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Research Article

The Evaluation Index System of Teaching Quality in Colleges and Universities: Based on the CIPP Model

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Under the comprehensive influence of the national political and economic environment, the law of higher education development, and the characteristics of teaching itself, the relationship between theoretical teaching and teaching should be properly handled, and in accordance with the goals and ideas of talent training in research universities, on the one hand, the teaching of theoretical courses should be done well to ensure the protection of students. A solid theoretical foundation, on the one hand, emphasizes the application-oriented and sexual teaching links and forms a teaching system that combines professional skills and professional technical application ability, and comprehensive ability. For research-oriented university education, it is an inevitable problem to face. Just as the diagnosis of a disease is required first, in order to promote teaching reform, it is necessary to have a clear understanding of the current situation of the school teaching system and to understand the root of the problem. Therefore, it is very necessary to study the evaluation of teaching, which will provide facts for the reform. Fundamentals, Orientation, and Metrics. Based on the CIPP model of effective teaching theory and formative assessment theory, this research constructs a teaching quality assurance index system in colleges, universities, and takes colleges and universities as a case for empirical research. The survey on the status quo of quality assurance and the experimental results show that the index system of teaching quality evaluation in colleges and universities based on the CIPP model has good applicability.

1. Introduction

At present, the main way for colleges and universities to carry out teaching activities is still classroom teaching, and evaluating classroom teaching is an important way to test the quality of education and teaching in a school. Classroom teaching evaluation is produced together with classroom teaching. It plays an important role in standardizing all aspects of classroom teaching and is an important means to improve the quality of classroom teaching. In order to realize the requirements of talent training such as knowledge transfer, ability training, and quality improvement, teaching, as an important part of university teaching, began to be given a new mission, and the development of teaching has been promoted to a new stage. Research-oriented college students' teaching evaluation research can promote the teaching evaluation research in the teaching field, enrich the content and level of teaching theory research, and provide new ideas and research methods for the application of education evaluation theory in the field of teaching. The theory of construction and reform has laid a factual foundation. This study focuses on building a teaching evaluation index system to evaluate engineering colleges and universities, in order to measure and improve the teaching quality of engineering colleges and universities. At this stage, because the teaching evaluation indicators of colleges and universities in China are too unified and there is no difference in treatment, classified evaluation can better play the guiding role of evaluation, guide colleges and universities at different levels and different disciplines to develop their own characteristics, and guide the peaceful mentality of all kinds of schools. The acceptance of evaluation is of great significance and should be used as an important reference for the formulation of a new round of evaluation indicators. The integrity of the evaluation system is more conducive to improving the level of teaching work [1–3].

2. Related Work

In the second half of the twentieth century, various types of educational evaluation organizations were gradually formed in European and American countries, and three representative educational evaluation and education quality assurance models have initially formed: the American model, the European model, and the British model. Among them, in the American model, American universities enjoy a high degree of autonomy and mainly rely on various professional academic institutions and groups in the society to conduct educational evaluations, forming a higher education evaluation system by types, majors, and regions. Currently, there are 6 regional professional accreditation agencies (Central, New England, North Central, Northwest, South, and West) recognized by the U.S. Federal Department of Education. Higher Education), mainly to identify private schools. Continental model, in Germany, France, Italy, and other countries, the government strictly controls the evaluation of higher education, the government directly organizes and participates in the evaluation, and the evaluation results are related to government funding. For example, French universities adopt a contract system in raising funds from the state, which requires universities to formulate an overall plan that matches subjective goals with objective reality and reasonable supporting policies necessary to achieve this plan. When the contract is about to expire, The National Evaluation Committee evaluates the implementation of university contract and the achievement of its goals and negotiates a new contract. The evaluation report of the National Evaluation Committee will directly affect the new contract signed by the government and the school and affect the government's funding for the school. In the British model, British universities have a great degree of freedom due to the continuation of history. The government mainly indirectly influences the university family through the Higher Education Fund Committee. The evaluation agency is relatively neutral, but the evaluation results can be used as a reference for the committee's funding. In the UK, the Quality Assurance Agency in high education serves the Higher Education Foundation according to the contract, and evaluates universities every 6 years; the Research Assessment Exercise is responsible for evaluating the scientific research of universities [4–10].

3. Construction of the Evaluation Index System of Teaching Quality in Colleges and Universities

3.1. Basis for the Establishment of Teaching Evaluation Indicators

3.1.1. Basis for the Establishment of Primary Indicators. This research chooses the CIPP model as the evaluation model, including four kinds of evaluations: teaching background evaluation, teaching input evaluation, teaching process evaluation, and teaching achievement evaluation. Teaching background evaluation is the evaluation of needs, problems, advantages, and opportunities in a specific situation; input evaluation is the evaluation of planning programs, programs, or service strategies and their related work plans and implementation budgets; process evaluation is the evaluation of program implementation, process documents, change the major mistakes or bad operations of certain procedures of the plan, and conduct continuous inspection and evaluation; the outcome evaluation is to evaluate the complete performance of the implementation results of the project and the degree to which the needs of all beneficiaries are met. Therefore, the four first-level indicators are teaching background evaluation, teaching input evaluation, teaching process evaluation, and teaching achievement evaluation [11–13].

3.1.2. Basis for the Establishment of Secondary Indicators. This paper deeply studies the theory of higher education evaluation, teaching theory, and teaching evaluation theory at home and abroad, clarifies the connotation, significance, and influencing factors of the first-level indicators above, and selects five second-level indicators for each first-level indicator in a comprehensive and systematic way. The secondary indicators of teaching background evaluation can refer to the main observation points of the "Guiding Ideas for Running Schools" in the teaching level evaluation indicators: positioning and planning, educational ideology, and teaching centrality. Combined with the teaching practice, five secondary indicators are listed: teaching concept, teaching purpose, teaching plan, educational regulations, and social needs. The selection of secondary indicators for the evaluation of teaching investment can be obtained by referring to the theory of production factors in economics. There are four types of production factors in economics, productivity, land, capital, and entrepreneurial talent. Later, information technology gradually became an independent production factor. Elements participate in social production activities. Taking into account the difference between the teaching activities of colleges and universities and the general production activities, five secondary indicators are listed: teachers, bases, funding, laboratories, and teaching materials. The selection of secondary indicators of teaching process evaluation can consider the theory of teaching system elements. At present, there are many theories about the constituent elements of the teaching system in the academic circle. Among them, Mr. Li Bingde explained the seven elements in the article "Review and Prospect of Teaching Theory" in 1989, that teaching activities include seven elements: teacher, student, purpose, content, method, environment, and feedback. Taking this theory into consideration, five secondary indicators are listed: teaching content, teaching methods, curriculum setting, teaching supervision, and teaching assessment. The secondary indicators of teaching achievement evaluation can be derived from the subsequent development of the CIPP theory. After establishing this model, Stafford Beam reconsidered the evaluation and believed that the four-step evaluation model was not enough to describe and evaluate long-term, real success reform plan. To this end, he supplemented and improved it, and decomposed the outcome

evaluation into four parts: impact, effectiveness, sustainability, and transportability [14–18]. The final indicator system is shown in Table 1 below.

3.2. Determination of Teaching Evaluation Index System. The index system of teaching evaluation in research-oriented universities is based on CIPP, as is shown in Table 2.

3.3. Determination of Evaluation Index System. This study adopts the Delphi method, consulted five professors and experts engaged in higher education teaching and university management, analyzed the returned three-point consultation questionnaire to obtain a scientific and reasonable indicator weight judgment result, and then use the analytic hierarchy process to calculate. For the weights of indicators at all levels, the final weight results are as follows: according to the above calculation results, three decimal places are reserved, and the weight distribution of indicators is as follows: [19, 20].

$$\begin{aligned} A_w &= [0.095, 0.183, 0.355, 0.367], \\ B1_w &= [0.122, 0.230, 0.648], \\ B2_w &= [0.539, 0.164, 0.297], \\ B3_w &= [0.230, 0.648, 0.122], \\ B4_w &= [0.539, 0.164, 0.297]. \end{aligned} \tag{1}$$

The established teaching evaluation framework is shown in Figure 1 below:

4. Application of Teaching Quality Evaluation in Colleges and Universities Based on CIPP Model

4.1. Data Collection and Organization. All the scores of the questionnaire were entered and counted with Excel software, and all the questionnaires with the same score for a single index were excluded, and the total score of each questionnaire was calculated based on the weights of the indicators at all levels, and the comprehensive evaluation result was obtained. The calculation method is:

$$\begin{aligned} \mathrm{VB1} &= 0.112 * \mathrm{C1} + 0.230 * \mathrm{C2} + 0.648 * \mathrm{C3}, \\ \mathrm{VB2} &= 0.539 * \mathrm{C4} + 0.164 * \mathrm{C5} + 0.297 * \mathrm{C6}, \\ \mathrm{VB3} &= 0.230 * \mathrm{C7} + 0.648 * \mathrm{C8} + 0.122 * \mathrm{C9}, \\ \mathrm{VB4} &= 0.539 * \mathrm{C10} + 0.164 * \mathrm{C11} + 0.297 * \mathrm{C12}, \\ \mathrm{VA} &= 0.095 * \mathrm{VB1} + 0.183 * \mathrm{VB2} + 0.355 * \mathrm{VB3} + 0.367 * \mathrm{VB4}. \end{aligned} \tag{2}$$

4.2. University Teaching Evaluation Data Analysis. In order to judge the influence relationship between teaching background, teaching input, teaching process and teaching results, and analyze the relationship between teaching background, teaching input and teaching process, on the basis of the above basic statistics and comparative analysis, regression analysis was performed on engineering, liberal arts, and total data, and the process was as follows:

4.2.1. Correlation Analysis of the First-Level Indicators of Science Teaching. Taking the teaching achievement as the dependent variable Y, and the teaching background, teaching input, and teaching process as the independent variables, input the statistical results of science data columns $B1$, $B2$, $B3$, and $B4$ into the EXCEL data analysis interface, select regression analysis, and output the following results.

According to the results shown in Tables 3–5, the binary linear regression equation of science teaching results can be directly written: $Y = b0 + b1*X1 + b2*X2 + b3*X3 = 0.953 + 0.379 \times 1 + 0.309X2 + 0.174X3$. $b1$ means that when the teaching investment and teaching process scores are determined, for each additional point of teaching background, the teaching results increase by 0.379 points; $b2$ means that when the teaching background and teaching process scores are determined, for each additional point of teaching investment, the teaching results increase 0.309 points; $b3$ means that when the teaching background and teaching input scores are determined, each additional point in the teaching process will increase the teaching results by 0.379 points. The correlation coefficient of regression statistics is 0.768539, indicating that when the three variables change, the degree of correlation between the dependent variable and the independent variable is 0.768539, indicating that the multiple correlation coefficient of the three variables of teaching background, teaching investment, and teaching process is 0.768539. The coefficient of determination is equal to 59.06% for the goodness of fit, indicating that 59.06% of the changes in the evaluation of teaching results can be explained by the changes in the three factors of teaching background, teaching input, and teaching process, and the remaining factors are random errors. Generally speaking, a goodness of fit greater than or equal to 0.6 is considered acceptable, and greater than 0.8 is considered excellent. In this analysis, the goodness of fit is approximately 0.6, which is acceptable. Given the significance level $a = 0.05$, $F = 11.062$ can be obtained by looking up the table, which is greater than $F0.05\ (2, 25) = 3.39$, so the null hypothesis is rejected, indicating that the $R2$ of the sample is significant, and the established multiple linear regression model is valid. Because the overall relationship of the equation is significantly different from that each independent variable has a significant effect on the dependent variable, a significant t-test is also performed for each independent variable. Given the significance level $a = 0.05$, look up the table to get $t0.05/2(27\text{-}3) = 2.064$, the test statistic of $b1$ $t1 = 2.219523 > 2.064$, reject the hypothesis of $H0{:}\beta1 = 0$; the test statistic of $b2$ quantity $t2 = 1.464698 < 2.064$, the hypothesis of $H0{:}\beta2 = 0$ is not rejected; the test statistic of $b3$ $t3 = 0.89623 < 2.064$, the hypothesis of $H0{:}\beta3 = 0$ is not rejected. Therefore, only the regression coefficient $b1$ is statistically significant, and in the correlation analysis of the science data, only the teaching background has a significant impact on the teaching results [21].

4.2.2. Correlation Analysis of the First-Level Indicators of Engineering Teaching. Taking the teaching achievement as the dependent variable Y, and the teaching background, teaching investment, and teaching process as the

Table 1: Selection of secondary indicators of teaching.

First-level indicator	Secondary indicators
Teaching background evaluation	Teaching concept, teaching purpose, teaching plan
Teaching investment evaluation	Faculty, base and equipment stock, and funding
Teaching process evaluation	Teaching content, teaching methods, teaching supervision, and assessment
Teaching achievement evaluation	Student ability, reform and innovation, and social recognition

Table 2: Index system of teaching evaluation in research-oriented universities based on CIPP model.

First-level indicator	Secondary indicators	Evaluation description
Teaching background $B1$	Teaching concept $C1$	Teaching concept science, advanced level
	Teaching purpose $C2$	The purpose of teaching is clear and in-depth
	Teaching plan $C3$	The teaching plan is clear and reasonable
Teaching input $B2$	Faculty $C4$	The strength of teaching faculty
	Base and equipment inventory $C5$	Abundance of base equipment stock
	Funding input $C6$	The adequacy of teaching funding
Teaching process $B3$	Teaching content $C7$	Rich and practical teaching content
	Teaching methods $C8$	Teaching method science, flexibility
	Teaching supervision and assessment $C9$	Teaching supervision and careful assessment of the seriousness
Teaching outcomes $B4$	Student ability $C10$	Students with strong ability and comprehensive quality
	Reform and innovation $C11$	Faster reform and innovation of teaching
	Social recognition $C12$	High degree of social recognition of students and institutions

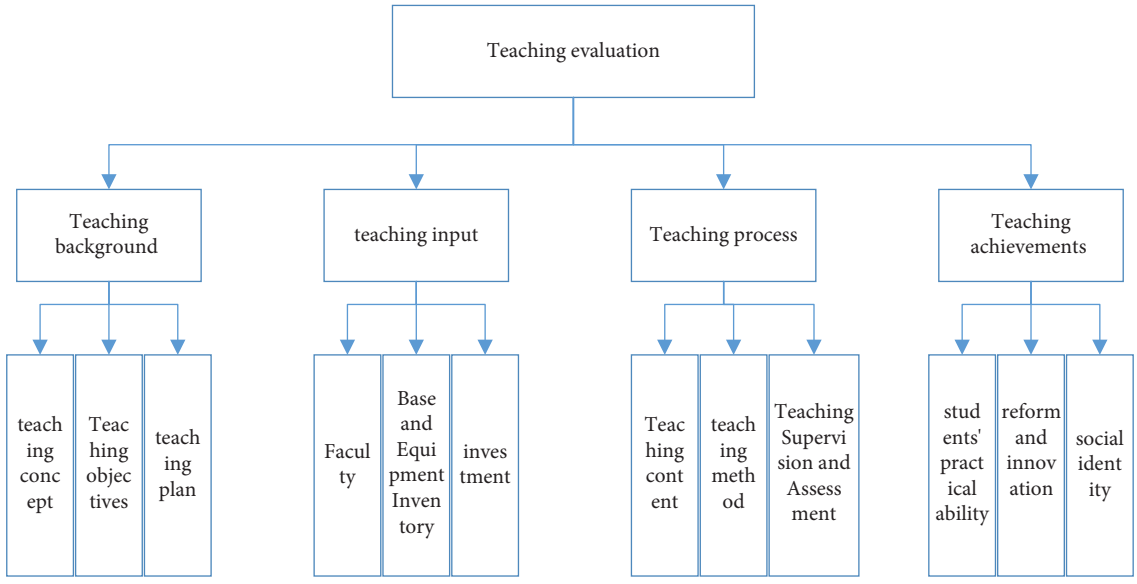

Figure 1: The teaching evaluation framework of research-oriented universities based on the CIPP model.

Table 3: Correlation analysis table of first-level indicators of science teaching (1).

Regression statistics	
Multiple R	0.768539
R square	0.590652
A adjusted R square	0.537258
Standard error	1.103188
Observations	27

independent variables, input the engineering data statistical results $B1$, $B2$, $B3$, and $B4$ into the Excel data analysis interface, select regression analysis and output the following results.

According to the results shown in Tables 6–8, the binary linear regression equation of engineering teaching results can be directly written: $Y = b0 + b1 * X1 + b2 * X2 + b3 * X3 = -1.280 + 0.364 \times 1 + 0.390 \times 2 + 0.408 \times 3$. $B1$ means that when the teaching investment and teaching process scores are determined, for each additional point of teaching background, the teaching results increase by 0.364 points; $b2$ means that when the teaching background and teaching process scores are determined, for each additional point of teaching investment, the teaching results increase by 0.390 points; $b3$ means that when the teaching background and teaching investment scores are determined, for each additional point in the teaching process, the teaching results will

Table 4: Correlation analysis table of first-level indicators of science teaching (2).

Variance analysis					
	D f	s s	M S	F	Significance F
Regression analysis	3	40.38922	13.46307	11.06229	0.000108_
Residual	23	27.99157	1.217025_		
Total	26	68.38079			

Table 5: Correlation analysis table of first-level indicators of science teaching (3).

	Coefficients	Standard error	tStat	P value	Lower 95%	Upper 95%	Lower limit 95.0%	Upper limit 95.0%
intercept	0.95308	1.21584	0.78388	0.4411	−1.56208	3.46824	−1.56208	3.46824
X variable 1_	0.17081	0.17081	2.21952	0.0365	0.02577	0.73249	0.02577	0.73249
X variable 2_	0.30939	0.21123	1.46469	0.1565	−0.12758	0.74637	−0.12758	0.74637
X variable 3_	0.17465	0.19487	0.89623	0.3794	−0.22848	0.57779	−0.22848	0.57779

Table 6: Correlation analysis table of first-level indicators of engineering teaching (1).

Regression statistics	
Multiple R	0.890359
R square	0.792739
A adjusted R square	0.773308
Standard error	0.848307
Observations	36

Table 7: Correlation analysis table of first-level indicators of engineering teaching (2).

Variance analysis					
	D f	s s	M S	F	Significance F
Regression analysis	3	88.07829	29.35943	40.79827	$4.8E-11$
Residual	32	23.02798	0.719624		
Total	35	111.1063			

Table 8: Correlation analysis table of first-level indicators of engineering teaching (3).

	Coefficients	Standard error	tStat	P value	Lower 95%	Upper 95%	Lower limit 95.0%	Upper limit 95.0%
intercept	−1.28014	0.76962	−1.66334	0.10601	−2.8478	0.28752	−2.8478	0.28752
X variable 1_	0.364303	0.15237	2.39091	0.02286	0.053935	0.67467	0.053935	0.67467
X variable 2_	0.39097	0.15309	2.553786	0.01562	0.079127	0.70281	0.079127	0.70281
X variable 3_	0.408839	0.14716	2.778196	0.00906	0.109084	0.70859	0.109084	0.70859

Table 9: Correlation analysis table of first-level indicators of liberal arts teaching (1).

Regression statistics	
Multiple R	0.833103
R square	0.644974
A adjusted R square	0.616188
Standard error	0.566894
Observations	41

Table 10: Correlation analysis table of first-level indicators of liberal arts teaching (2).

Variance analysis					
	Df	s s	M S	F	Significance F
Regression analysis	3	21.60165	7.200551	22.40588	$1.93E-08$
Residual	37	11.89065	0.321369		
Total	40	33.4923			

increase by 0.408 points. The correlation coefficient of regression statistics is 0.8903, indicating that when the three variables change, the degree of correlation between the dependent variable and the independent variable is 0.8903, indicating that the multiple correlation coefficient of the three variables of teaching background, teaching investment and teaching process is 0.8903. The coefficient of determination is equal to 79.27% for the goodness of fit, indicating that 79.27% of the changes in the evaluation of teaching results can be explained by the changes in the three factors of teaching background, teaching input, and teaching process, and the remaining factors are random errors. The goodness of fit in this analysis is approximately 0.8, which is an excellent level. Given the significance level $a = 0.05$, $F = 40.798$ can be obtained by looking up the table, which is greater than $F0.05$ $(2, 33) = 3.28$, so the null hypothesis is rejected, indicating that

Table 11: Correlation analysis table of first-level indicators of liberal arts teaching (3).

	Coefficients	Standard error	tStat	P value	Lower 95%	Upper 95%	Lower limit 95.0%	Upper limit 95.0%
intercept	2.01919	0.65565	3.07968	0.00389	0.69072	3.34767	0.690725	3.34767
X variable 1 _	0.14566	0.11274	1.29193	0.20439	−0.08279	0.37411	−0.08279	0.37411
X variable 2 _	0.15328	0.10656	1.43848	0.15870	−0.06263	0.36920	−0.06263	0.36920
X variable 3 _	0.49004	0.15035	3.25934	0.00239	0.18540	0.79468	0.185404	0.79468

Table 12: Correlation analysis table of first-level indicators of teaching in research universities (1).

Regression statistics	
Multiple R	0.806263
R square	0.65006
A adjusted R square	0.639562
Standard error	0.884838
Observations	104

Table 13: Correlation analysis table of first-level indicators of teaching in research universities (2).

Variance analysis					
	Df	s s	M S	F	Significance F
Regression analysis	3	145.4415	48.48048	61.9212	$1.03E-22$
Residual	100	78.29384	0.782938		
Total	103	223.7353			

the $R2$ of the sample is significant, and the established multiple linear regression model is valid. Because the overall relationship of the equation is significantly different from that each independent variable has a significant effect on the dependent variable, a significant t-test is also performed for each independent variable. Given the significance level $a = 0.05$, look up the table to get $t0.05/2(36\text{-}3) = 2.035$, the test statistic of b1 $t1 = 2.390 > 2.035$, reject the hypothesis of H0: $\beta 1 = 0$; the test statistic of $b2$ The quantity $t2 = 2.553 > 2.035$, reject the hypothesis of H0:$\beta 2 = 0$; the test statistic of $b3$ is $2.778 > 2.035$, reject the hypothesis of H0:$\beta 3 = 0$. Therefore, the regression coefficients $b1$, $b2$, and $b3$ are statistically significant. In the correlation analysis of engineering data, the effects of teaching background, teaching investment, and teaching process on teaching results are all significant.

4.2.3. Correlation Analysis of the First-Level Indicators of Liberal Arts Teaching. Taking the teaching achievement as the dependent variable Y, and the teaching background, teaching input, and teaching process as the independent variables, input the liberal arts data statistical results columns $B1$, $B2$, $B3$, and $B4$ into the EXCEL data analysis interface, select regression analysis, and output the following results.

According to the results shown in Tables 9–11 above, the binary linear regression equation of liberal arts teaching results can be directly written: $Y = b0 + b1 * X1 + b2 * X2 + b3 * X3 = 2.019 + 0.145 \times 1 + 0.153 \times 2 + 0.490 \times 3$. $B1$ means that when the teaching investment and teaching process scores are determined, for each additional point of teaching background, the teaching results increase by 0.145 points; $b2$ means that when the teaching background and teaching process scores are determined, for each additional point of teaching investment, the teaching results increase by 0.153 points; $b3$ means that when the teaching background and teaching investment scores are determined, each additional point in the teaching process will increase the teaching results by 0.490 points. The correlation coefficient of regression statistics is 0.8031, indicating that when the three variables change, the degree of correlation between the dependent variable and the independent variable is 0.8031, indicating that the multiple correlation coefficient of the three variables of teaching background, teaching investment and teaching process is 0.8031. The coefficient of determination is equal to 64.49% and the goodness of fit is equal to 64.49%, indicating that 64.49% of the changes in the evaluation of teaching results can be explained by the changes in the three factors of teaching background, teaching investment, and teaching process, and the remaining factors are random errors. The goodness of fit in this analysis is 0.645, which is acceptable. Given the significance level $a = 0.05$, $F = 22.405$ can be obtained by looking up the table, which is greater than $F0.05(2, 38) = 3.24$, so the null hypothesis is rejected, indicating that the $R2$ of the sample is significant, and the established multiple linear regression model is valid. Because the overall relationship of the equation is significantly different from that each independent variable has a significant effect on the dependent variable, a significant t-test is also performed for each independent variable. Given the significance level $a = 0.05$, look up the table to get $t0.05/2(41\text{-}3) = 2.024$, the test statistic of $b1$ $t1 = 1.291 < 2.024$, the hypothesis of H0:$\beta 1 = 0$ is not rejected; the test of $b2$ The statistic $t2 = 1.438 < 2.024$, does not reject the hypothesis of H0:$\beta 2 = 0$; the test statistic of $b3$ is $3.259 > 2.024$, rejects the hypothesis of H0:$\beta 3 = 0$. Therefore, only the regression coefficient $b3$ is statistically significant, that is, in the correlation analysis of liberal arts data, only the impact of the teaching process on the teaching results is significant.

4.2.4. Correlation Analysis of First-Level Indicators of Teaching in Research Universities. Taking the teaching achievement as the dependent variable Y, and the teaching background, teaching input, and teaching process as the independent variables, input the columns $B1$, $B2$, $B3$, and $B4$ of all the statistical results of the data into the EXCEL data analysis interface, select regression analysis, and output the following results.

According to the results shown in Tables 12–14 above, the binary linear regression equation of the teaching achievements of research universities can be directly written:

Table 14: Correlation analysis table of first-level indicators of teaching in research universities (3).

	Coefficients	Standard error	tStat	P value	Lower 95%	Upper 95%	Lower limit 95.0%	Upper limit 95.0%
intercept	0.65002	0.46502	1.39783	0.16525	−0.2725	1.57262	−0.2725	1.57262
X variable 1 _	0.39962	0.08430	4.74004	7.09 E	0.23236	0.56689	0.23236	0.56689
X variable 2 _	0.13876	0.08054	1.72277	0.08802	−0.0210	0.29857	−0.0210	0.29857
X variable 3 _	0.38909	0.09645	4.03387	0.0001 0	0.19772	0.58046	0.19772	0.58046

Table 15: Research-oriented teaching evaluation data analysis summary.

	Teaching background	Teaching input	Teaching process	Teaching achievements	Teaching evaluation
Science	7.293 (significant impact on teaching results)	7.388	6.809	7.193	7.102
Engineering	6.663 (significant impact on teaching results)	6.841 (significant impact on teaching outcomes)	6.252 (significant impact on teaching results)	6.378	6.445
Liberal arts	6.907	5.783	6.037 (significant impact on teaching results)	6.870	6.379
Research university	6.922 (significant impact on teaching results)	6.566	6.312 (significant impact on teaching outcomes)	6.784	6.590
Remarks: Correlation analysis (regression) goodness of fit is greater than 0.6					

$Y = b0 + b1 * X1 + b2 * X2 + b3 * X3 = 0.650 + 0.399 \times 1 + 0.138 \times 2 + 0.389 \times 3$. $B1$ means that when teaching investment and teaching process scores are determined, for every one-point increase in teaching background, teaching results increase by 0.399 points; $b2$ means when teaching background and teaching process scores are determined, for every one-point increase in teaching investment, teaching results increase by 0.138 points; $b3$ means that when the teaching background and teaching investment scores are determined, for each additional point in the teaching process, the teaching results will increase by 0.389 points. The correlation coefficient of regression statistics is 0.806, indicating that when the three variables change, the degree of correlation between the dependent variable and the independent variable is 0.806, indicating that the multiple correlation coefficient of the three variables of teaching background, teaching investment, and teaching process is 0.806. The coefficient of determination is equal to 65.0% for the goodness of fit, indicating that 65.0% of the changes in the evaluation of teaching results can be explained by changes in the three factors of teaching background, teaching investment, and teaching process, and the remaining factors are random errors. The goodness of fit in this analysis is 0.65, which is acceptable. Given the significance level $a = 0.05$, $F = 61.9212$ can be obtained by looking up the table, which is greater than $F0.05(2, 102) = 3.09$, so the null hypothesis is rejected, indicating that the $R2$ of the sample is significant, and the established multiple linear regression model is valid. Because the overall relationship of the equation is significantly different from that each independent variable has a significant effect on the dependent variable, a significant t-test is also performed for each independent variable. Given the significance level $a = 0.05$, look up the table to get $t0.05/2(105\text{-}3) = 1.984$, the test statistic of $b1$ $t1 = 4.740 > 1.984$, reject the hypothesis of H0: $\beta 1 = 0$; the test statistic of $b2$ The quantity $t2 = 1.722 < 1.984$, does not reject the hypothesis of H0:$\beta 2 = 0$; the test statistic of $b3$ is $4.033 > 1.984$, rejects the hypothesis of H0:$\beta 3 = 0$. Therefore, the regression coefficients $b1$ and $b3$ are statistically significant, that is, in the correlation analysis of research university data, the influence of teaching background and teaching process on teaching results is significant. The data statistics and related analysis results of this chapter are summarized in the following Table 15:

5. Conclusion

On the basis of fully consulting teaching experts, this research selects 12 secondary indicators, uses the expert consultation method to collect experts' judgment of the importance of the indicators, and uses the analytic hierarchy process to finally determine the indicator system. Then, this research uses this index system to study the teaching evaluation of research universities in Guangdong Province, describes the current research university teaching status, points out the problems existing in the current research university teaching, and analyzes the current situation of research university teaching on the basis of statistics and analysis data. The reasons for the current problems in the teaching of research universities. The whole research adheres to the principle of objectivity and authenticity. The CIPP model used in this study is an analysis model suitable for the research situation. The problem analysis and countermeasure suggestions are completely based on real data, and the results are authentic and credible. Due to the limitation of the professional quality of researchers and the number of consultants, the evaluation indicators proposed in this paper may not be all reasonable and will be used as a scope for further improvement in the future.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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