	0.012	0.122	0.393	0.002
Response degree	0.109	0.026	0.107	-1.443	0.003
Adjustment degree	0.093	0.009	0.096	-2.423	0.005
Synergy degree	0.106	0.022	0.132	3.266	0.009

V. Conclusion

Based on relevant theories, this paper categorizes the adaptability of talent cultivation strategies in higher education institutions into six dimensions and obtains quantitative values for this study through a questionnaire survey. The obtained quantitative values are then imported into SPSS statistical analysis software, and single-factor analysis of variance, correlation testing, and multiple linear regression are used to conduct an in-depth exploration of the adaptability of talent cultivation strategies in higher education institutions. The regression equation for the adaptability of talent cultivation strategies in higher education institutions is 0.084 + 0.105 × Matching Degree + 0.119 × Compatibility Degree + 0.123 × Compatibility Degree + 0.109 × Responsiveness Degree + 0.093 × Adjustability Degree + 0.106 × Synergy Degree. This equation reveals the interactive relationships among the six dimensions of the adaptability of talent cultivation strategies in higher education institutions, providing valuable guidance for enhancing the quality of talent cultivation in higher education institutions.

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