Simulation of Empirical Model on the Effectiveness of Methods in Educational Reform in Colleges and Universities

XU Yaguang

Dept. of Information System, Dalian Naval Academy, Dalian 116018, China

77209xu@163.com

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Abstract: To explore a new mode of educational reform in colleges and universities in order to promote the improvement of the effect of education and teaching in colleges and universities. This paper puts forward an empirical model of method effectiveness in university education reform based on quantitative regression analysis. The characteristic quantity of practice effect decision of university education reform method is constructed, and the fuzzy set scheduling set of practice effect distribution of university education reform method under linear programming mode is obtained, the characteristics of association rules of practice effect of university education reform method are extracted, the index structure of constraint parameters is constructed, and the multi-order intrinsic modal function analysis model is established, and the quantitative regression analysis of the practice effect of university education reform method is carried out. It is concluded that the reliability of the method effectiveness analysis in the educational reform of colleges and universities is better, and the quantitative analysis results are accurate and reliable, which improves the effectiveness of the empirical analysis of the educational reform in colleges and universities.

1. Introduction

Although some colleges and universities have carried out career development education for college students, they have not paid enough attention to their internal needs, lack of long-term and holistic planning in the structural system, and lack of systematic and comprehensive understanding of logical thinking[1,2]. The principle of college students' career development education is to adhere to student-oriented and set up the concept of all for students to become talents [3,4].As an important tool of teaching evaluation, the method of educational reform in colleges and universities plays an irreplaceable role in the process of education. The reform method of university education is an important way to test the effect of university education and teaching, which plays a key role in improving the teaching quality of university education and promoting students' learning[5].

2. An Analysis of the present situation of the methods of Educational Reform in Colleges and Universities in the course of Education in Colleges and Universities

From the current situation of educational reform methods in colleges and universities, there are mainly some problems, such as the contents of educational reform methods in colleges and universities are not comprehensive enough, which affect the teaching effect of educational courses in colleges and universities to a certain extent[6,7].

2.1. Content of educational reform method in colleges and universities is not comprehensive enough

Compared with the quantitative mathematics theory in elementary mathematics curriculum, the content of university education is more abstract and the difficulty of learning is greatly improved. In order to achieve the ideal results of the educational reform methods in colleges and universities, the

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difficulty and standards of the educational reform methods in colleges and universities are reduced[8].

2.2. The methods of educational reform in colleges and universities are not scientific enough

Taking the test results as the standard and the implementation of the credit system, the students do not pay enough attention to the study of higher education, and the purpose of obtaining credit through the examination is to greatly reduce the effect of learning. It is urgent to improve the teaching effect of college education, and it is the most important task to make scientific reform method according to the characteristics of college education.

2.3. The method of educational reform in colleges and universities is relatively single

The single way of educational reform in colleges and universities is another main factor that causes the effect of education and teaching in colleges and universities to be not ideal. Taking the written examination as a single way of university education reform, it is not only difficult to comprehensively test the students' mastery ability of university education, but also cause the misunderstanding that the university education is not important to the students. Taking the written examination as a single way of educational reform in colleges and universities will also lead to the loss of the test results, some students have strong learning ability, and the application ability of university education is higher, but the examination-oriented ability is relatively weak, and the written examination results are difficult to reflect their true ability.

3. Establishing and optimizing practical teaching environment

The effectiveness of college students' participants in the education system of college students' career development is the key. This requires colleges and universities to establish and optimize the practical teaching environment, actively absorb social forces, mobilize social resources to cooperate together, and form a good linkage mechanism.

3.1. Relying on the Resource advantages of higher Vocational Colleges to realize the Cooperation between Colleges and Universities

Compared with ordinary higher education colleges, the practice teaching resources of higher vocational colleges should be more abundant, so the ordinary colleges and universities in the same city and the developed and mature higher vocational colleges can establish long-term practice cooperative relationship, and realize the smooth transition from school to enterprise for ordinary college students.

3.2. Relying on Industry Enterprises to broaden the channels of Vocational training

Colleges and universities should employ the technology of enterprises and the management personnel to form a professional construction steering committee to make the teaching process close to the development direction of the specialty; employ the management of the production line of the enterprise, enrich the double-qualified teacher team with the technical backbone, and make use of the advanced production equipment and places of the enterprise as the practice training base. The training department of the college can also obtain the information of training demand, employ the backbone of production management technology in the production line of the enterprise to form a training expert lecture group, and tailor-made vocational training for the corresponding industries, departments and enterprises. Therefore, colleges and universities should select training contents according to the needs of industries, departments and enterprises, select teachers with strong ability, ensure quality and broaden their own vocational training market.

3.3. Relying on Internet Technology, developing 5G distance Teaching observation course

The development of network technology has broken the barrier of regional restriction. Colleges and universities should rely on the advantages of Internet technology, build "5G intelligent education" classroom, change the normal teaching means, and promote diversified education and

teaching. Many advanced professional technologies in colleges and universities can not be popularized by the constraints of the practical environment. With the help of 5G technology, the practical process can be introduced into the classroom, so that college students can watch and learn from close range, walk in the forefront of technology, and improve their employability.

4. Exploration on the formulation of Educational Reform methods

Under the current mode of educational reform methods in colleges and universities, not only the teaching effect cannot be improved, but also the teaching effect of higher education will be reduced, so it is necessary to reform the educational reform methods in colleges and universities.

4.1. Combination of reform methods and processes

Under the traditional mode of college education reform, the only way of college education reform is written examination, but the method of college education reform for students in the course of teaching is neglected. Learning is a dynamic process, not just a short time before and after the examination, to test the students learning effect, we need to comprehensively measure the learning situation and the test results in peacetime. The examination has certain unpredictability, some students learning ability is strong, but because of the psychological quality or the accidental factor influence, may appear the examination result not ideal situation, if only takes the examination result as the measurement standard will be biased. Combining the reform method of college education with the result method of college education can scientifically measure the learning effect of students college education.

4.2. The phased and comprehensive combination of the reform method

The study of higher education needs to be carried out step by step, and the test of learning effect must be carried out in stages. The method of educational reform in colleges and universities in stages can greatly reduce the blind area of teachers' teaching and further improve the pertinence of teaching. Students can find their own shortcomings in time and make up for them in time. On the basis of the phased educational reform method of colleges and universities, the comprehensive learning content can be tested by using the educational reform method at the end of the period, which can greatly promote the improvement of teaching effect. The combination of phased university education reform method and comprehensive university education reform method can achieve the purpose of promoting learning by examination.

4.3. The combination of basic theory educational reform method and practical application

The application of the university education determines the practicality of the education teaching test in the university, and it is necessary to cultivate the practical application ability of the students consciously in the theoretical study. The training and inspection of practical application ability can refer to the model of mathematical modeling, expand the application in other aspects, and explore the introduction of more diversified practical application courses in higher education, which is of great benefit to the improvement of the teaching effect of higher education and the training of the students' creative ability.

5. Quantitative analysis model of practical effect of educational reform methods

5.1. Evaluation constraint parameter analysis

The fuzzy constraint index analysis method is used to analyze the constraint parameter analysis of the practical effectiveness of the educational reform method in colleges and universities:

$$MSD_{a\to b}=1-\frac{\sum_{i=1}^{|I_{a,b}|}\sqrt{(d_{a,i}-\bar{d}_a)^2+(d_{b,i}-\bar{d}_b)^2}}{|I_{a,b}|\times\sum_{i=1}^{|I_{a,b}|}\left[\sqrt{(d_{a,i}-\bar{d}_a)^2}+\sqrt{(d_{b,i}-\bar{d}_b)^2}\right]} \quad (1)$$

Wherein, $MSD_{a\to b}$ is the consistency function of distributed evaluation of teaching reform practice under the pattern of multi-tier evaluation. The distribution level $\mathrm{x}^{(0)}$ of practical effect of educational reform method in colleges and universities is divided into N levels. The linear programming model is adopted for 为$\mathrm{x}^{(1)},\mathrm{x}^{(2)},\cdots,\mathrm{x}^{(N)}$, that is $\mathrm{x}^{(0)}=\bigcup_{i=1}^{N}\mathrm{x}^{(i)}$. The correlation mapping relationship of practical effect distribution of educational reform method is obtained as follows:

$$p\left(R^N=r_i\right)=p\begin{pmatrix}X^N=x_i\left|\left|x_i\right|=\left|r_i\right|,angle\left(x_i\right)\right.\\=\left(angle\left(r_i\right)-\varphi_g\right)\bmod\left(2\pi\right)\end{pmatrix} \quad (2)$$

The fuzzy set function is constructed to obtain the constraint parameter index of the practical effect of the educational reform method in colleges and universities:

$$H\left(X^N\mid Z^N\right)=H\left(R^N\mid Z^N\right)+H\left(\varphi_g\mid Z^N\right) \quad (3)$$

The state parameter set of the practical effect factors of the educational reform method in colleges and universities is expressed as follows:

$$F=\left\{f_1,f_2,\cdots,f_n\right\} \quad (4)$$

It is obtained that the fuzzy set scheduling set of the practical effect distribution of the educational reform method in colleges and universities under the linear programming mode is obtained as follows:

$$f(t)=\frac{1}{2\pi}\frac{d}{dt}[\arg z(t)] \quad (5)$$

The characteristic quantity of practical effect decision of constructing the method of educational reform in colleges and universities is obtained as follows:

$$S_x=E\left[x^3(t)\right]+\sqrt{s}bu[s(t-\tau_0)] \quad (6)$$

$$K_x=E\left[x^4(t)\right]-3E^2\left[x^2(t)\right]b \quad (7)$$

Wherein, $E\left[x^3(t)\right]$ is the expected value of the practical effect of the educational reform method and universities, b represents the decision coefficient, and the fuzzy scheduling set of the practical effect planning and scheduling of the educational reform method and universities is as follows:

$$\begin{cases}H_0:x'(t)=w(t)\\H_1:\sqrt{E}s'(t)+w(t)\end{cases}\qquad 0\le t\le T \quad (8)$$

In the above formula, x'(t) and s '(t) are:

$$x'(t)=x(t)*h_w(t) \quad (9)$$

$$s'(t)=s(t)*h_w(t) \quad (10)$$

Based on the above analysis, this paper extracts the characteristics of association rules and constructs the constraint parameter index system[10].

5.2. Quantitative regression analysis model

The multi-order eigenmode function analysis model of the practical effect of the educational reform method of the university is constructed, and the quantitative regression analysis of the practice effect of the educational reform method of the university is expressed as follows:

$$\begin{aligned}S_{C/A}(f)=&\frac{T_B}{\left(NT_C\right)^2}\left|X(f)\right|^2\\&+\sum_{l=-\infty}^{\infty}\sin c^2\left(\pi T_B\left(f-\frac{l}{NT_C}\right)\right)\end{aligned} \quad (11)$$

Wherein

$$\left|X(f)\right|^2 = T_C{}^2 N \sin c^2(\pi f T_C)\left|X_{code}(f)\right|^2 \tag{12}$$

$$X_{code}(f) = \frac{1}{\sqrt{N}}\sum_{n=0}^{N-1} x_n \exp(-j2\pi fnT_c) \tag{13}$$

In the above formula, T_C is the nonlinear characteristic distribution threshold, f is the information sampling frequency of the teaching reform effect, and $\left|X_{code}(f)\right|$ is the information weighted eigenvector. The multi-order intrinsic modal function analysis model of the practical effect of the university education reform method is constructed[11], which can be described as follows:

$$\begin{pmatrix} x_1(t) \\ \vdots \\ x_m(t) \end{pmatrix} = \begin{pmatrix} a_{1i} \\ \vdots \\ a_{mi} \end{pmatrix} s_1(t) \Rightarrow \frac{x_1(t)}{a_{1i}} = \cdots = \frac{x_m(t)}{a_{mi}} = s_i(t) \tag{14}$$

According to the association rule mining method, the statistical regression analysis model of the practice effect of the education reform method of the university is expressed as follows:

$$\hat{w}_j^k = \begin{cases} sign(w_j^k)\left(|w_j^k| - \beta \cdot T_j\right), \text{if } |w_j^k| \geq T_j \\ 0, \qquad\qquad \text{else} \end{cases} \quad j=1,2,...,J+1 \tag{15}$$

Construct a multi-order intrinsic modal function analysis model for the practical effect of educational reform method in colleges and universities, which is expressed as a dual-dimensional planning problem, which is described as follows:

$$T_j = \begin{cases} \sigma\sqrt{2\ln(N)}\left(1 - \frac{J}{2} \times \frac{E_j}{\sum_{j=1}^{J+1} E_j}\right), \quad j=1,2,...,J \\ \sigma\sqrt{2\ln(N)} \times \frac{E_j}{\sum_{j=1}^{J+1} E_j}, \; j = J+1 \end{cases} \tag{16}$$

Wherein, N denotes the length of exponential distribution, and J is the order of hierarchical analysis of the practical effect of educational reform methods in colleges and universities, so as to realize the quantitative analysis of the practical effects of educational reform methods in colleges and universities.

6. Empirical analysis and inspection

Combined with Matlab and SPSS statistical analysis software, the practical effect of educational reform method in colleges and universities is evaluated and analyzed quantitatively. The control constraint parameter model and explanatory variable model are constructed in the experiment. The sample number of sample data is 2000, the training sample set is 120, the number of iterations is 100, and the test sample set is 10 groups of samples. The descriptive statistical analysis results are shown in Table 1.

Table 1 Describes the results of the statistical analysis

Statistical object	Teaching input	Teaching staff	Hardware facilities	Policy factors	Discipline setting	Investment in the construction of basic disciplines
Sample 1	0.456	0.542	0.632	0.432	0.445	0.547
Sample 2	0.467	0.898	0.578	0.347	0.535	0.653
Sample 3	0.743	0.632	0.639	0.435	0.567	0.431
Sample 4	0.467	0.357	0.631	0.578	0.743	0.346
Sample 5	0.543	0.376	0.765	0.554	0.647	0.545
Sample 6	0.486	0.533	0.456	0.659	0.545	0.665
Sample 7	0.654	0.457	0.435	0.433	0.357	0.532
Sample 8	0.437	0.634	0.567	0.447	0.535	0.437
Sample 9	0.458	0.465	0.434	0.443	0.544	0.743
Sample 10	0.546	0.435	0.745	0.645	0.586	0.642
All sample	0.653	0.767	0.676	0.653	0.543	0.655

According to the statistical analysis results of Table 1, the quantitative analysis of the practical effect of the educational reform method in colleges and universities is carried out, and the distribution of the sample data is shown in figure 1.

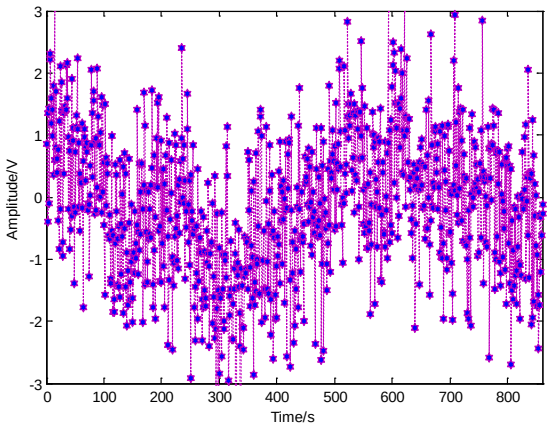
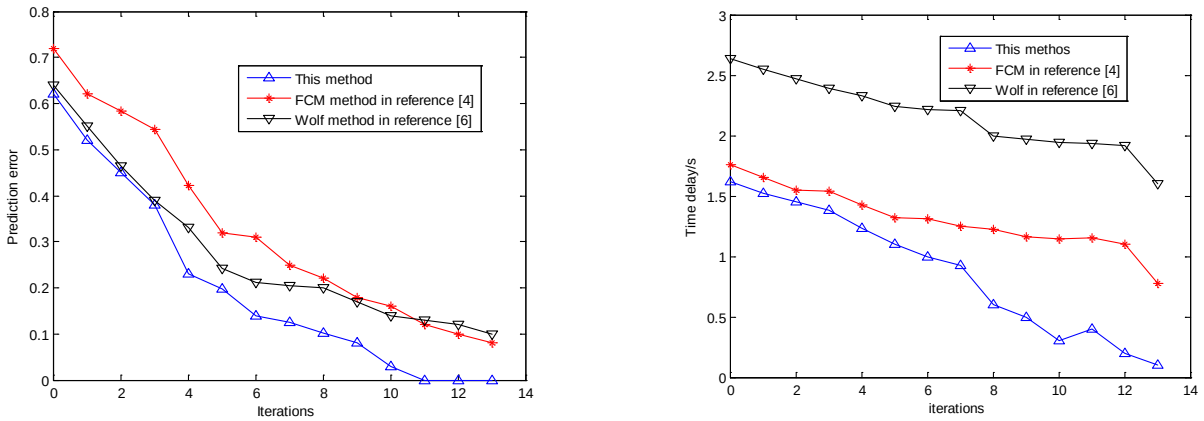


Fig. 1 data sampling for quantitative analysis of practical effects of educational reform methods

Taking the data of figure 1 as the test object set, the practical effect of the educational reform method in colleges and universities is quantitatively evaluated, and the test results are shown in figure 2.



(a) Predictive encoding **(b) Time cost**

Figure 2 Performance comparison results

The analysis of Figure 2 shows that the model can effectively evaluate the practical effect of the reform method of the university education, and the result of the evaluation is accurate and reliable. The method has the advantages of low error, short time cost, good self-adaptability, good information prediction and statistical analysis capability, and improves the effectiveness prediction performance of the reform effect.

7. Conclusions

This paper puts forward an empirical model of method effectiveness in university education reform based on quantitative regression analysis. By analyzing the present situation of the methods of educational reform in colleges and universities, this paper understands the shortcomings of the methods of educational reform in colleges and universities, explores the direction of making educational reform in colleges and universities, and promotes the further improvement of the methods of educational reform in colleges and universities. This paper constructs the quantitative analysis model of the practical effect of the university education reform method, adopts the fuzzy constraint index analysis method, analyzes the practical validity constraint parameters of the university education reform method, abstracts the characteristics of the association rules of the practical effect of the university education reform method, carries on the quantitative regression analysis of the reform practice effect, analyzes the practical effect of the university education reform method reform, and demonstrates the practical function of the university education reform method. The characteristic quantity of practice effect decision of university education reform method is constructed, and the fuzzy set scheduling set of practice effect distribution of university education reform method under linear programming mode is obtained, the characteristics of association rules of practice effect of university education reform method are extracted, the index structure of constraint parameters is constructed, the multi-order intrinsic modal function analysis model is established, and the quantitative regression analysis of the practice effect of university education reform method is carried out. It is concluded that the reliability of the method effectiveness analysis in the university education reform is good, and the quantitative analysis results are accurate and reliable, which improves the effectiveness of the empirical analysis of the university education reform. This method has a good application value in the statistical analysis and prediction of the effectiveness of the university education reform.

References

[1] XUE D, WU L F, LI H B, et al. TraDR:a destination prediction method based on trajectory decomposition and reconstruction in geo-social networks[J]. Computer Science, 2016, 43(3):93-98.

[2] CHEN Zhiwang1, HUANG Xingwang2, CHEN Zhixing3, ZHAO Zizheng2, HUANG Lifang4. Non-dominated sorting cloud model algorithm for interval multi-objective optimization. CEA, 2017, 53(22): 143-149.

[3] Wang W, Cheng M, Zhang B, et al. Flux-weakening vector control of interior permanent magnet synchronous motor based on sliding mode variable structure controller[J]. IEEE Transactions on Power Electronics, 2013, 29(4):1646-1658.

[4] Almeida A T D, Fernando J T E, Ferreira T E, et al. Standards for efficiency of electric motors[J]. IEEE Industry Applications Magazine, 2011, 17(1):12-19.

[5] Akrad A, Hilairet M, Diallo D. Design of a fault-tolerant controller based on observers for a PMSM drive[J]. IEEE Transactions on Industrial Electronics, 2011, 58(4):1416-1427.

[6] Gao Z W, Cecati C, Ding S X. A survey of fault diagnosis and fault-tolerant techniques-part I:Fault diagnosis with model-based and signal-based approaches[J]. IEEE Transactions on Industrial Electronics, 2015, 6(62):3757-3767.

[7] Guo Chunyi,Zhao Chengyong,Iravani R,et al.Impact of phase-locked loop on small-signal

dynamics of the line commutated converter-based high-voltage direct-current station[J].IET Generation,Transmission & Distribution,2017,11(5),1311-1318.

[8] U Q, YUAN L, NING B, et al. A noval classification algorithm for imbalanced datasets based on hybrid resampling strategy[J]. Computer Engineering and Science, 2012, 34(10):128-134.

[9] LI C F, ZHU G C, WU X J, et al. False-positive reduction on lung nodules detection in chest radiographs by ensemble of convolutional neural networks[J]. IEEE Access, 2018, 6(99):16060-16067.

[10]Xin ZHANG,Yun-hui HE. Modifid Interpolatory Projection Method for Weakly Singular Integral Equation Eigenvalue Problems[J]. Acta Mathematicae Applicatae Sinica, English Serie, 2019, 35(2): 327-339.

[11]Z ZHANG Chaohua, LI Lianhe,YUN Guohong. Study on moving dislocations in decagonal quasicrystals[J]. Chinese Journal of Solid Mechanics, 2017,38(2): 165 -169.