Evaluation of the Innovative Education Model of Human Resource Management Integration and Training in Higher Vocational Colleges - Taking Guangxi Mechanical and Electrical Vocational and Technical College as an example

Abstract: In terms of the human resources teaching and training model and the evaluation of training effects in higher vocational colleges, the current model for systematically summarizing the evaluation of human resources teaching for students is still the four-level model of the "Kirkpatrick model". This evaluation tool is more practical. It not only requires observing students' reactions and checking students' learning outcomes, but also emphasizes the performance of the quality of human resources teaching and the changes of students in the integration of education and training and innovative teaching.

This study takes Guangxi Mechanical and Electrical Vocational and Technical College as an example, from the perspective of Kirkpatrick's four-level evaluation model, based on 500 students majoring in human resource management as a sample. The actual teaching situation of the human resource management major implementing the training-training integration and innovative education model is studied, with human resource major students who participate in the human resource management teaching course throughout the whole process as the research object.The first level of effectiveness evaluation uses the "teaching satisfaction" questionnaire and non-participant observation to collect data. The second level of effectiveness evaluation uses the "learning acceptance level" as an evaluation tool, which is filled out by the research subjects before and after the training and training integration innovation education model course, supplemented by document analysis to collect data. The third level of effectiveness evaluation is conducted again one month after the human resources management teacher guides the new practice.This study uses factor analysis combined with regression analysis to analyze the collected data through four levels as factors. This study uses a small number of factors to reflect the information of the analysis questions, thereby achieving the purpose of reducing the dimension and facilitating analysis, and then names the factors for regression analysis. Finally, based on the results of the linear regression study, it is expected to provide a reference for the evaluation of human resource management teaching.

Keywords: Human resource management, integration of education and training, Teaching Innovation, education model, teaching quality.

Introduction

Classroom teaching of human resource management is the main channel and main position for cultivating students' professional theoretical knowledge, ability, quality and skills. The human resource management training and education integration and innovation education model of higher vocational colleges can directly refer to the Kirkpatrick model and refer to many manuals, guidelines, questionnaires, etc. that have been developed [1].

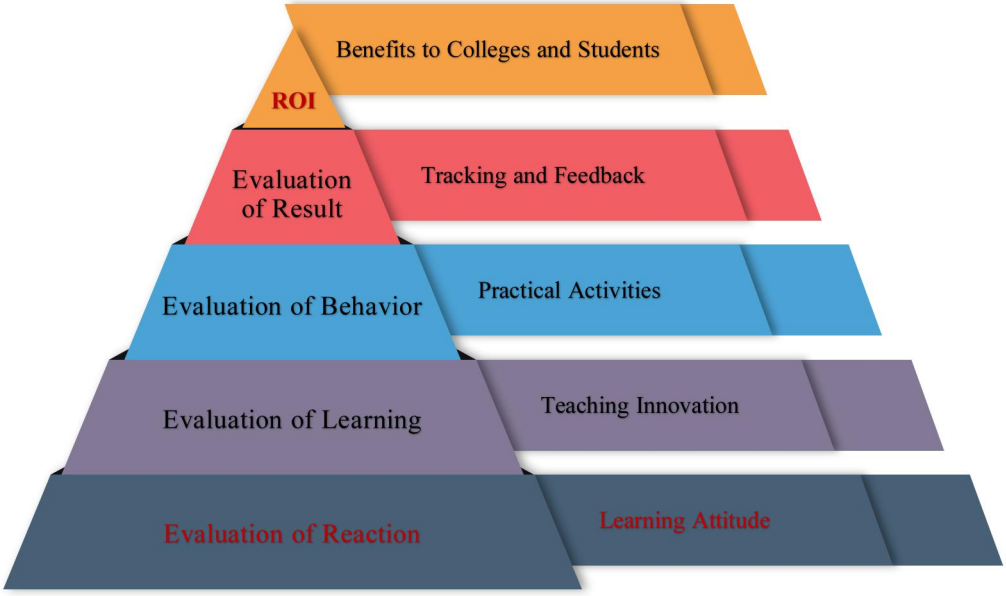

Figure 1.Kilpatrick Assessment Model under the Education-Training Integration Innovation Education Model

However, when vocational colleges adopt the Kirkpatrick model in the process of teaching quality control, they should consider or pay attention to the following:

At the end and during each course of human resource management, teachers should rely on asking, listening or filling out forms to understand students' reactions (Level I). This reaction evaluation is mainly "students' evaluation of teachers' teaching and courses", which covers a wider range than the "students' evaluation of teachers' teaching" implemented by many schools and colleges nowadays [2].

Just because a student majoring in human resource management likes this course or class (Level I) does not mean that he/she has learned the necessary knowledge, skills and attitudes (Level II).

1.3.Vocational colleges rely on regular tests, assignments, midterm exams and final exams to assess the knowledge, abilities and attitudes of students in their majors (Level II). In addition to continuing to pay attention to its reliability and validity, vocational colleges should strengthen pre-teaching assessments in order to better understand students' initial abilities and acquisition abilities [3].

Vocational colleges should have a clearer understanding that they must assess students' application of the information they have learned in the workplace in order to do a good job in Level III assessment, especially in school-enterprise cooperation, off-campus internships, and especially human resources professional simulations, and the extent to which students apply what they have learned in real work environments [4].

Vocational colleges should conduct Level IV evaluation when resources and materials permit. Formulating a Level IV evaluation plan will help to discover the weaknesses of students in the evaluated major in advance [5]. The positive results obtained through Level IV evaluation can also best confirm the value of the teaching content.

1. Application of Kirkpatrick evaluation model in the innovative education model integrating education and training

According to the four levels of the Kirkpatrick model, we divided the education and training

integration innovation project into five parts and carried out them in sequence [6].

1.1.Human resources teaching project formulation stage: We followed the principles of the human resources professional teaching curriculum and conducted a questionnaire survey on students [7]. After the data analysis of the questionnaire, based on the motivation of the sample students for training shown in the results, invalid questionnaires and questionnaires with unclear motivations were deleted. Finally, through the pre-test, we finally determined that 250 students participating in the education and training integration innovation project and 250 students not participating in the education and training integration innovation project would be the research subjects[8].

1.2.The course implementation stage of the education-training integration innovation education project: that is, the reaction level evaluation stage. On-site observation and questionnaires were used to evaluate the effectiveness of the training project by observing the performance of 250 students participating in the education-training integration innovation project and 250 students not participating in the education-training integration innovation education project during teaching, as well as the direct reactions and satisfaction of employees to the training curriculum, project content, simulation effect and other elements after the project [9].

1.3.The early stage of the end of the education and training integration innovation education project course: that is, the learning level evaluation stage. The teaching content test will be conducted on the second day after the end of the project [10]. We will arrange the test content in advance and obtain direct and objective evaluation of the knowledge and skills learned by the students participating in the project through questionnaires, so as to conduct effect evaluation.

1.4.Mid-term evaluation of the project after the end of the project: that is, the behavioral evaluation stage. We chose to determine the improvement of students' behavior after project learning based on the comparison of test scores one month after the project ended. In this way, we can evaluate whether the specific behaviors of students in the interview simulation have undergone positive changes after the project learning training, and determine the evaluation effect at this level [11].

1.5.The post-project phase of the education-training integration innovation project: the evaluation phase at the results level. Two months after the project is completed, we analyze the scores of students in this major, simulation results, student satisfaction reports and other data to measure the actual situation after the project and determine the evaluation effect at this level [12].

2. Construction of the teaching effect evaluation system of the innovative education model integrating education and training

According to the actual situation of the human resource management major of Guangxi Mechanical and Electrical Vocational and Technical College, one or two evaluation indicators alone cannot fully describe it . In order to make the collected feedback results more real, reliable and accurate, we need to establish a complete training effect evaluation indicator system [13]. Based on the Kirkpatrick model theory and combined with the actual teaching situation of the human resource management major, we have formulated a refined teaching content assessment and evaluation system [14]. The evaluation factors are divided into 4 items: teaching satisfaction, student acceptance, simulation effect and student ability improvement. The specific indicators are shown in the figure below [15].

Table 1. Evaluation index system for the effect of training-integration innovation education model

Level 1 indicators	Level 2 indicators	Level 3 indicators
Reaction Evaluation	Teaching satisfaction	Teaching requirements: the necessity of teaching, whether the teaching objectives are clear; Teaching content: the practicality and advancement of teaching content, the combination of theory and practice, the use of problem-based teaching methods, and the case satisfaction of human resources; Teaching conditions: the professional level of teachers, the ratio of teachers to students, the teaching environment and equipment, and the learning atmosphere; Teaching management: the overall arrangement of teaching time, and the record of student attendance;
Learning	Student acceptance	Teaching participation: number of times of learning, relevant knowledge learned, attitude/status of independent learning, participation in teaching activities, completion of interview simulation, communication skills with doctors and nurses, etc.; Assessment records: interview simulation assessment, daily assessment results, homework completion, attendance assessment results;
Behavioral	Simulation effect	Practical effect: familiarity with teaching content, basic communication skills, ability to optimize resume plans, communication and coordination skills, copywriting level, etc.; Thought attitude: cognition of human resources work, corporate profit model and other thinking;
Result	Improvement of student abilities	Benefits to higher vocational colleges: teaching satisfaction, improvement in teaching content indicators, teacher-student teamwork, etc. Benefits to students: students' professional confidence, practical achievements, personal development, etc.;

3. Factor analysis combined with regression analysis

The data sample of this study is 500. The factor analysis results of this study are mainly divided into five steps. After meeting the conditions of factor analysis, it is necessary to check whether the factors need to be adjusted, otherwise the results may be biased. After adjusting the factors, check the factor extraction and information concentration, and finally further perform regression analysis on the factor scores.

Table 2. Evaluation indicators and affiliation degree of innovative education model based on training integration

Index	Indicator Affiliation
Cost 1	Cost
Cost 2	Cost
Cost 3	Cost
Cost 4	Cost
Practical Activities 1	Practical Activities
Practical Activities 2	Practical Activities
Practical Activities 3	Practical Activities
Practical Activities 4	Practical Activities
Student Grouping 1	Student Grouping
Student Grouping 2	Student Grouping
Student Grouping 3	Student Grouping
Student Grouping 4	Student Grouping
Degree of benefit 1	Degree of benefit
Degree of benefit 2	Degree of benefit
Degree of benefit 3	Degree of benefit
Degree of benefit 4	Degree of benefit
Teaching Innovation 1	Teaching Innovation
Teaching Innovation 2	Teaching Innovation
Teaching Innovation 3	Teaching Innovation
Teaching Innovation 4	Teaching Innovation

The results of factor analysis are mainly divided into five steps. After the conditions for factor analysis are met, it is necessary to check whether the factors need to be adjusted, otherwise the results may be biased. After adjusting the factors, check the factor extraction and information concentration, and finally further perform regression analysis on the factor scores.

3.1.Prerequisites

1. Table 3. KMO value and Bartlete's sphericity test

Bartlete test of sphericity	**KMO value**		**0.911**
		Approximate Chi-Square	3666.783
		df	120
		P value	0.000

Factor analysis was used to condense information, after confirming data suitability. The KMO value of 0.911 (above 0.6) and a significant Bartlett sphericity test ($p < 0.05$) indicated the data was appropriate for this analysis.

3.2.Factor loading coefficient table

Table 4. Table of factor loading coefficients after rotation

Item	Factor loading coefficient table				Commonality
	Factor 1	Factor 2	Factor 3	Factor 4	
Cost 1	0.224	0.408	0.744	0.282	0.853
Cost 2	0.217	0.378	0.828	0.232	0.923
Cost 3	0.275	0.435	0.769	0.243	0.912
Cost 4	0.281	0.434	0.709	0.349	0.887

Practical Activities 1	0.191	0.363	0.471	0.746	0.944
Practical Activities 2	0.223	0.448	0.426	0.731	0.944
Student Grouping 1	0.242	0.826	0.379	0.212	0.928
Student Grouping 2	0.262	0.718	0.345	0.309	0.862
Student Grouping 3	0.243	0.769	0.369	0.344	0.902
Student Grouping 4	0.234	0.845	0.371	0.168	0.932
Degree of benefit 1	0.909	0.181	0.122	0.151	0.897
Degree of benefit 2	0.895	0.178	0.168	0.189	0.898
Degree of benefit 3	0.898	0.147	0.197	0.091	0.876
Degree of benefit 4	0.821	0.248	0.249	0.039	0.798

Commonality values for all items exceeded 0.4, signifying strong factor correlations and effective information extraction. We then analyzed item-factor relationships, with absolute factor loadings above 0.4 indicating a connection. From the above figure, we can see that "Practical Activity 2" can appear under Factor 2, Factor 3 and Factor 4 at the same time. However, we consider that there are only two items left in factor 4, so we say it is acceptable. The "entanglement" of other analysis items is also acceptable for the research question. Finally, we found four dimensions, namely "spending situation", "practical activities", "student grouping" and "benefit degree", which have good correspondence with the items. The factor analysis is over, and the analysis items do not need to be further adjusted. Next, we will check the number of factors extracted and the information concentration.

Table 5. Variance explained table

Factor No.	Characteristic root			Rotational front variance explained			Variance explained after rotation		
	Characteristic root	Variance explained %	Grand total %	Characteristic root	Variance explained %	Grand total %	Characteristic root	Variance explained %	Grand total %
1	9.426	67.329	67.329	9.427	67.329	67.329	3.686	26.329	26.329
2	2.042	14.578	81.907	2.042	14.578	81.907	3.651	26.071	52.399
3	0.617	4.406	86.308	0.618	4.404	86.309	3.468	24.763	77.163
4	0.457	3.265	89.573	0.458	3.264	89.574	1.738	12.412	89.574
5	0.325	2.321	91.895	-	-	-	-	-	-
6	0.209	1.487	93.381	-	-	-	-	-	-

7	0.189	1.349	94.727	-	-	-	-	-	-
8	0.183	1.298	96.127	-	-	-	-	-	-
9	0.139	0.984	97.019	-	-	-	-	-	-
10	0.131	0.925	97.934	-	-	-	-	-	-
11	0.108	0.774	98.707	-	-	-	-	-	-
12	0.071	0.509	99.219	-	-	-	-	-	-
13	0.059	0.413	99.631	-	-	-	-	-	-
14	0.052	0.371	100.00	-	-	-	-	-	-

Variance explanation rate indicates a factor's information content from original data. Higher rates mean more information. In factor analysis, rotated data is key. The figure above shows that among the 14 indicators, the variance explanation rates of the four factors are 26.329%, 26.329%, 26.329% and 26.329% respectively. The cumulative variance explanation rate is 89.573% when these four items are added together. There is no fixed standard for the value of the cumulative variance explanation rate, and generally more than 60% is acceptable.

When performing factor analysis, we do not preset the number of factors, and the system will divide them based on the eigenvalue "greater than 1" as the standard.

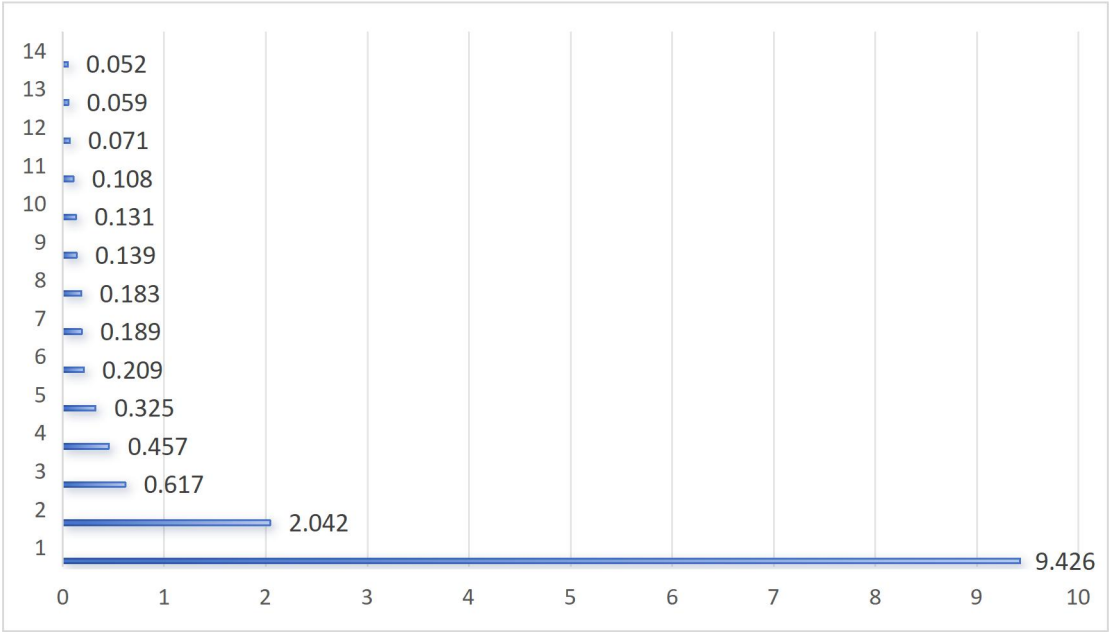

Figure 2. Gravel chart

From the figure, indicators are on the vertical, characteristic roots on the horizontal. The first four factors significantly change characteristic roots, explaining most of the original variables. After that, changes are small, and so is the contribution. Thus, the first four factors are crucial. The scree plot only assists in deciding the number of factors. If three factors are analyzed from this figure, it is also possible. Commonality values for all items exceeded 0.4, signifying strong factor correlations and effective information extraction.

3. Model effect

The intermediate process of linear regression analysis will be described from three aspects: F test, model goodness of fit and collinearity.

Table 6. F-test

	Sum of Squares	df	Mean Square	F	P value
Regression	123.019	4	30.756	95.452	0.000
Residuals	62.829	195	0.323	-	-
Total	185.849	198	-	-	-

From the table above, we can see that the sum of squares of the deviation is 185.849, the sum of squares of the residual is 62.829, and the sum of squares of the regression is 123.019. In the significance test of the regression equation, the statistic F=95.452, and the corresponding p-value is much less than 0.05. The linear relationship of the explained variables is significant, and the model can be established. After the model is established, we need to further check the goodness of fit of the model.

Table 7. Goodness of fit

R	R^2	Adjust R^2	Model Error RMSE	DW value	AIC value	BIC value
0.814	0.662	0.655	0.560	1.966	345.997	362.488

As can be seen from the above table, we use "benefit degree", "student grouping", "spending" and "practical activities" as independent variables, and "teaching innovation" as the dependent variable for linear regression analysis. As can be seen from the above table, the model R square value is 0.662, and the adjusted R square is 0.655. Among them, R square is the determination coefficient, which is a model fit index. It reflects how much of the fluctuation of Y can be described by the fluctuation of X. Adjusted R square is also a model fit index. When the number of x is large, adjusted R^2 is more accurate than R^2. It can be seen that the model fit is good, indicating that the explained variable can be explained by the model.

Table 8. Multicollinearity

	Unstandardized coefficients		Standardized coefficient	t	p	95% CI	VIF
	B	Standard error	Beta				
Constant	0.277	0.177	-	1.568	0.118	-0.069~0.621	-
Degree of benefit	0.757	0.052	0.741	14.771	0.000**	0.657~0.858	1.449
Student grouping	0.178	0.083	0.179	2.185	0.031*	0.018~0.341	3.884
Practical activities	0.035	0.077	0.035	0.452	0.654	-0.115~0.184	3.465
Cost	-0.088	0.091	-0.088	-0.992	0.323	-0.266~0.088	4.601
Dependent variable: teaching innovation. *p<0.05; **p<0.01;							

VIF detects collinearity. Below 10 (or 5 strictly) means no collinearity. Tolerance (1/VIF) works too: above 0.1 (or 0.2 strictly) means no collinearity. We use VIF. Our results show all VIFs were under 5, so no multicollinearity. Through the analysis results, we found that the F test results of the regression analysis were good, and the model had a good fit and could explain most of the

information and there was no multicollinearity problem.

4.Linear regression analysis results

Table 9. Linear regression analysis results

	Unstandardized coefficients		Standardized coefficient	t	p	VIF	R^2	Adjust R^2	F
	B	Standard error	Beta						
Constant	0.277	0.177	-	1.568	0.118	-	-	-	F(4,195)=95.452, P=0.000
Degree of benefit	0.757	0.052	0.741	14.771	0.000**	1.449	-	-	
Student grouping	0.178	0.083	0.179	2.185	0.031*	3.884	0.662	0.655	
Practical activities	0.035	0.077	0.035	0.452	0.654	3.465	-	-	
Cost	-0.088	0.091	-0.088	-0.992	0.323	4.601	-	-	
Dependent variable: teaching innovation; D-W value: 1.996; *p<0.05; **p<0.01;									

(1) Model formula

As can be seen from the table above, "benefit degree", "student grouping", "spending situation" and "practical activities" are used as independent variables, and "teaching innovation" is used as the dependent variable for linear regression analysis. As can be seen from the table above, the model formula is: Teaching innovation = 0.277 + 0.757*benefit degree + 0.178*student grouping + 0.035*practical activities-0.089*spending situation (for this study, the model prediction is not very meaningful).

(2) Analysis results

When we conducted an F test on the model, we found that the model passed the F test (F=95.452, p=0.000<0.05), which means that at least one of the "benefit degree", "student grouping", "spending situation" and "practical activities" will have an impact on "teaching innovation", and the D-W value is around 2 (generally, only time series models will consider this value, and others do not need to be overly concerned). Therefore, it shows that there is no autocorrelation in the model, and there is no correlation between the sample data, and the model is good.

Table 10. Linear regression results analysis

	Unstandardized coefficients		Standardized coefficient	t	p	VIF	R^2	Adjust R^2
	B	Standard error	Beta					
Constant	0.277	0.177	-	1.568	0.118	-	-	-
Degree of benefit	0.757	0.052	0.741	14.771	0.000**	1.449	-	-
Student grouping	0.178	0.083	0.179	2.185	0.031*	3.884	0.662	0.655
Practical activities	0.035	0.077	0.035	0.452	0.654	3.465	-	-
Cost	-0.088	0.091	-0.088	-0.992	0.323	4.601	-	-
Dependent variable: Teaching innovation								

Significant X impact on Y ($p < 0.01$) means: positive Beta, X increases Y (larger Beta, stronger impact); negative Beta, X decreases Y (smaller Beta, stronger impact). 'Benefit degree' and 'student grouping' significantly and positively impact 'teaching innovation'. The standardized regression coefficients of the two are 0.741 and 0.179 respectively. It can be seen that in the model, "benefit degree" has the greatest impact on "teaching innovation", followed by "student grouping".

Conclusion

This study obtained the factor scores through factor analysis and then conducted regression analysis. We first conducted factor analysis and found that the data met the basic prerequisites, but found that the analysis items needed to be adjusted. After adjusting the corresponding items, we conducted analysis to explain the factor extraction and obtained 4 independent variables. After that, we conducted regression analysis and found that "benefit degree" and "student grouping" would have a significant positive impact on "teaching innovation". However, "practical activities" and "spending" did not have an impact on "teaching innovation". And we found that "benefit degree" had the greatest impact on "teaching innovation". If in actual analysis, we can focus on the "benefit degree" indicator.

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