

## *Retraction*

# **Retracted: Application of Linear Regression Mathematical Model in the Evaluation of Teachers' Informatization Quality**

## **Complexity**

Received 3 October 2023; Accepted 3 October 2023; Published 4 October 2023

Copyright © 2023 Complexity. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

## **References**

- [1] S. Li and X. Yuan, "Application of Linear Regression Mathematical Model in the Evaluation of Teachers' Informatization Quality," *Complexity*, vol. 2021, Article ID 5599655, 10 pages, 2021.

## Research Article

# Application of Linear Regression Mathematical Model in the Evaluation of Teachers' Informatization Quality

Shuping Li and Xinlei Yuan 

*School of Education Science, Mudanjiang Normal University, Mudanjiang 157011, Heilongjiang, China*

Correspondence should be addressed to Xinlei Yuan; 1205002@mdjnu.edu.cn

Received 2 March 2021; Revised 10 April 2021; Accepted 16 April 2021; Published 27 April 2021

Academic Editor: Zhihan Lv

Copyright © 2021 Shuping Li and Xinlei Yuan. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

With the widespread application of information technology and the continuous deepening of my country's education informatization construction, the educational field has increasingly higher requirements for teachers' informatization quality. The advancement of the process of education informatization depends to a large extent on the level of teachers' own level of informatization and has gradually become an important indicator to measure the informatization of education. The main body of education and the decisive factor are teachers. The scientific and reasonable evaluation of informatization education is an important content of today's education informatization. This paper uses regression analysis to evaluate the teacher education information system and uses mathematical statistics to establish a linear regression model for the city and analyze and calculate it. Through the quantitative analysis of the evaluation index system of the education informatization level, the multiple linear regression analysis method was used to establish the linear regression mathematical model of the school education informatization level on each secondary index, and the influence of various indicators on the school education informatization level was analyzed to establish a scientific evaluation system to evaluate the literacy of teachers' informatization education and to give suggestions for improving the level of school education informatization. The design of the evaluation system is more scientific and reasonable, the regression error is small, the results obtained are more accurate, and the impact of nonlinear errors is basically eliminated.

## 1. Introduction

The concept of informatization of education was put forward with the construction of the information superhighway [1]. The Clinton administration formally proposed the construction of the "Information Superhighway" plan, which specifically introduced the application of information technology in education [2]. As an important way to implement education reform oriented to the twenty-first century. This move by the United States has aroused positive reactions from countries around the world, and governments of many countries have successively formulated plans to promote the informatization of education in their own countries. E-Learning refers to learning and teaching activities mainly carried out through the Internet. It makes full use of the learning environment provided by modern

information technology with a new communication mechanism and rich resources to achieve a new learning method; this learning method will change the role of teachers in traditional teaching and the relationship between teachers and students, thereby fundamentally changing the teaching structure and the nature of education.

Educational informatization has the following salient features. Multimedia teaching materials use multimedia, especially hypermedia technology, to structure, dynamic, and visualize teaching content. More and more teaching materials and reference books have become multimedia [3]. They not only contain text and graphics but also present sounds, animations, videos, and simulated three-dimensional scenes. The use of the Internet can connect the world's educational resources into a sea of information, which can be shared and used by educators and learners anytime and

anywhere, breaking the closure and monopoly of various forms of educational resources in the past. The important means of education informatization is based on the network platform. The network is the most open object-oriented system today, which is mainly reflected in open content, open structure, and open function [4]. Open content refers to the seamless connection between local resources and remote resources, and the content can be expanded arbitrarily; open structure refers to the use of network technology to update educational resources and expand system capabilities at any time. Functional openness refers to the provision of comprehensive educational services that can support on-demand learning, timely learning, flexible learning, and personalized customized services. The intelligent tutor system constructed by artificial intelligence technology can teach and provide assistance according to the different personality characteristics and needs of students. Due to the increasing recognition of student-based educational ideas, education informatization has greatly strengthened the autonomy and independence of students in learning. Students can independently choose textbooks and teachers and arrange their own courses and class hours. Learning activities through cooperation is also the current development direction of international education. Information technology can play an important role in supporting cooperative learning. Its forms include computer cooperation (online cooperative learning), cooperation in front of the computer (such as group work), and computer cooperation (the computer plays the role of a student's companion) [5]. Diversification and socialization of service targets: allow and tolerate various forms of education, such as school education, on-the-job training education, community education, and self-study education. The service targets of education are no longer limited to school students, in order to form lifelong learning and educational learning society provides a network platform.

On the basis of inheriting domestic and foreign scholars' research on informatization and education informatization evaluation methods, after sorting out, analyzing, absorbing, and learning from and expanding the research process, this paper proposes a method model suitable for education informatization evaluation. A qualitative analysis and summary of the current situation of domestic and foreign education informatization evaluation and related research results; under the guidance of qualitative analysis, the classical gray system theory is improved and expanded, and a comprehensive evaluation method of education informatization based on gray interval system theory is proposed. This paper uses multiple linear regression analysis methods to establish a linear regression mathematical model of school education informatization level on each secondary index. The influence of various indicators established on the level of school education informatization can be a reference for improving the level of school education informatization.

## 2. Related Work

It can be seen from the indicator systems of educational informatization in various countries that the evaluation of educational informatization abroad mainly focuses on the

application of information technology in the process of teaching and learning and does not include the application of technology in school management. This should be related to the understanding of the concept of education informatization. Because the concept of informatization of education is basically a product of eastern language thinking, it is widely used in eastern countries such as Japan, Korea, and China. The more generally accepted English translation method for informatization is "informatization," but in Western countries, highly general terms such as "informatization" are rarely used. Westerners call "IT in Education" and the concept of education informatization is more consistent. Therefore, in most evaluations, it only involves teaching informatization and not education informatization. In the field of education in China, the understanding of education informatization is as follows: "not only regulates the development of resources and the efficiency and quality of learning and teaching, but also promotes educational administration and school management, and to complete its tasks efficiently"; its connotation is broader than IT in Education [6]. These indicator systems differ significantly from each other from the perspective of the classification of the level indicators. Just as Shen and Ho [7], the former Minister of Education, said "There is no standard that can be used to refer to or a unified measurement for education informatization in the world. There is indeed no unified measurement standard for a country, region, and industry. According to the situation of each country, each country is formulating some standards suitable for the situation of the country". However, looking at these evaluation studies on the effect of information technology in education, most of the evaluation conclusions are relatively pessimistic, and it is not obvious that information technology plays a role in education. The World Bank summarized the results of these current evaluations in the "Knowledge Map: The Role of ICT in Education," and pointed out the problem: "The impact of the use of ICT in education is uncertain and full of controversy. It is that there is still a lack of widely recognized standard methods and indicator systems to evaluate the impact of the use of ICT in education, and there is a gap between the inferences about the impact of the use of ICT in education and their actual conditions."

Thibaut et al. [8] of Wuhan University of Technology studied the entire process of higher education informatization from multiple levels, established a theoretical framework for higher education informatization, and conducted an empirical analysis of the situation of higher education informatization in Henan Province. Goosen and Van Heerden [9] proposed in the article "Concept of the Construction of Ningxia Education Informationization Index System" that the evaluation index system should be constructed from 9 aspects including infrastructure, education website, information resources, and funding input. Boa et al. in the Education Information Measurement Index, Nankai University [10], designed the education information infrastructure index, education information resource index, education network construction index, education information main body level index, and education information consumption level index. It constitutes an index system for

measuring education informatization. Dickison et al. [11] discussed the construction ideas and basic principles of the evaluation index system of higher education informatization based on the strategic goals of universities and proposed a set of higher education informatization evaluation index system. Fabiano et al. [12], based on the analysis of the domestic and foreign university informatization evaluation system, drew on the Chinese enterprise informatization index system that has been promulgated and constructed the basic index and evaluation index of the informatization index system of colleges and universities.

In terms of practical operation, in 2018, we conducted questionnaire survey, interview and field survey on the status quo of primary and secondary education in China. Various methods have been used for investigation and research. From October to November 2018, the School of Education of Peking University conducted an investigation on the informatization development of domestic universities [13]. Corresponding indicators show that the construction of campus networks in Chinese universities is not perfect, and the online services and resources provided by universities are still relatively limited. Although there has been some emphasis on formulating informatization strategies, there is a lack of corresponding planning and technical support provided by relevant departments. In addition, the domestic informatization evaluation of colleges and universities that can be used as a reference is also included in the part of the description of informatization in the “Undergraduate Teaching Level Evaluation Program for Ordinary Colleges and Universities,” which has guiding significance for many schools.

This paper makes a qualitative analysis and summary of the current situation of education informatization evaluation at home and abroad and related research results: under the guidance of qualitative analysis, the classic gray system theory is improved and expanded, and a comprehensive evaluation method of education informatization based on gray interval system theory is proposed. Finally, a scientific evaluation system was established to evaluate the literacy of teachers’ informatization education, the influence of various indicators on the level of school education informatization was analyzed, and reference opinions for improving the level of school education informatization were given.

### 3. Regression Analysis Theory and Basic Algorithm

**3.1. Regression Analysis Theory.** The so-called regression analysis is based on mastering a large amount of observation data, using the statistical method to establish the regression relationship between the dependent variable and the independent variable. When the causal relationship studied only involves the dependent variable and one independent variable, it is called univariate regression analysis; when it involves the dependent variable and two or more independent variables, it is called multiple regression analysis; when it is based on describing the causality between the independent variable and the dependent variable whether

the function expression of the relationship is linear or nonlinear, it is divided into linear regression analysis and nonlinear regression analysis. Usually, linear regression analysis is the most basic analysis method [14]. Based on a large amount of data, we analyze the quantitative indicators of the evaluation system of teacher informatization education, which can be approximately regarded as linear or close to linear. Then, to establish a comprehensive evaluation system for teacher informatization education, first determine the specific content of the evaluation indicators in the evaluation system and their respective weights; secondly, analyze the data, establish the corresponding matrix model, and perform calculations; and finally, find out what we need the weight matrix is the result of our analysis.

**3.2. Quantitative Indicators.** Through research and investigation, we summarize the evaluation system of teacher informatization education into three evaluation indicators from three aspects: theory, operation, and practice, which are basic theoretical knowledge evaluation index (theory), practical operation ability evaluation index (operation), and actually used in auxiliary teaching evaluation index (practice); it is represented by  $S_1$ ,  $S_2$ , and  $S_3$ , respectively. Under the three evaluation indicators, there are several detailed and easy-to-measure quantitative indicators, which are represented by  $x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8$ , and  $x_9$ . Among them, the basic cardinal number corresponding to each quantitative index is  $x_i$  ( $0 \leq x_i \leq 1$ ,  $0 < i \leq 9$ ). The relationship between evaluation indicators and quantitative indicators is shown in Figure 1.

The teacher informatization education evaluation system is divided into three evaluation indicators: basic theoretical knowledge evaluation indicators, practical operation ability evaluation indicators, and actual use of auxiliary teaching evaluation indicators. Under the three evaluation indicators, there are several detailed and easy-to-measure indicators. Quantitative indicators are, for example, the use of commonly used software, the use of teaching aids, the acquisition of new knowledge through learning websites, the use of multimedia teaching software, basic knowledge of databases, actual teaching courseware, and classroom teaching feedback.

**3.3. Evaluation Method.** On the basis of mastering a large amount of observation data, we use statistical methods to establish the regression relationship function expression between the dependent variable and the independent variable. Usually, linear regression analysis is the most basic analysis method. We analyze the quantitative indicators of the teacher informatization education evaluation system based on a large amount of data. To establish a comprehensive evaluation system for teacher informatization education, we should first determine the specific content of the evaluation indicators in the evaluation system and their respective weights; secondly analyze the data, establish the corresponding matrix model, and perform calculations; and finally, find the weight matrix we need.

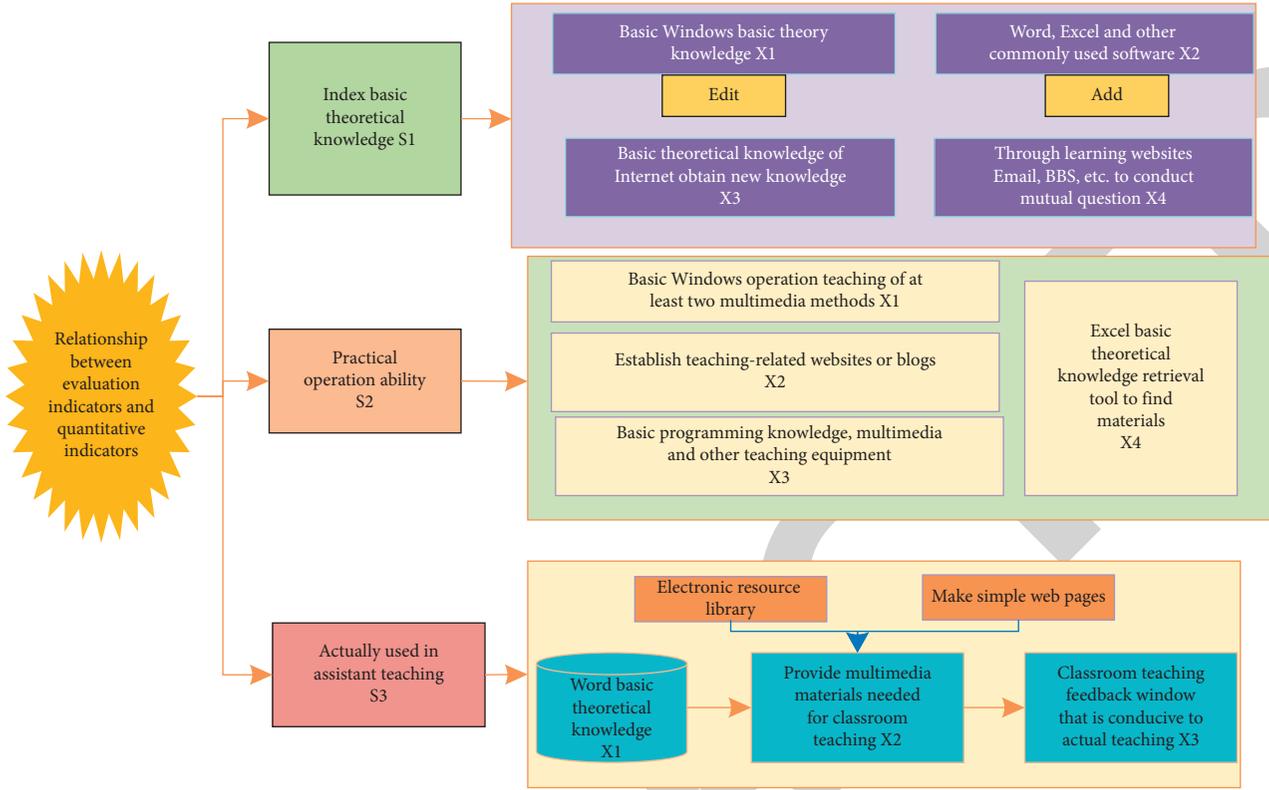


FIGURE 1: Relationship between evaluation indicators and quantitative indicators.

Assume that the quantitative indicator system of teacher information education is linear or close to linear, defined as follows:

- (1) The sample obtained is  $i$  ( $i \in R$ ).
- (2) The evaluation index is  $S_j$  ( $j \in R$ ,  $1 \leq j \leq 3$ ).
- (3) The column vector  $Y_j$  is composed of the sum of the quantitative index parameters in the evaluation index.
- (4) The quantitative index is  $X_i$  ( $i \in R$ ,  $1 \leq i \leq 9$ ,  $0 \leq x_i \leq 1$ ), and the  $j$ -th quantitative index under the  $i$ -th sample whose evaluation index is  $Y_j$  is marked as  $x_{ij}$ .
- (5) The weight of the evaluation index is  $w_i$ .
- (6) The mean square error is  $\sigma_i$ .
- (7) Evaluation plan set  $E = \{e_1, e_2, e_3, e_4, e_5\} = \{0.2, 0.4, 0.6, 0.8, 1\}$ .
- (8) The weight of the maximum degree of membership is  $M_{\max}$ ; then, the sum of the quantitative index parameters of the  $S_j$  evaluation index of the  $i$ -th sample is represented by  $A_i$ , which is

$$A_i = \sum_{j=1}^n x_{ij}. \quad (1)$$

Then, according to the definition of regression analysis, the following equation should be satisfied:

$$S_i \beta = Y. \quad (2)$$

Then, there is

$$\begin{aligned} S_i &= [x_{11} \ x_{12} \ \dots \ x_{ij}], \\ Y_i &= [A_1 \ A_2 \ \dots \ A_i]^T, \\ S\beta &= \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1j} \\ x_{21} & x_{22} & \dots & x_{2j} \\ \dots & \dots & \dots & \dots \\ x_{i1} & x_{i2} & \dots & x_{ij} \end{bmatrix} \beta = Y. \end{aligned} \quad (3)$$

The specific evaluation algorithm is shown in Figure 2.

Use the least squares method to perform a regression analysis to solve  $x$ , thereby obtaining the weight  $w_i$  of the evaluation index:

$$w_i = [w_1 \ w_2 \ \dots \ w_i]^T. \quad (4)$$

Due to errors such as calculation statistics in the actual process, there is generally no safe and accurate  $w$  result. This requires us to obtain the optimal solution with the smallest error and the best reflection of the objective facts in the actual analysis. The smallest  $\beta$  satisfies  $|S\beta - Y|$ . Here, we use the deviation least square method to obtain the solution of  $\beta$  of the linear regression equation  $|S\beta - Y|$ , and  $|S\beta - Y|$  is the mean square error of  $S\beta - Y$ :

$$\sigma_i = S_i \beta - Y_i. \quad (5)$$

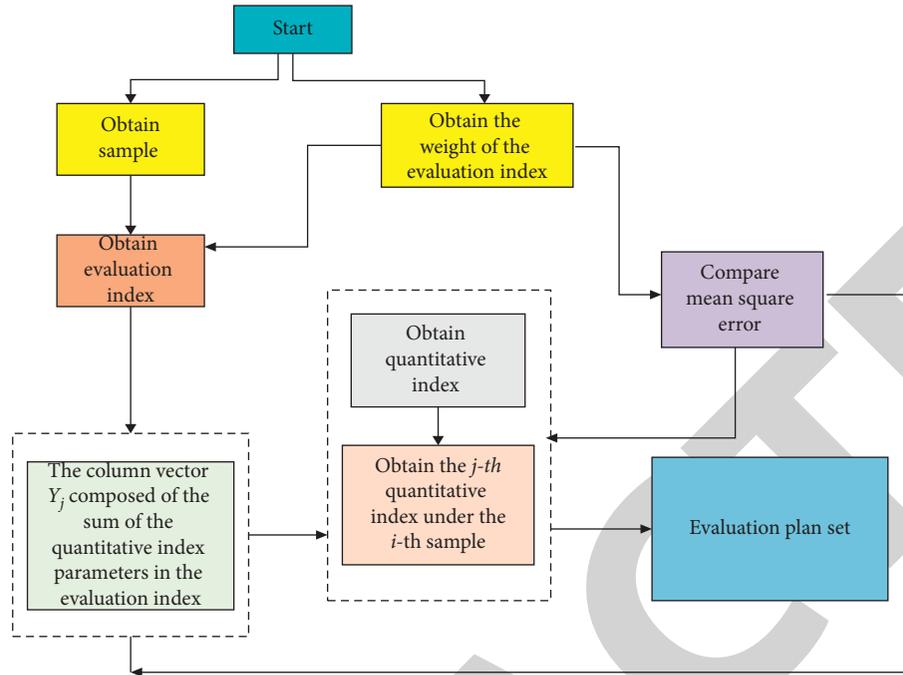


FIGURE 2: Quantitative evaluation algorithm for teacher informatization education.

When the calculated value of the mean square error is smaller, the calculation of the weight matrix  $w$  of  $x$  is more accurate, the data can truly reflect the objective facts, and the evaluation results can be obtained more accurately.

**3.4. Evaluation Results.** Establish a set of evaluation system schemes [15]. Dividing the comprehensive evaluation system into five program levels, there is an evaluation system program set  $E = \{e_1, e_2, e_3, e_4, e_5\} = \{0.2, 0.4, 0.6, 0.8, 1\}$ . According to the principle of maximum membership degree, the weight matrix  $w_k$  of each evaluation index is solved to the maximum:

$$\beta_{\max} = \max(w_i)^{-1}. \quad (6)$$

#### 4. Application of Linear Regression Algorithm in Teacher Education Information Evaluation

The basic framework of the evaluation index system for school education informatization level is composed of five first-level indicators, including organization and management, infrastructure construction, teaching resource construction, informatization applications, and informatization talents, including 20 second-level indicators and 60 three-level indicators [16]. The analysis in this paper only involves the primary and secondary indicators, so only the primary and secondary indicators are given; see Table 1.

To objectively evaluate a school's educational informatization level, it needs to be examined and mutually confirmed from multiple angles. The methods used in this topic include questionnaire survey, field survey, teacher-student

discussion, and skill test. In the questionnaire survey, the overall situation of the school was investigated by designing questionnaires for different objects [17]. Using the analytic hierarchy process, the different data corresponding to each index obtained in various ways are weighted and summed to obtain the education informatization evaluation index and total score of each school. Since the data is obtained through multiple methods and multiple indicators, it can reflect the objective reality of school education informatization. The data comes from 80 primary and secondary schools, and after deleting invalid data, there are 60 schools in total.

**4.1. Establishment of Regression Model.** In the regression model, the independent variables  $X_1 - X_5$  correspond to the secondary indicators, and the detailed definitions are shown in Table 1. The dependent variable  $Y$  corresponds to the total score of the school's education informatization level. According to experience, the relationship between the dependent variable and the independent variable is roughly linear, so the following multiple linear regression model is established:

$$Y_i = \beta_0 - \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5, \quad (7)$$

where  $Y$  is the estimated value of the mean of the dependent variable under the condition of the respective variable taking a certain value;  $X_1, X_2, \dots, X_e$  are the independent variables;  $\beta_0$  is the constant term of the regression equation, also known as the intercept;  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  are called partial regression coefficients, and  $\beta_i$  represents the average change of  $Y$  after each unit change of  $X_i$  under the condition of fixed independent variables other than  $X_i$  [18].

Interpretation structure model of influencing factors of school informatization application is shown in Figure 3. In

TABLE 1: Evaluation index system of informatization level.

First-level index	Second-level index	
<i>Basic theoretical knowledge (S<sub>1</sub>)</i>	The basic knowledge of the topic/theme learning website	X <sub>1</sub>
	Basic theory of Internet	X <sub>2</sub>
	Basic theoretical knowledge of mail	X <sub>3</sub>
	Teaching resource library	X <sub>4</sub>
	Basic programming knowledge	X <sub>5</sub>
<i>Practical ability (S<sub>2</sub>)</i>	Information technology and subject curriculum integration	X <sub>1</sub>
	Search tool to find information	X <sub>2</sub>
	The use of multimedia teaching software	X <sub>3</sub>
	Use of multimedia and other teaching equipment	X <sub>4</sub>
	Use of electronic resource library	X <sub>5</sub>
<i>Actually used in auxiliary teaching (S<sub>3</sub>)</i>	Information management talent	X <sub>1</sub>
	Classroom teaching feedback window	X <sub>2</sub>
	Build teaching-related websites or blogs	X <sub>3</sub>
	Provide multimedia materials needed for classroom teaching	X <sub>4</sub>
	E-mail, B B S, etc. for mutual Q&A	X <sub>5</sub>

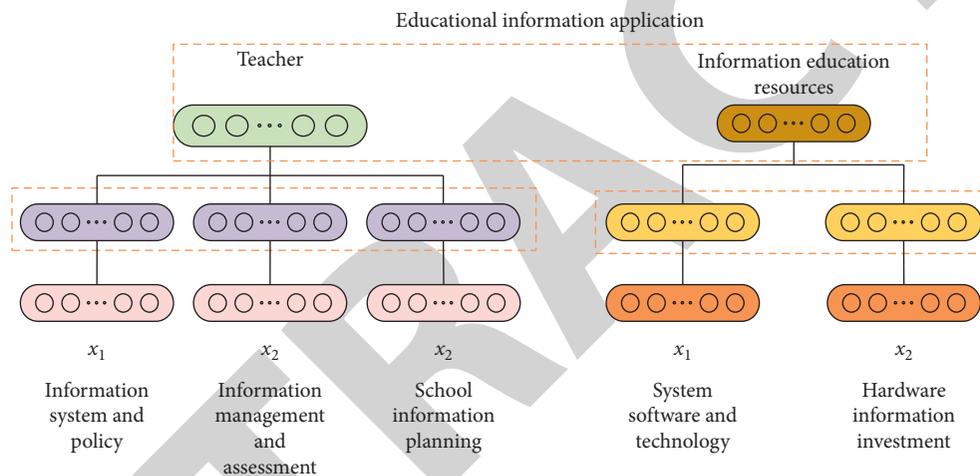


FIGURE 3: Interpretation structure model of influencing factors of school informatization application.

multiple linear regression analysis, how many independent variables should be introduced in the model need to be focused on. If fewer independent variables are introduced, the regression equation will not be able to explain the changes in the dependent variable well, but it is not that the more independent variables, the more it is good. Therefore, it is necessary to adopt some strategies to control and screen the independent variables into the regression equation. We adopt the stepwise regression method, which is to test the import threshold of the  $P$  value according to the set regression coefficient significance, introduce independent variables into the model one by one, and then recalculate the  $P$  values of all coefficients in the model, according to the set elimination threshold Perform variable filtering. When selecting independent variables, first select the variable with the highest linear correlation coefficient with the dependent variable into the equation, and perform various tests of the regression equation; then, find the variable with the highest partial correlation coefficient with the dependent variable and pass the test among the remaining variables. Regression equation and various tests are performed on the newly established regression equation; this process is repeated until

there are no more variables that can enter the equation [19]. The regression equation is

$$Y = 0.042 + 0.114x_1 + 0.236x_2 + 0.165x_3 + 0.047x_4 + 0.034x_5. \quad (8)$$

#### 4.2. Model Test

**4.2.1. The Goodness of Fit Test of the Regression Equation.** The judgment coefficient  $R^2 = 0.932$ , which is very close to 1, indicates that the regression equation is highly significant.  $X_1, X_2, \dots, X_e$  have a highly significant linear effect on  $Y$  as a whole. The data processing is performed in SAS 8.01 for Windows software, the significance level of entering the model is set to 0.05, and the significance level of excluded or retained variables is also set to 0.05. The analysis process of selecting variables and performing regression is shown in Figure 4.

**4.2.2. Linear Test of Regression Equation.** The  $F$  test value depends on whether the independent variable has a significant effect on the dependent variable as a whole. The  $F$

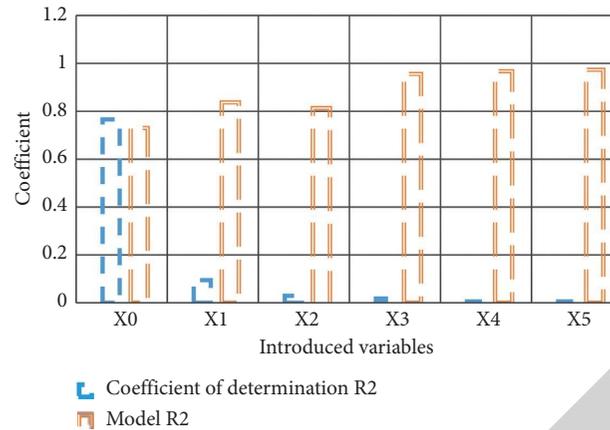


FIGURE 4: Stepwise regression coefficient of regression equation.

test value is 214.32, and the significance ( $Pr > F$ ) is less than  $<0.005$ , indicating that  $X_1, X_2, \dots, X_e$  have a significant impact on  $Y$ , and the regression effect is very significant, as shown in Figure 5.

**4.2.3. Significance Test of Regression Parameters.** Figure 6 shows the estimated value, standard error, and other data of the regression coefficient, indicating that  $X_1, X_2, \dots, X_e$ , 5 independent variables have passed the regression coefficient significance test.

**4.2.4. Residual Error Analysis.** Residual error refers to the difference between the actual observation value and the regression estimate. Residual error analysis is to analyze the reliability, periodicity, or other interference of the data through the information provided by the residual error. According to the calculation results of the formula, the evaluation indicators  $S_1, S_2$ , and  $S_3$ , and the corresponding weights  $w_1, w_2$ , and  $w_3$  are distributed in Figure 7. Use MATLAB to fit the weight matrices  $w_1, w_2$ , and  $w_3$  corresponding to the evaluation indicators  $S_1, S_2$ , and  $S_3$ , as shown in Figure 8.

## 5. Regression Analysis Conclusion

According to the regression equation and the size of the regression coefficients, informatization classrooms, development planning and implementation plan, teaching resource library, school website, educational technology research, information technology, and subject curriculum integration, information management talents and informatization eight factors, including the application of moral education, have a significant impact on the level of education informatization in schools. We adopt the stepwise regression method, which is to test the import threshold of the  $P$  value according to the set regression coefficient significance, introduce independent variables to the model one by one, then recalculate the  $P$  values of all coefficients in the model, and eliminate the threshold according to the set performing variable filtering.

- (1) Informatization classroom ( $X_1$ ): According to the regression model, among the five secondary indicators, informationized classrooms rank first. The reason is obvious: informationized classrooms belong to the primary indicators, infrastructure and public management platform applications, and infrastructure and public management platform applications. It is the materialized equipment and material foundation on which the development of educational informatization depends and the carrier of information flowing across time and space. Its development degree is directly related to whether the informatization has the corresponding material conditions. Therefore, infrastructure and public management platform applications, including informationized classrooms, reflect the supporting conditions of the hard environment of educational informatization, are an important factor reflecting the level of educational informatization, and occupy an important component in the evaluation of educational informatization.
- (2) Development planning and implementation plan ( $X_2$ ): The development plan and implementation plan mainly examine the formulation and implementation effects of the informatization development plan in the school informatization process, including semester/annual plans, work objectives, measures to be taken, operability, and implementation effects. Education informatization construction is a systematic project, including hardware facilities, software platforms, educational resources, teacher training, and other elements. It also inevitably requires systematic planning and design of this huge project, as hardware, software, human resources, and policies. The laws and regulations are complemented and coordinated with each other, and the elements are combined to maximize the benefits. Practice has proved that this is a relatively successful way of education informatization, and development planning and implementation plans have an important impact on the level of education informatization in schools.

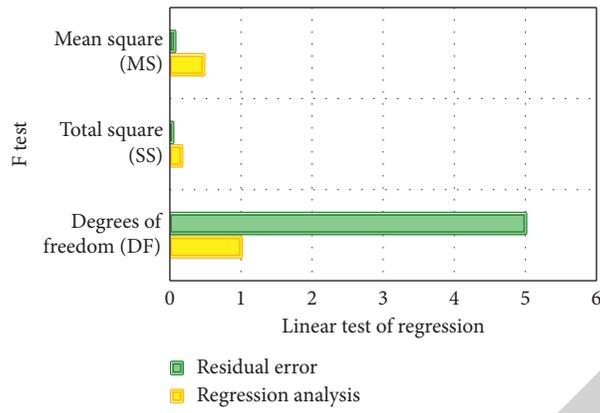


FIGURE 5: Regression statistics result.

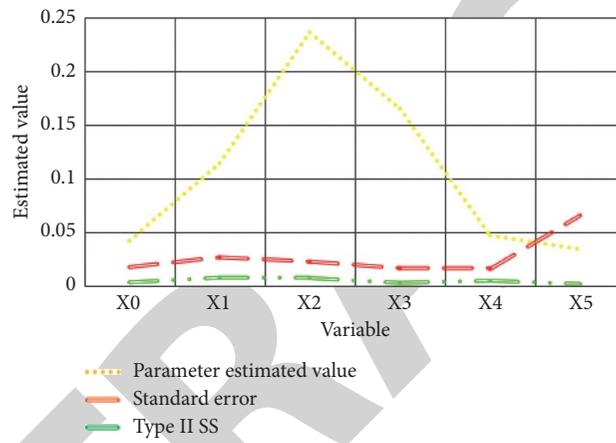


FIGURE 6: Significance test of regression parameters.

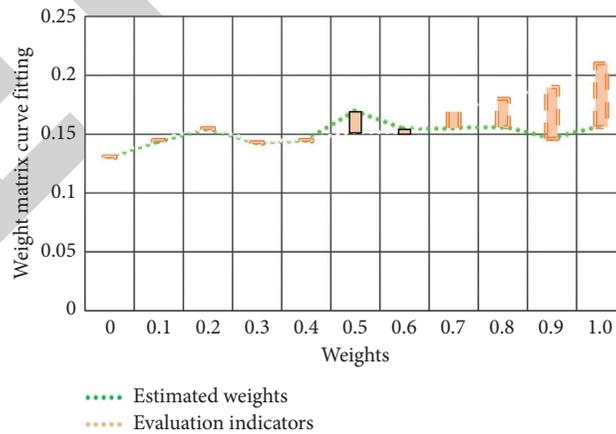


FIGURE 7: The weight matrix curve fitting diagram of the evaluation index S1 regression analysis.

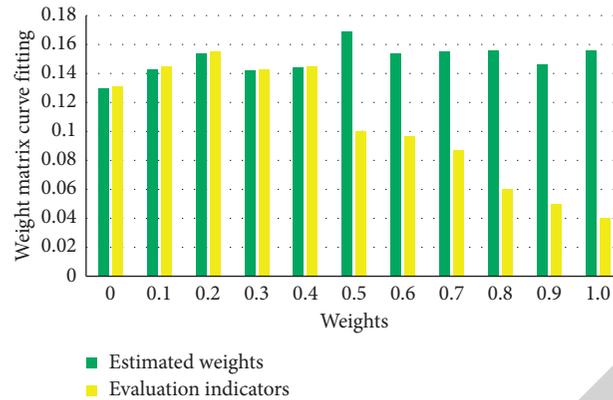


FIGURE 8: The weight matrix curve fitting diagram of the regression analysis of the evaluation index S2.

- (3) Teaching resource library ( $X_3$ ): This indicator belongs to the construction and application of education and teaching resources, and they have a greater impact on the level of education informatization. The development and utilization of educational and teaching resources is an important content of educational informatization, which reflects the level of informatization construction and application. The operation of the information system depends on the development and utilization of information resources to support. If the information system is compared to the human skeleton, then the information resources are muscle and blood. It can be seen that the development and utilization of information resources play an important role in the evaluation of education informatization level. From the perspective of information resource development and utilization, it can reflect the degree of utilization of information systems.
- (4) Educational technology research ( $X_4$ ): This indicator is integrated to reflect the application of school informatization. The huge investment in informatization must be applied to realize its value and generate benefits. A school develops education in depth and breadth. The level of technological research is an important guarantee for the continuous advancement of informatization applications. Only in the process of application, the unknown fields and discovered problems can be researched to enable better output of informatization input. The integration of information technology and subject curriculum is the most feasible application mode of educational informatization. It is the most viable application mode of education informatization. Through effective integration, it can improve teaching efficiency and quality, increase students' interest in learning, change learning habits, and improve academic performance and overall quality. In addition, many studies and practices show that the use of informatization in moral education can achieve effects that cannot be achieved by traditional moral education. Although these indicators are

important factors for investigating the level of school education informatization, the regression coefficient in the regression equation is small. The reason is that maybe this is related to the low or in-depth level of information application and research in various schools, which makes the gap between schools smaller.

- (5) Information management talents ( $X_5$ ): Informatization management talents, namely, school leaders, play an important role in the construction and application of educational informatization in schools. Many problems in educational informatization are directly or indirectly related to school leaders. There is a dialectical relationship between the educational information level of the school and the sustainable development ability of the school [20]. In the process of education informatization, the main tasks faced by school leaders include education informatization planning and construction, information technology and curriculum integration, informatization and the overall development of students, informatization and office automation, informatization to promote teacher professional development, and education information evaluation. With the deepening of education informatization, informatization managers have accumulated rich experience and lessons, which are the basis for promoting educational informatization.

## 6. Conclusion

The functional standards proposed in this article fill in the gaps in the responsibility standards for education informatization, theoretically improve the structure of the education-informatization standard system, and in practice are conducive to promoting the focus of education informatization from construction to application through the normative role of standards change. The methods we use in this article include questionnaire surveys, field surveys, teacher-student discussions, and skill tests. Although we do not have simulation, we use the analytic hierarchy process to weight and sum different data corresponding to various indicators obtained in various ways to obtain the education

information evaluation indicators and total scores of each school. This article's thoughts on functional standards can be used as important reference materials for researchers, decision-makers, and practitioners to formulate education informatization application standards. The research on the index system of education informatization level evaluation is a systematic project. The regression analysis method can be used to quantitatively analyze the impact of various indicators on the school informatization level. According to the regression equation, the school informatization level can be predicted. The regression analysis method is used to evaluate the teacher education informatization system, and the linear regression model is established by the method of mathematical statistics and analyzed and calculated. The design of the evaluation system is more scientific and reasonable, the regression error is small, the results obtained are more accurate, and the influence of nonlinear errors is basically eliminated.

### Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

### Conflicts of Interest

The authors declare that they have no known conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

### Acknowledgments

The study was supported by "Study on Professional Development of Rural Teachers with the Support of Information Technology (Grant no. BCA160055)".

### References

- [1] S. Fadli and K. Imtihan, "Implementation of MOORA method in evaluating work performance of honorary teachers," *SinkrOn*, vol. 4, no. 1, pp. 128–135, 2019.
- [2] E. Baran, S. Canbazoglu Bilici, A. Albayrak Sari, and J. Tondeur, "Investigating the impact of teacher education strategies on preservice teachers' TPACK," *British Journal of Educational Technology*, vol. 50, no. 1, pp. 357–370, 2019.
- [3] A. J. Lekwa, L. A. Reddy, and E. S. Shernoff, "Measuring teacher practices and student academic engagement: a convergent validity study," *School Psychology*, vol. 34, no. 1, pp. 109–118, 2019.
- [4] G. Chen, B. Xu, M. Lu, and N. S. Chen, "Exploring blockchain technology and its potential applications for education," *Smart Learning Environments*, vol. 5, no. 1, pp. 1–10, 2018.
- [5] Z. Han and A. Xu, "Ecological evolution path of smart education platform based on deep learning and image detection," *Microprocessors and Microsystems*, vol. 80, pp. 103–143, 2021.
- [6] M. W. Rodrigues, S. Isotani, and L. E. Zárate, "Educational data mining: a review of evaluation process in the e-learning," *Telematics and Informatics*, vol. 35, no. 6, pp. 1701–1717, 2018.
- [7] C. W. Shen and J. T. Ho, "Technology-enhanced learning in higher education: a bibliometric analysis with latent semantic approach," *Computers in Human Behavior*, vol. 104, pp. 106–177, 2020.
- [8] L. Thibaut, H. Knipprath, W. Dehaene, and F. Depaape, "The influence of teachers' attitudes and school context on instructional practices in integrated STEM education," *Teaching and Teacher Education*, vol. 71, no. 1, pp. 190–205, 2018.
- [9] L. Goosen and D. Van Heerden, "Assessment of students in higher education—information and communication technology tools and tips," *Progression*, vol. 40, no. 1, pp. 1–23, 2018.
- [10] E. A. Boa, A. Wattanatorn, and K. Tagong, "The development and validation of the Blended Socratic Method of Teaching (BSMT): an instructional model to enhance critical thinking skills of undergraduate business students," *Kasetsart Journal of Social Sciences*, vol. 39, no. 1, pp. 81–89, 2018.
- [11] P. Dickison, K. A. Haerling, and K. Lasater, "Integrating the national council of state boards of nursing clinical judgment model into nursing educational frameworks," *Journal of Nursing Education*, vol. 58, no. 2, pp. 72–78, 2019.
- [12] G. A. Fabiano, L. A. Reddy, and C. M. Dudek, "Teacher coaching supported by formative assessment for improving classroom practices," *School Psychology Quarterly*, vol. 33, no. 2, pp. 293–304, 2018.
- [13] N. Barnes, H. Fives, and C. M. Dacey, "U.S. teachers' conceptions of the purposes of assessment," *Teaching and Teacher Education*, vol. 65, pp. 107–116, 2017.
- [14] J. C. Sánchez-Prieto, S. Olmos-Migueláñez, and F. J. García-Peñalvo, "MLearning and pre-service teachers: an assessment of the behavioral intention using an expanded TAM model," *Computers in Human Behavior*, vol. 72, pp. 644–654, 2017.
- [15] G. Kurt, "Implementing the flipped classroom in teacher education: evidence from Turkey," *Journal of Educational Technology & Society*, vol. 20, no. 1, pp. 211–221, 2017.
- [16] F. Hinojo-Lucena, Á. Mingorance-Estrada, J. Trujillo-Torres, I. Aznar-Díaz, and M. Cáceres Reche, "Incidence of the flipped classroom in the physical education students' academic performance in university contexts," *Sustainability*, vol. 10, no. 5, p. 1334, 2018.
- [17] I. Arseven, "The use of qualitative case studies as an experiential teaching method in the training of pre-service teachers," *International Journal of Higher Education*, vol. 7, no. 1, pp. 111–125, 2018.
- [18] E. B. Costa, B. Fonseca, M. A. Santana, F. F. De Araújo, and J. Rego, "Evaluating the effectiveness of educational data mining techniques for early prediction of students' academic failure in introductory programming courses," *Computers in Human Behavior*, vol. 73, pp. 247–256, 2017.
- [19] J. Lockyer, C. Carraccio, M.-K. Chan et al., "Core principles of assessment in competency-based medical education," *Medical Teacher*, vol. 39, no. 6, pp. 609–616, 2017.
- [20] C. J. Anthony and J. C. DiPerna, "Identifying sets of maximally efficient items from the academic competence evaluation scales-teacher form," *School Psychology Quarterly*, vol. 32, no. 4, pp. 552–559, 2017.