The Core Importance of High Quality Development of Vocational Undergraduate "Dual-Teacher" Teaching Staff in the Information Age

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Abstract How to better improve the quality of "dual-teacher" teachers and promote the overall development of university education is one of the most important issues at present. In this paper, on the basis of clarifying the connotation of "dual-teacher" teachers, based on Person's correlation coefficient to determine the correlation between the research variables, the use of least squares to explore the significance of regression coefficients and multiple covariance between the variables, and to complete the research design of "dual-teacher" teacher team construction under the support of linear regression model. Complete the research design of "dual-teacher" under the support of linear regression model. The research object and sample were determined, and the data were obtained through the survey and put into the regression model. The results show that school orientation (-0.071, 0.011), title (-0.112, 0.009), study abroad experience (0.518, 0.004), the number of school-enterprise cooperation (0.667, 0.005), social sponsorship (0.578, 0.006), the source of funding (0.784, 0.002), faculty planning (0.769. 0.007), qualification access (0.553, 0.007), cultivation and training (0.627, 0.013), and evaluation incentives (0.558, 0.004) are all regressively significantly correlated with the development of high quality of vocational undergraduates' "dual-teacher" teaching force. This study provides a reference for the construction of dual-teacher team in local colleges and universities to meet the requirements of education for social and economic development.

Index Terms Person's correlation coefficient, Least squares method, Linear regression model, Dual-teacher teachers

I. Introduction

Teachers are at the heart of education. Teachers are the first quality of education quality, and standards must come first in order for teachers to develop [1]–[3]. The establishment of the basic standard of "double-teacher" teachers is not only the proper meaning of the construction of the vocational education teacher system, but also an important foundation for promoting the construction of high-quality "double-teacher" teachers.

The development of higher vocational colleges and universities located in the vocational education highland carries a historical mission, aiming to cultivate high-level technical and skilled personnel to promote the upgrading of high-end industries, and to create a "dual-teacher" teacher team with good teacher ethics, good professional qualities, and strong teaching ability has become the core element of the construction of high level of higher vocational [4]–[7]. Therefore, under the background of vocational education highland how to promote higher vocational colleges and universities "dual vocational education highland background teacher type" teacher team construction of high-quality development is the current research hotspot in the field of vocational education, but also the current preparations for vocational undergraduate education of higher vocational colleges and universities are faced with the problem.

The goal of vocational education reform is to promote the high-quality development of vocational education, and the starting point and core of the construction of high-quality vocational education is the high-level construction of the "dual-teacher" team, and vocational education without a high-level dual-teacher team is not the real meaning of high-quality education [8]–[10]. Among them, the concept of "dual-teacher type" or "dual-teacher quality" in the field of vocational education refers to professional teachers in vocational colleges who have obtained industry qualification certificates, industry technical titles, or skill level certifications in a certain professional industry field, and have a teaching qualification certificate in a higher education institution [11]–[13]. In the process of the development of vocational education at home and abroad, vocational colleges in various countries have always attached great importance to the construction quality of "double-teacher" teachers, especially in the recruitment and selection of teachers and team training.

The cultivation of "dual-teacher" teachers is also a sys-

tematic project, which requires the synergy of multiple sub-systems, such as society, industry, enterprises, and schools, to form a pull effect, so as to promote the high-quality development of "dual-teacher" teacher training. From the social level, teacher training needs to create a good social environment, especially the government should create a good policy environment, increase the incentive of "dual-teacher" teacher training [14]–[16]. At the industry and enterprise level, enterprises should take the initiative to cooperate with higher vocational colleges and universities to establish a mutually open, interdependent, and mutually promoting interest entity characterized by common goals, common construction, common management, shared results, and shared risks in the construction of "dual-teacher" teachers. At the school level, colleges and universities should make every effort to build a high-quality "dual-teacher" teacher team by increasing investment, improving the system, creating platforms, innovating mechanisms and strengthening training. In this way, the construction of "dual-teacher" teacher team in higher vocational colleges and universities, as a synergistic theoretical carrier, will be gradually transformed into an organizational form of in-depth cooperation among the society, industry, enterprises and schools [17]. Each subject plays its own role, shares resources, manages together, supports each other, and finally forms a benign interaction of the "dual-teacher" teacher team construction ecology.

This paper firstly proposes the research design of "dual-teacher" teachers under linear regression theory. Secondly, based on the different educational concepts of the times, the concept of "dual-teacher" teachers is categorized into traditional and new situation "dual-teacher" teacher concepts. Then the linear regression model for the construction of "dual-teacher" teachers in colleges and universities is constructed by combining Person's correlation coefficient calculation method and the least squares method, and the significance of regression and statistical multiple covariance test are elaborated in detail. Finally, the research object and sample are determined, and the questionnaire is issued to obtain the research data, which is then tested for reliability and validity to ensure the rigor of the research program. The regression equation of the factors influencing the construction of "dual-teacher" teachers is constructed through the sample data, and the core meaning of its high-quality development is dug out.

II. Research model on "dual-teacher" teachers and their influencing factors

A. Dual Teacher Philosophy

1) Traditional concept of "dual-teacher" teachers
The "double teacher" teacher is the characteristic of the Chinese vocational education, but the working education community has no standard definition of the "double teacher" teacher. The traditional concept has the following definition:

1) Specific literal understanding
Specific literal understanding of "dual-certification type", "dual-title type", "dual-qualification type", "dual-

integration type" and so on. Dual-credential", "dual-title", "dual-qualification", "dual-fusion", etc. This kind of viewpoint says that "dual-teacher" teachers in undergraduate colleges and universities are not teachers on a single level, but need to emphasize their "dual", and give them another technical position, which is usually reflected through the title qualification, and need to combine their teacher status with their technical position, so that they can be recognized as teachers in their own right. The identity of the teacher and the technical position need to be combined and utilized in practice.

2) Abstract conceptual understanding
Abstract conceptual understanding of "multi-teacher", "specific", "hierarchical" and so on, this kind of view that the concept of "double teacher" is only to emphasize the importance of practice, and the word "double" is just a word. This kind of viewpoint believes that the concept of "dual-teacher" is only to emphasize the importance of practice, which is put forward in the specific background of the higher vocational education sector that emphasizes the theory but not the practice, and the word "dual" is only a synonym, and leaving this specific educational background, the reference to "dual-teacher" will lose the meaning of "dual-teacher". Without this specific educational context, the reference to "dual teacher" loses its practical significance.

2) The concept of "dual-teacher" teachers in the new situation
Because the "two-teacher" teacher definition itself is complex, it cannot be defined in a single perspective. Combining the commonality and differences of scholars, the "two-teacher" teacher definition of the new situation is no longer from a single point of view, and the human identity is the same as the "two-teacher" teachers.

1) Knowledge structure
Not only to provide basic cultural knowledge for the poor cultural foundation and low self-esteem of higher vocational students, but also to provide cutting-edge technical counseling for the strong operational ability and adaptability of higher vocational students. Therefore, the knowledge structure of "dual-teacher" teachers needs to reflect the traditional teachers' profound knowledge and the excellent master's skill.

2) Competency structure
First, the primary ability of teachers is to be able to teach, that is, to achieve the ultimate goal of educating students through the main form of teaching. Teachers will be their own professional knowledge, professional skills through their education and teaching capabilities into students' own knowledge and skills. Secondly, "dual-teacher" teachers are required to participate in enterprise practice activities on a regular basis, undertake actual jobs in enterprises, and often participate in academic activities organized by the industry. Thirdly, the scientific research requirements here favor the development and promotion of technology, which is closely

related to practical life and transforms theories into real productivity.

3) Quality structure

First, they should have high moral quality, which is specifically manifested in the fact that "dual-teacher" teachers in higher vocational education should always be careful with what they say and do, and should not harm the legitimate rights and interests of the school, and should always safeguard the legitimate rights and interests of the students. Second, the professional quality of a wide range, including scientific way of thinking, efficient behavior, long-term development vision, a high degree of professionalism and positive attitude of cooperation. Thirdly, the quality of teachers' psychological quality directly affects whether their teaching tasks can be successfully accomplished, because the learning process is always a spiritual interaction between teachers and students, and the teachers' psychological factors have the strongest power of projection on the students.

B. Linear regression models

1) Correlation coefficients

Among the relationships between a large number of variables, they can usually be categorized into two different types: functional relationships and correlations. If the relationship between two variables is not a definite one-to-one correspondence, but varies within a certain range according to a certain law, this interrelationship between variables can be called a correlation with uncertainty.

Correlation analysis refers to the analysis of two or more elements of the variables with correlation, can measure the degree of correlation between the two variables due to the close degree. And Pearson correlation coefficient is used to measure the linear relationship between two variables. There is n data pair $(a_i, b_i)\,(i = 1, 2, \cdots, n)$, Pearson correlation coefficient formula:

$$r = \frac{\sum_{i=1}^{n} (a_i - \bar{a})(b_i - \bar{b})}{\sqrt{\sum_{i=1}^{n} (a_i - \bar{a})^2 \sum_{i=1}^{n} (b_i - \bar{b})^2}}, \quad (1)$$

where $\bar{a} = \sum_{i=1}^{n} a_i, \bar{b} = \sum_{i=1}^{n} b_i$.

Pearson's correlation coefficient ranges from: $|r| \leq 1, r$ for a positive value indicates that the direction of correlation between the two is a positive correlation, i.e., the independent variable grows, the dependent variable grows with it, the two variables change in the same direction, and when one variable changes from large to small or small to large, the other variable changes from large to small or small to large, and negative values indicate that the direction of correlation is a negative correlation, which is the opposite of the positive direction of correlation; $|r| = 1$. The two are perfectly correlated; $0.95 \leq |r| < 1$, the two are significantly correlated; $0.8 \leq |r| < 0.95$, the two are highly correlated; $0.5 \leq |r| < 0.8$, the two are moderately correlated; $0.3 \leq |r| < 0.5$, the two are poorly correlated; $0 < |r| < 0.3$, the two are weakly correlated; $|r| = 0$, the two are not correlated.

The sample correlation coefficient is almost optimal for the correlation between variables and is a great likelihood estimate of the overall correlation coefficient $cov(a, b) \big/ [Var(a)Var(y)]^{1/2}$ with asymptotic unbiasedness and validity. For non-normal aggregates, on the other hand, the sample correlation coefficient is still asymptotically unbiased, but may be a non-valid estimate.

The Pearson correlation coefficient requires that the data be obtained in pairs from a normal distribution and that the data be equally spaced, at least within logical limits. In addition, it is susceptible to outliers. The Pearson correlation coefficient describes linear correlation, and when linear correlation is rejected, there may be other correlations between the variables that are not necessarily uncorrelated. If two random variables are independent of each other, they must be uncorrelated: conversely, uncorrelation cannot introduce mutual independence. If (a, b) follows a two-dimensional normal distribution, then uncorrelation is equivalent to mutual independence.

2) Linear relationships

Assuming a linear relationship between random variable Y and p independent variables $X_1, X_2, \cdots, X_p$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p, \quad (2)$$

where $\beta_0, \beta_1, \cdots, \beta_p$ are unknown parameters (called regression coefficients), $X_1, X_2, \cdots, X_p$ are p variables that can be precisely measured and controlled (called explanatory variables), and Y are response variables. If its n observations are $(X_{i1}, X_{i2}, \cdots, X_{ip}, Y_i), i = 1, 2, \cdots, n$, then these n observations can be written in the following form:

$$\begin{cases} y_1 = \beta_0 + \beta_1 X_{11} + \beta_2 X_{12+} \cdots + \beta_p X_{1p} + \varepsilon_1; \\ y_2 = \beta_0 + \beta_1 X_{21} + \beta_2 X_{22+} \cdots + \beta_p X_{2p} + \varepsilon_2; \\ \quad\quad\quad\quad\quad \vdots \\ y_n = \beta_0 + \beta_1 X_{n1} + \beta_2 X_{n2+} \cdots + \beta_p X_{np} + \varepsilon_n, \end{cases} \quad (3)$$

where $\varepsilon_0, \varepsilon_1, \cdots, \varepsilon_n$ is the random error and we assume that they are independent of each other and follow the same normal distribution $N(0, \sigma^2)$.

If the system of Eqs (3) is expressed as a matrix, we have:

$$Y = X\beta + \varepsilon. \quad (4)$$

Among them

$$Y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}_{n \times 1},$$

$$X = \begin{pmatrix} 1 & x_{11} & \cdots & x_{1p} \\ 1 & x_{21} & \cdots & x_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & \cdots & x_{np} \end{pmatrix}_{n \times (p+1)},$$

$$\beta = \begin{pmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_p \end{pmatrix}_{(p+1) \times 1},$$

$$\varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}_{n \times 1}.$$

It is usually assumed that ε satisfies several conditions:

1) Independence, i.e., $\varepsilon_1, \varepsilon_2, \cdots, \varepsilon_n$ are independent of each other.
2) Equal and zero means, i.e. $E(\varepsilon_i) = 0, i = 1, 2, \cdots, n$.
3) Variance uniformity, i.e. $Var(\varepsilon_i) = \sigma^2, i = 1, 2, \cdots, n$, where σ^2 is generally an unknown constant. The above three are known as Gauss-Markov assumptions. In addition to these, it may be assumed in specific cases that ε obeys mutually independent normal distributions.
4) Normality, i.e. $\mathcal{E} \sim N(0, \sigma^2 I_n)$.

3) Least squares estimation

The main task of multiple linear regression is to establish a multiple linear regression equation by seeking an estimate $\hat{\beta}$ of β, which can be expressed as:

$$Y = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \cdots + \hat{\beta}_p X_p. \tag{5}$$

And make a test of the significance of this equation and its regression coefficients.

To find the estimate $\hat{\beta}$ of parameter β is to solve β_j so that the sum of the squared residuals of all observations Y_i and the regression value (fitted value) $\hat{Y}_i (i = 1, 2, \cdots n)$ can be expressed as:

$$Q(\beta_0, \beta_1, \cdots, \beta_p)$$
$$= \sum_{i=1}^{n} (Y_i - \beta_0 - \beta_1 X_{i1} - \beta_2 X_{i2} - \cdots - \beta_p X_{ip})^2, \tag{6}$$

reaches a minimum.

It can be shown that if X is column full rank, then the least squares estimate of β is:

$$\hat{\beta} = (X^T X)^{-1} X^T Y. \tag{7}$$

We call $\hat{\beta}$ the least squares estimate of β and $\hat{\beta}$ the unbiased estimate of β, i.e., $E(\hat{\beta}) = \beta$. By the residual vector $\hat{\varepsilon} = Y - X\hat{\beta}$, usually taken:

$$\hat{\sigma}^2 = \frac{\hat{\varepsilon}^T \hat{\varepsilon}}{n - p - 1}. \tag{8}$$

As an estimate of σ^2, also known as the least squares estimate of σ^2.

4) Regression significance
  1) Significance test of regression equation
    Consider the problem of hypothesis testing:

$$\begin{cases} H_0 : \beta_0 = \beta_1 = \cdots = \beta_p = 0, \\ H_1 : \beta_0, \beta_1, \cdots, \beta_p s \ not \ all \ 0. \end{cases} \tag{9}$$

It can be shown that when H_0 holds, the statistic is expressed as:

$$F = \frac{SSR/p}{SSE/n - p - 1} \sim F(p, n - p - 1). \tag{10}$$

Among them

$$\begin{cases} SSR = \sum_{i=1}^{n} (\hat{Y}_i - \bar{Y}_i)^2, \\ SSE = \sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2, \\ SST = \sum_{i=1}^{n} (Y_i - \bar{Y}_i)^2, \end{cases} \tag{11}$$

where SST is the total sum of squares, which represents the sum of squares of changes in n sample size y_i values $SSR = SST - SSE$ is the regression sum of squares.

  2) Significance test of regression coefficients
    Above is the test of significance of the regression equation as a whole, the next section describes the test of each parameter estimate before each regression independent variable X one by one. The hypothesis testing is as follows:

$$\begin{cases} H_{0j} : \beta_j = 0, \\ H_{1j} : \beta_j \neq 0 (j = 0, 1, \cdots, p). \end{cases} \tag{12}$$

The F statistic for this hypothesis test is:

$$F_j = \frac{Q_j}{SSE/n - p - 1} \sim F(1, n - p - 1), \tag{13}$$

where $Q_j = SSE_{(j)} - SSE$, $SSE_{(j)}$ is the sum of squares of residuals after removing X_j.

For a given confidence level α, the original hypothesis H_{0j} is rejected when $F_j > F_{1-\alpha}(1, n - p - 1)$, otherwise the original hypothesis H_{1j} is accepted. The value of p for the test is:

$$p = P(F(1, n - p - 1) > F_j). \tag{14}$$

The original hypothesis H_{0j} is rejected when the value of p is less than $\frac{2}{\alpha}$, otherwise the original hypothesis H_{1j} is accepted.

If the original hypothesis H_{0j} is accepted, it means that the independent variable X_j has a lesser degree of influence on the dependent variable Y, therefore, the regression analysis and hypothesis testing need to be redone after removing the independent variable X_j.

5) Statistical multicollinearity diagnosis
When fitting multiple linear regression, the independent variables are related to each other by the existence of a linear or near-linear relationship, which hides the significance of the variables, increases the variance of the parameter estimates, and produces an unstable model, so the method of covariance

diagnosis is to analyze the matrices $X^T X$ composed of the observations of the independent variables using a variety of metrics reflecting the covariance between the independent variables. Commonly used statistics for covariance diagnosis are variance inflation factors, condition indices and variance ratios.

Currently, the most commonly used formal diagnostic method for multicollinearity is the use of the variance inflation factor, which is notated as VIF_J for the independent variable x_j, and it is calculated as:

$$VIF_J = \left(1 - R_j{}^2\right)^{-1}. \qquad (15)$$

R_j^2 is the coefficient of complex determination of the regression on the other independent variables when x_j is the dependent variable.

It is generally accepted that if $VIF_J > 10$, it indicates that there is strong covariance in the model will severely affect the least squares estimate. In fact, if there is

$$VIF_J = \left(1 - R_j^2\right)^{-1} > 10. \qquad (16)$$

Available:

$$\left(1 - R_j^2\right) < 0.1. \qquad (17)$$

To wit:

$$R_j^2 > 0.9. \qquad (18)$$

Obviously, after calculating the variance inflation factors of all the variables, if the largest of them is found to be greater than 10, it means that the complex determination coefficient of the corresponding independent variable in the linear regression analysis with the other independent variables is higher than 0.9. In this case, it can be assumed that the independent variable is an approximately linear combination of the other independent variables, that is to say, there is a high degree of correlation among the independent variables.

If the eigenvalue of matrix $X^T X$ is $d_1 \geq d_2 \geq \cdots \geq d_k$, then the condition number $\frac{d_1}{d_k}$ of X is an index for planning its singularity. So also called $\frac{d_1}{d_j}(j = 1, 2, \cdots, k)$ for the condition index.

It is generally believed that if the condition index value between 10 and 30, the independent variables for the weak correlation, between 30 and 100 for the medium correlation, greater than 100 for the strong correlation; because each condition index corresponds to an eigenvector, and the corresponding eigenvalue of the large condition index is small, so the composition of this eigenvector of the variables between the linear relationship between the approximation.

III. Research design and implementation

A. Subjects and Sample Selection

1) Subject of the study

According to the selected topic, the quality of faculty teaching in undergraduate institutions is investigated and analyzed. Since the high-quality development of the teaching force encompasses a wide range of content, the survey and research include not only students, but also teachers, as well as the school's curricula, the employment rate in recent years, the employment of graduates, and so on.

2) Sample selection

A total of three undergraduate colleges and universities in a prefecture-level city, namely, a city teacher's college, a city polytechnic, and a city college of science and technology, were selected for this survey based on the geographic location and size of each school and used as a sample to conduct the survey and research, in which the survey was conducted using a combination of online and offline questionnaires, so as to obtain the initial data needed for the research and analysis.

B. Distribution and collection of questionnaires

1) Distribution of questionnaires

At present, it seems that undergraduate colleges and universities do not have a strong enough faculty, and their overall quality can not fully adapt to the teaching of undergraduate colleges and universities with special characteristics and the needs of the market and society. In this case, it is particularly important and necessary for undergraduate colleges and universities to cultivate the dual-teacher quality of teachers and create a "dual-teacher" teaching force. With the help of my family and friends, the author distributed questionnaires in various undergraduate colleges and employers. The research on the development of high-quality research on the "dual-teacher" teaching staff of vocational undergraduates in the information age was randomly distributed to all students, regardless of their grades.

2) Recovery of questionnaires

The author distributed 200 surveys on the high-quality research and development of the "double-teacher" faculty team of vocational undergraduates in the information age in the above three undergraduate colleges and universities, and a total of 600 copies were recovered, 188 copies, 197 copies, and 195 copies, with recovery rates of 94.00%, 98.50%, and 97.50%, respectively, and 180, 188, and 183 valid questionnaires, with effective rates of 90.00%, 94.00%, and 91.50%, respectively.

C. Reliability test

1) Reliability test

In this study, the internal consistency, reliability and stability of the questionnaire were examined by conducting a reliability analysis with a coefficient of $Cronbach's\ Alpha$. In general, the larger the reliability coefficient, the higher the reliability of the questionnaire. Through the test, the internal consistency coefficient of the whole questionnaire is 0.914, and the reliability coefficients of all dimensions are between the chemical 0.743 and 0.846. This shows that the internal consistency of the questionnaire is good.

2) Validity tests

First, content validity, the questionnaire was compiled through repeated discussions and analysis with instructors, based on the questionnaire for teachers' professional development and the characteristics of "dual-teacher" teachers' teaching ability. After the questionnaire was preliminarily formed, relevant experts were invited to review it, and three undergraduate colleges and universities in a certain city were selected to make predictions. According to the modification opinions and prediction results proposed by the experts, the questionnaire was revised again, and finally the questionnaire on the current status of high-quality development of undergraduate colleges and universities' "two-teacher" teaching team was formed, which contained 20 items. Therefore, through theoretical analysis, expert review and empirical prediction, the questionnaire can, to a certain extent, ensure that the questionnaire can more comprehensively reflect the current reality of undergraduate colleges and universities in the development of "dual-teacher" faculty development and development characteristics, and has a good content validity. Second, structural validity. Through the correlation factor analysis, it is found that the correlation coefficients between the dimensions of the questionnaire and the overall value range from 0.46 to 0.884, indicating that there is a high correlation between the dimensions of the questionnaire and the overall value of the questionnaire. Meanwhile, the correlation coefficients between the dimensions of the questionnaire range from 0.237 to 0.406, indicating a low to medium correlation between the dimensions of the questionnaire and a certain degree of independence of the dimensions. It can be seen that the content of the questionnaire can better reflect the content of the survey and has good structural validity.

IV. Empirical Analysis of Linear Regression Models for "Dual-Teacher" Teachers

A. Characterization of "dual-teacher" faculty development

1) Characterization of teacher planning for "dual-teacher" teachers

The results of the characterization of "dual-teacher" teacher planning are shown in Table 1, which shows that, on the whole, school positioning has a significant impact on the quality of "dual-teacher" teacher team building. Using the independent samples t-test method to do one-way analysis of school orientation, it can be seen that there are significant differences in the scores of schools with different orientations in the three dimensions of cultivation and training (0.003), evaluation and incentives (0.004), and teacher quality (0.001) ($p < 0.05$). However, the significance for the strategic transformation of the university is not very significant, which can indicate that along with the transformation of local undergraduate colleges and universities, most of the schools now have a lot of deficiencies in the planning of post-transformation faculty.

2) Characterization of access to "dual teacher" status

The difference analysis of the title on the qualification access of "dual-teacher" teachers jointly trained by schools and enterprises is shown in Table 2, and the difference analysis of the study abroad experience on the qualification access of "dual-teacher" teachers jointly trained by schools and enterprises is shown in Table 3. The data show that the grade of professional title has a significant effect on the quality of "dual-teacher" teacher team building. Using the independent samples t-test method to do one-way analysis of school orientation, it can be seen that there is a significant difference in the ratings of the respondents with different titles on the four dimensions of cultivation and training (0.022), qualification access (0.002), faculty planning (0.005), and quality of faculty (0.005) ($p<0.05$); this can indicate that, along with the transformation of local undergraduate colleges and universities, there is a significant impact on the quality of "dual-teacher" faculty construction. It can be indicated that along with the transformation of local undergraduate colleges and universities, the qualification requirements for "dual-teacher" teachers are getting higher and higher, and the need for "dual-teacher" teachers is greatly influenced by the achievement of a full senior title. Meanwhile, whether or not to study abroad also has a significant impact on the construction of "dual-teacher" faculty, and the ratings of the three dimensions of qualification access (0.034), faculty planning (0.026), and faculty quality (0.006) of the respondents who have studied abroad are lower than those of those who do not have the experience of studying abroad ($p<0.05$), which indicates that the current "dual-teacher" faculty in local undergraduate colleges and universities is not as strong as that of the respondents who have studied abroad. Currently, very few "dual-teacher" faculty members in local undergraduate colleges and universities have traveled abroad for experience, so this examination should shed light on undergraduate colleges and universities.

3) Characterization of the training and development of "dual-teacher" teachers

The difference analysis of the number of school-enterprise cooperation on the cultivation of "dual-teacher" teachers is shown in Table 4, and the difference analysis of the cooperative R&D experience on the cultivation of "dual-teacher" teachers is shown in Table 5. It can be seen that the number of enterprises that have carried out school-enterprise cooperation has a significant impact on the quality of "dual-teacher" teacher team building. Using the independent samples t-test method to do one-way analysis of school orientation, it can be seen that the difference in the number of enterprises that have carried out school-enterprise cooperation has a significant impact on the scores of cultivation and training (0.002) and qualification access (0.015) dimensions ($p < 0.05$), which can indicate that along with the transformation of the local undergraduate colleges and universities, then it means that the chances of school-enterprise cooperation are getting bigger and bigger, and teachers with the number of school-enterprise cooperation reaching 20 or so are more and more likely to have

School orientation	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
Research type	3.14±0.22	2.12±0.29	2.76±0.48	3.11±0.26	2.43±0.14
Teaching and research	3.23±0.19	2.09±0.34	3.18±0.33	3.21±0.26	3.06±0.16
Teaching type	3.24±0.19	2.06±0.34	3.16±0.28	3.21±0.27	3.06±0.14
Vocational technical type	3.29±0.19	2.18±0.35	3.06±0.28	3.25±0.23	3.11±0.15
Other	3.25±0.37	2.16±0.46	3.05±0.33	3.19±0.32	3.07±0.22
F-Value	4.923	3.446	1.533	2.071	6.433
P-Value	0.003	0.004	0.142	0.067	0.001

Table 1: Analysis of the characteristics of teachers' planning of "double teacher" teachers

Job title	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
Primary	3.24±0.21	2.16±0.34	3.09±0.31	3.18±0.33	3.08±0.16
Intermediate	3.28±0.19	2.06±0.35	3.11±0.28	3.27±0.24	3.11±0.15
Secondary title	3.24±0.21	2.12±0.34	3.18±0.34	3.21±0.26	3.07±0.14
Positive height	3.23±0.19	2.13±0.33	2.48±0.33	3.17±0.26	3.05±0.17
F-Value	3.244	2.543	10.326	6.328	4.946
P-Value	0.022	0.058	0.002	0.005	0.005

Table 2: Professional title and "double teacher" teacher qualification analysis

Study abroad	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
Yes	3.25±0.19	2.09±0.34	2.54±0.33	3.18±0.28	3.06±0.16
No	3.24±0.18	2.11±0.35	3.06±0.55	3.22±0.26	3.08±0.17
T-Value	0.143	-0.944	-2.342	-2.122	-2.439
P-Value	0.826	0.311	0.034	0.026	0.006

Table 3: Study on student and teacher qualification of "double teacher"

the same number of enterprises as teachers. The effectiveness of teacher training is greatest for the number of enterprises reaching about 20, indicating that local undergraduate colleges now attach great importance to school-enterprise cooperation to train teachers. Similarly, it can be proved that whether or not there is experience of cooperating with enterprises in research and development has a significant effect on "dual-teacher" teachers.

4) Characterization of evaluation incentives for "dual-teacher" teachers

The results of the difference analysis of social sponsorship on the evaluation and motivation of school-enterprise joint training "dual-teacher" teachers are shown in Table 6, and the difference analysis of funding source on the evaluation and motivation of school-enterprise joint training "dual-teacher" teachers is shown in Table 7. Overall, the P-value of each dimension of "dual-teacher" teacher construction (0.708, 0.906, 0.808, 0.831, 0.716) is greater than 0.05, which means that social sponsorship does not have a significant impact on the quality of "dual-teacher" teacher team construction. Have a significant effect. The independent samples t-test method is used to do one-way analysis of schooling orientation, and for the source of funding, the government does not give support, resulting in "dual-teacher" teacher team building evaluation and incentives do not play an effective role and influence, that is, the current evaluation and incentive mechanism of "dual-teacher" teachers is not effective, indicating that "dual-teacher" teachers have no significant impact on the quality of teacher training. This shows that the evaluation and incentive mechanism for "dual-teacher-type" teachers has not yet been established. According to the goal of talent training and spe-

cific training requirements, it is necessary to strengthen the cultivation of teaching ability in the later stage, improve the relevant training system for teachers, actively communicate with relevant personnel, etc., to form an effective working mechanism for joint cultivation of teachers by universities and relevant departments of the industry and enterprises, and to build a "dual-teacher, dual-competence" teaching team with multiple vocational abilities, such as teacher, engineer, and so on. "Teachers. In the face of the transformation and development of colleges and universities, in fact, the transformation of teachers is the key factor, because teachers are the main body of the school, the transformation of teachers in order to promote the transformation of colleges and universities, so to encourage and support the teachers to social development needs as the center of the practice and the related technology research and development work, timely development of technology and industrial innovation work to carry out a comprehensive understanding of the work of scientific research to feed the work of the teaching mechanism.

B. Correlation and multicollinearity

1) Correlation analysis

In this subsection, the Person correlation coefficient is used to analyze the correlation between the four dimensions of teacher planning, qualification access, cultivation and training, and evaluation and incentives, and the results of the correlation analysis of the "dual-teacher" teaching force are shown in Table 8. The results show that the correlation coefficients of "dual-teacher" teacher quality and teacher planning, qualification access, training and evaluation incentives are 0.556, 0.683, 0.668, 0.524 respectively, and the Sig values are less than 0.05, which indicates that the quality of "dual-teacher"

The number of school cooperation	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
2-8	3.22±0.19	2.14±0.33	3.07±0.31	3.36±0.27	3.06±0.17
8-14	3.26±0.18	2.06±0.38	3.08±0.30	3.21±0.26	3.07±0.14
14-20	3.25±0.22	2.13±0.36	3.03±0.33	3.22±0.25	3.08±0.18
Above 20	3.28±0.19	2.11±0.33	2.98±0.28	3.23±0.26	3.08±0.16
F-Value	6.833	2.253	3.276	0.608	0.043
P-Value	0.002	0.054	0.015	0.593	0.933

Table 4: School enterprise cooperation data and "double teacher" teacher culture

Have we had cooperation and development experience	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
Yes	3.27±0.19	2.12±0.36	3.04±0.31	3.22±0.25	3.08±0.16
No	3.23±0.22	2.11±0.34	3.07±0.56	3.21±0.26	3.07±0.16
T-Value	3.224	0.919	-2.721	0.443	0.333
P-Value	0.005	0.324	0.012	0.613	0.707

Table 5: Research and development experience and "double teacher" teacher culture

Social sponsorship	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
Yes	3.26±0.22	2.12±0.33	3.05±0.32	3.22±0.27	3.08±0.17
No	0.24±0.19	2.11±0.35	3.04±0.31	3.21±0.26	3.07±0.16
T-Value	-0.331	-0.105	-0.224	-0.137	-0.328
P-Value	0.708	0.906	0.808	0.831	0.716

Table 6: Social sponsorship and teacher evaluation incentives

Funding source	Training	Evaluation incentive	Qualifying access	Teacher planning	Teacher quality
Yes	3.23±0.19	2.12±0.34	3.14±0.31	3.19±0.27	3.06±0.16
No	3.31±0.18	2.05±0.68	3.11±0.29	3.31±0.21	3.11±0.14
T-Value	4.841	-2.242	2.624	5.314	3.618
P-Value	0.002	0.046	0.004	0.001	0.0005

Table 7: Source and teacher evaluation incentive

teachers is significantly and positively correlated with the teacher planning, qualification access, training and evaluation incentives, and the correlation coefficients of "dual-teacher" teacher quality and teacher planning, qualification access, training and evaluation incentives are significantly positive. That is to say, it indicates that the quality of "dual-teacher" teachers is significantly positively correlated with teacher planning, qualification access, training and evaluation incentives, and lays the foundation for the multiple covariance and regression analysis.

2) Multiple covariance tests

In order to ensure the effectiveness of regression analysis, the multicollinearity test was performed before regression analysis, and the VIF value and DW value of variance expansion factor were used as the measures of multicollinearity. The results of the multicollinearity test of the "double-teacher" teachers are shown in Table 9, the VIF values of all the research variables are between 1.152~2.545, which is lower than the critical value of 10, and the average VIF value is 1.982 close to 2, indicating that the multicollinearity or sequence-related problems for the "double-teacher" teachers are very small.

C. Regression analysis

We take school orientation, title, study abroad experience, the number of school-enterprise cooperation, social sponsor-ship, source of funding, teacher planning, qualification access, training, evaluation and incentives as independent variables, and the quality of "dual-teacher" teaching force as dependent variables for linear regression analysis. The results of the regression analysis of "dual-teacher" teacher team quality are shown in Table 10. The data show that the R^2 value is 0.247, indicating that all the independent variables can explain 24.7% of the changes in the development of the high quality of vocational undergraduates' "dual-teacher" faculty in the information age. f=14.306, p-value <0.05, indicating that the orientation of school running, professional title, experience of studying abroad, the number of cooperation between schools and enterprises, social sponsorship, funding sources, faculty planning, qualification access, and the quality of teachers are the main reasons for the changes in the quality of vocational undergraduates. Source, teacher planning, qualification access, cultivation and training, evaluation and incentive independent variables have significant correlation with the development of high quality of vocational undergraduates' "dual-teacher" teaching force in the information age, and the linear regression equation for the development of high quality of "dual-teacher" teaching force is as follows. The linear regression equation is

$$y = 0.446 - 0.071x_1 - 0.112x_2 + 0.518x_3 + 0.667x_4 + 0.578x_5 + 0.784x_6 + 0.769x_7 + 0.553x_8 + 0.627x_9 + 0.558x_{10}.$$

Study variable		Teacher quality	Training	Evaluation incentive	Qualifying access	Teacher planning
Teacher quality	Person	1	0.556	0.683	0.668	0.524
	Sig		0.007	0.007	0.003	0.002
Training	Person	0.556	1	0.568	0.661	0.594
	Sig	0.007		0.006	0.009	0.005
Evaluation incentive	Person	0.683	0.568	1	0.511	0.634
	Sig	0.007	0.006		0.008	0.003
Qualifying access	Person	0.668	0.661	0.511	1	0.518
	Sig	0.003	0.009	0.008		0.001
Teacher planning	Person	0.524	0.594	0.634	0.518	1
	Sig	0.002	0.005	0.003	0.001	

Table 8: The results of the correlation analysis of the teacher team

Project	Tolerance	VIF
School orientation	0.734	2.545
Job title	0.458	2.162
Study abroad	0.674	1.152
The number of school cooperation	0.727	2.083
Social sponsorship	0.433	1.945
Funding source	0.524	1.855
Teacher planning	0.546	1.723
Qualifying access	0.506	1.987
Training	0.353	2.428
Evaluation incentive	0.687	1.944

Table 9: The results of the "two-teacher" teachers' team multilinear test results

Name	Nonnormalized coefficient		Normalization factor	T-Value	P-Value
	B	SE	Beta		
Constant	0.446	0.311	-	1.514	0.134
School orientation	-0.071	0.1311	-0.074	1.5276	0.011
Job title	-0.112	0.0631	-0.286	3.7768	0.009
Study abroad	0.518	0.1361	0.129	0.6665	0.004
The number of school cooperation	0.677	0.0514	0.184	0.6629	0.005
Social sponsorship	0.578	0.0984	0.206	0.3584	0.006
Funding source	0.784	0.0668	0.058	2.2594	0.002
Teacher planning	0.769	0.0862	0.164	2.0497	0.007
Qualifying access	0.553	0.1216	0.112	2.4364	0.007
Training	0.627	0.0558	0.137	4.3759	0.013
Evaluation incentive	0.558	0.0932	0.307	2.8068	0.004
R²	0.247				
Adjust R²	0.229				
F-Value	14.306				

Table 10: The results of the quality regression of the "double teacher" teachers' team

V. Conclusion

The construction of "dual-teacher" faculty still has many problems in the process of rapid development, and has long been a prominent problem for the transformation of colleges and universities. In view of this, this paper proposes a study on the construction of "dual-teacher" teachers under the linear regression theory, and empirically analyzes the proposed research model based on the questionnaire and data analysis software.

1) The p-values of the dimensions of "dual-teacher" teacher construction evaluation and incentives (0.708, 0.906, 0.808, 0.831, 0.716) are all greater than 0.05, indicating that the social sponsorship does not have a significant impact on the quality of "dual-teacher" teacher team construction. This indicates that social sponsorship does not have a significant effect on the quality of "dual-teacher" teacher team building, which reveals the interaction relationship between the internal influencing factors of the quality of teacher team building.

2) The correlation coefficients between the quality of "dual-teacher" teachers and teacher planning, qualification access, cultivation and training, evaluation and incentives are 0.556, 0.683, 0.668, 0.524 respectively, and the Sig values are all less than 0.05, which indicates that there is a significant correlation between the quality of "dual-teacher" teachers and the four dimensions. The Sig value is less than 0.05, indicating that there is a significant correlation between the quality of "dual-teacher" teachers and the four dimensions, and the VIF value of all the research variables ranges from 1.152 to 2.545, which is lower than the critical value of 10, which further confirms that there is no multilinear covariance in the linear regression model for the construction of "dual-teacher" teachers' team.

3) In the linear regression analysis of the quality of the

"double-teacher" teacher, F=14.306 and the P value <0.05 were obtained, indicating that the independent variables of school positioning, professional title, study abroad experience, number of school-enterprise cooperation, social sponsorship, funding source, teacher planning, qualification access, training and evaluation, and evaluation and incentive were all significantly correlated with the regression coefficient of the dependent variable (the quality of the "double-teacher" teacher), which could provide enlightenment for the construction of the "double-teacher" teacher.

Due to the haste of time and limited resources, there is still a shortage of research and practice exploration. In future studies, work and life, the researchers also need to investigate the work further. On the basis of this, the idea of "double height" is committed to the practice of improving the evaluation mechanism of the "double teacher" faculty team, and the existing research results are tested in practice, developed and made up for insufficient, and thus promotes the healthy development of the "double high" work. On the basis of the evaluation index of "double teacher" teachers, the unity of comprehensive and targeted, theoretical and practical, academic and operational is realized.

VI. Funding

References

[1] Garzón Artacho, E., Martínez, T. S., Ortega Martin, J. L., Marin Marin, J. A., & Gomez Garcia, G. (2020). Teacher training in lifelong learning—The importance of digital competence in the encouragement of teaching innovation. *Sustainability, 12*(7), 2852.

[2] Innocente, N., & Baker, J. (2018). The sociology teaching fellowship: a mentorship model for graduate student teacher training. *Teaching Sociology, 46*(2), 0092055X1879168.

[3] Fernández-Cruz, F. J., Fernández-Díaz, M., & Rodríguez-Mantilla, J. M. (2023). Design and validation of an instrument to measure teacher training profiles in information and communication technologies. *Revista Española de Pedagogía, 76*(270), 14.

[4] Moreno-Pino, F. M., Jiménez-Fontana, R., Cardeñoso Domingo, J. M., & Azcárate Goded, P. (2021). Study of the presence of sustainability competencies in teacher training in mathematics education. *Sustainability, 13*(10), 5629.

[5] Fauth, F., & Juan González-Martínez. (2021). Trainees personal characteristics in the leaming transfer process of pennanent online ict teacher training. Sustainability, 14.

[6] Tou, N. X., Kee, Y. H., Koh, K. T., Martin Camiré, & Chow, J. Y. (2020). Singapore teachers' attitudes towards the use of information and communication technologies in physical education. *European Physical Education Review, 26*(2), 1356336X1986973.

[7] Foutsitzi, A. (2018). Teacher Training as an Influential Factor in the Use of Visual Materials in Education. *European Journal of Education, 6*(1), 93-100.

[8] Waltner, E. M., Rieß, W., & Brock, A. (2018). Development of an ESD indicator for teacher training and the national monitoring for ESD implementation in Germany. *Sustainability, 10*(7), 2508.

[9] Chaipidech, P., Kajonmanee, T., Chaipah, K., Panjaburee, P., & Srisawasdi, N. (2021). Implementation of an andragogical teacher professional development training program for boosting TPACK in STEM education. *Educational Technology & Society, 24*(4), 220-239.

[10] Álvarez-García, O., García-Escudero, L. Á., Salvà-Mut, F., & Calvo-Sastre, A. (2019). Variables influencing pre-service teacher training in education for sustainable development: A case study of two Spanish universities. Sustainability, 11(16), 4412.

[11] Cachon Zagalaz, J., López Manrique, I., San Pedro Veledo, M. B., Zagalaz Sanchez, M. L., & Gonzalez Gonzalez de Mesa, C. (2020). The importance of the phoenix bird technique (resilience) in teacher training: CD-RISC scale validation. *Sustainability, 12*(3), 1002.

[12] Chen, M., Chiang, F. K., Jiang, Y. N., & Yu, S. Q. (2017). A context-adaptive teacher training model in a ubiquitous learning environment. *Interactive Learning Environments, 25*(1), 113-126.

[13] De Villiers, R. (2021). The Force Field Model applied to a Music Education teacher training framework in a South African context. *British Journal of Music Education, 38*(3), 219-233.

[14] Rodríguez Moreno, J., Agreda Montoro, M., & Ortiz Colon, A. M. (2019). Changes in teacher training within the TPACK model framework: A systematic review. *Sustainability, 11*(7), 1870.

[15] Xiaoming, L., Donghang, L. I., Xiaoli, W. U., & Philosophy, S. O. (2018). An empirical analysis of the learning community construction in political and moral lessons based on the new national teacher training project. Journal of Teacher Education.

[16] Bastian, K. C., Patterson, K. M., & Carpenter, D. (2022). Placed for success: Which teachers benefit from high-quality student teaching placements?. *Educational Policy, 36*(7), 1583-1611.

[17] Fiorilli, C., Buonomo, I., Romano, L., Passiatore, Y., Iezzi, D. F., Santoro, P. E., ... & Pepe, A. (2020). Teacher confidence in professional training: The predictive roles of engagement and burnout. *Sustainability, 12*(16), 6345.

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