Hindawi
Mobile Information Systems
Volume 2021, Article ID 9790766, 11 pages
https://doi.org/10.1155/2021/9790766

Research Article

Research on Classroom Teaching Evaluation and Instruction System Based on GIS Mobile Terminal

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Received 17 May 2021; Revised 10 June 2021; Accepted 28 June 2021; Published 16 July 2021

Academic Editor: Sang-Bing Tsai

With the development of mobile terminal technology, GIS has begun to be applied in all walks of life. With its powerful spatial indexing, positioning, query, analysis, and graphics processing capabilities, it has become the evaluation and guidance analysis of domestic and foreign scholars. As an essential tool to improve the quality of teaching in our country's primary and secondary schools and universities and to understand the status quo of education and teaching levels, appropriate teaching evaluation and guidance are essential. In order to adopt a better method to carry out teaching work, this research uses GIS mobile terminal to analyze the classroom teaching evaluation and guidance system, and through the research on teaching evaluation, the teaching work is made more effective. This paper uses questionnaire survey method, index weighted evaluation method, and fuzzy analytic hierarchy process as research methods. In the experimental part, a classroom teaching evaluation and guidance system based on GIS mobile terminal is designed. In the analysis part, a comprehensive analysis of teaching evaluation and guidance is carried out, including the analysis of teacher teaching evaluation, the analysis of teaching evaluation system, and the analysis of teachers and students' understanding of teaching evaluation. Among them, after adopting the teaching evaluation system of GIS mobile terminal, the number of students who thought the teaching evaluation system was useless dropped from 4.6% to 1.8%. Students tend to emphasize the teacher's effectiveness in teaching (57.2%) and interesting teaching content in the classroom (56.9%). This analysis has a certain significance for teaching evaluation, and it occupies a relatively important proportion in the improvement of the evaluation system. In general, the teaching evaluation system using GIS mobile terminals can improve the communication and teaching diagnosis between teachers and students and help further improve teaching.

1. Introduction

In the actual application process, teaching evaluation has many problems that need to be solved urgently. How to adapt to the teaching development of higher education, how to scientifically evaluate teaching, how to improve the quality of teaching, etc., are all issues worthy of attention. With the rapid development of information technology, all kinds of new technology and equipment have appeared like spring calculations after the rain, which has also led to the advancement of education informatization. Among them, mobile devices have received widespread attention due to their portability, good communication capabilities, and mobility support. In particular, the popularity of mobile terminals has made their application in education and teaching a research hotspot.

Based on the above application scenarios, in recent years, many scholars at home and abroad have conducted related research. Ye et al. introduced that, in recent years, well-designed terminal-based methods for collecting index data have been widely used in many studies. However, it has been found that the content and quality index system of spatial data vary greatly among different cultivated land areas. Therefore, there is a need for a system for investigating farmland quality indicators that can flexibly use various types of spatial data and quality indicators without program modification. The author introduced a highly flexible mobile GIS-based system framework in his research and called it the "Cultivated Land Quality Index Data Collection System" (ALQIDCS). The system combines a series of adaptive methods, data table-driven models, and two types of

formulas for flexible data collection and processing. The results show that ALQIDCS can effectively adapt to changes in spatial data and quality index systems and meet different goals. It also puts forward the limitations of ALQIDCS and suggestions for future work. In his research, the author proposed ALQIDCS, a mobile terminal system for data collection and processing, conducted various experiments, and considered the limitations of this system and gave suggestions. However, the application of this system involves still relatively few [1]. Liu believes that there is a certain degree of subjectivity in the teaching evaluation process, which leads to low accuracy of the intelligent scoring system. In order to promote the intelligent development of teaching evaluation based on machine learning, the author briefly introduced the background and current situation of teaching evaluation in his research and introduced in detail the relevant algorithms for data analysis and modeling using data mining technology and machine learning methods. In addition, this research describes the establishment process of the traditional classroom teaching evaluation system and uses the classification algorithm in machine learning in the construction of the evaluation model to further improve the scientificity and feasibility of teaching evaluation. This research is based on empirical algorithms to evaluate the quality of teaching, using the topic word distribution obtained by the joint model training as the original knowledge, and the performance of the research system is analyzed through control experiments. And the author concluded from the research results that the score of the research model is similar to the score of the standard manual, which can provide a theoretical reference for follow-up related research. The experimental data mining technology of this research studies teaching evaluation, combined with related algorithms in machine learning, and provides a certain reference for future research, but the author did not combine related systems or design a suitable system for this kind of teaching. Evaluation conducted in-depth research [2]. Yusnimar's research aims to explore the role of teacher-directed autonomous learning (AL) in improving students' oral English abilities and abilities. Before and after the implementation of learning strategies in the classroom, 22 first-year college students were pretested and posttested to assess their improvement in their prepared speeches. Questionnaires were also collected to understand their views on this learning strategy. The questionnaire takes the form of closed questions. Tableau software was used to analyze the results before and after the test. It can be concluded that, under the guidance of teachers, AL has played an important role in improving students' English preparation ability. This research designed a specific experimental method called AL for research and combined it with related software for analysis and testing. From this research, it can be concluded that this method is indeed instructive for teaching, but this experimental sample is small and may have a certain degree of error [3].

This article first makes a general analysis of the relevant research on the mobile terminal and the teaching evaluation and guidance system. In the method part, the working principle of mobile terminal and GIS is introduced, and two teaching evaluation methods are introduced: index weighted evaluation method and fuzzy analytic hierarchy process. In the experiment part, the teaching evaluation system was designed from three aspects, and the experimental objects and experimental indicators were selected. In the analysis part, the analysis of teacher's teaching evaluation, the analysis of teaching evaluation system, and the analysis of teachers and students' understanding of teaching evaluation and guidance are carried out. The innovation of this article lies in the application of geographic information system to the education industry, and the analysis and research on the teaching evaluation and guidance system in many aspects are of great significance for improving the quality of teaching.

2. Research Method of Classroom Teaching Evaluation and Guidance System Based on GIS Mobile Terminal

2.1. Mobile Terminal. Mobile terminals generally include a presentation layer, a business layer, and a data access layer [4]. Among them, the presentation layer refers to the basic visual interface that users can see. The main function is to provide users with an interface for data or business access and also to provide users with business access data display. The business layer is the most important part of the three-tier architecture. It completes obtaining business requests from the client, completes the analysis and processing of the business, and finally obtains the data information required by the user from the data access layer. The management system provides the data source, and the data access layer is connected with the data source. The client can access the database management system through the data access layer to obtain the required data. The GIS mobile terminal is mainly involved in this research [5, 6].

2.1.1. GIS. GIS is a specific spatial system with the functions of collection, storage, retrieval, management, operation, analysis, and description [7]. Mobile GIS is a portable handheld device as the hardware terminal, relying on mobile positioning technology, GIS technology, and communication technology GIS application system, through the wireless communication network to dynamically provide users with intelligent and diversified spatial information services, such as real-time positioning, maps browsing, data collection, and information query. GIS can not only process a large amount of spatial information but also integrate virtual reality, animation, multimedia, and other computer technologies. It is the best tool for computerized teaching of geography. GIS can also provide digital maps with autonomous roaming and infinite zooming. The rich and diverse statistical information is processed and the spatial relationship between things is displayed [8]. The composition of this system is shown in Figure 1.

GIS system generally consists of three parts: hardware system, software system, and geographic data [9]. GIS geographic information system is dynamic and spatial and can collect, manage, analyze, and output a variety of

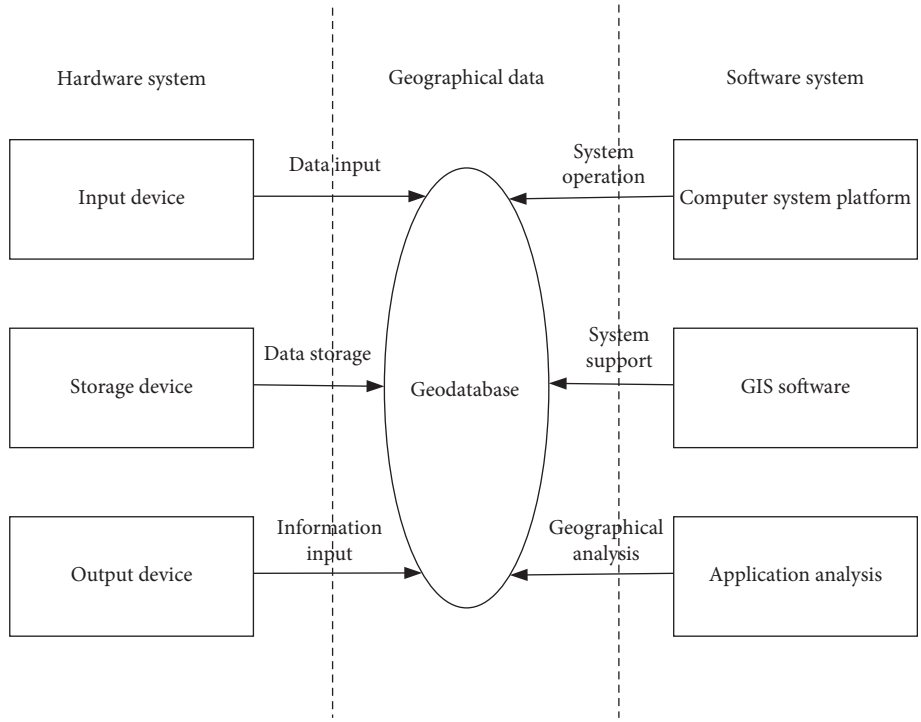

Figure 1: Geographic information system composition diagram.

information. GIS geographic information system has the management function of spatial data, which mainly manages spatial geographic data information through computer and uses computer programs to virtualize the method of analyzing and processing geographic data information to obtain useful geographic space information. The main purpose of GIS geographic information system is to realize the research and decision-making of geography, which mainly adopts the method of geographic model, which can realize the dynamic prediction and comprehensive analysis of multiple elements such as space, and then obtain higher-level geographic data.

2.2. Teaching Evaluation. Since the concept of teacher teaching quality evaluation came into being, many scholars have participated in the research process of teaching evaluation, and they have created and discovered numerous research methods, including analytic hierarchy process (AHP), SOLO classification, and gray correlation evaluation, expert evaluation method and other evaluation methods [12, 13]. Regardless of the method, the main purpose is to make the teaching evaluation process more comprehensive, systematic, and objective. In order to ensure the fairness and objectivity of the evaluation results, the evaluation objects are comprehensive and objective in the evaluation process. Systematic and objective analysis not only uses a combination of quantitative and qualitative analysis methods but also analyzes them from multiple angles and levels. In the process of evaluation, a comprehensive evaluation of teachers' teaching ability, knowledge level, and political quality are mainly carried out. When evaluating the teaching of teachers, we should combine our own situation and choose the evaluation methods and evaluation elements reasonably [14].

2.2.1. Index Weighted Evaluation Method. For teaching evaluation, the traditional index weighted average method is the most used. Through the school management personnel to discuss and develop various evaluation indicators and give different weights according to the importance of each indicator, formulate a questionnaire or design an evaluation system [15, 16]. After that, the students fill in the questionnaires or give scores to the teachers on the campus network, so as to collect the teaching evaluation data, which is processed by the mobile terminal, so as to obtain the scores and evaluation status of each evaluated object. Sometimes there will be some suggestions for improvement, and finally through these indicators, teachers are rated and assessed. Table 1 is the teaching quality evaluation index table, using the graded evaluation standard: A means excellent (100-90 points), B means good (89-80 points), C means fair (79-70 points), D means qualified (69-60 points), and E means unqualified (less than 60 points). Through students' ABCDE evaluation and scoring of teachers, these indicators are then converted into component numbers to realize the assessment of teachers.

2.2.2. Fuzzy Analytic Hierarchy Process. The analytic hierarchy process has both qualitative and quantitative methods, which can clarify complex problems and is more suitable for solving uncertain problems. The analytic hierarchy process clarifies vague problems. Its problem-solving idea is to decompose and divide a complex problem according to its nature and overall goal and divide it into levels, establish a

Table 1: Classroom teaching quality evaluation index.

Evaluation content	Evaluation index	Evaluation grade
Teaching attitude	The class is full of energy, and the lecture is serious and responsible.	A B C D E
Teaching content	Clear thinking and accurate explanation.	A B C D E
	Highlight the key points, clarify the difficulties, and be appropriate in detail.	A B C D E
Teaching method	Pay attention to the cultivation of students' innovative consciousness and ability.	A B C D E
	Encourage students to discuss and communicate, and focus on heuristic and discussion-based teaching.	A B C D E
	Rich and diverse teaching methods, able to use modern teaching techniques.	A B C D E
Teaching organization	Strict requirements, adopt appropriate methods to check attendance of students.	A B C D E
	Able to effectively maintain classroom teaching order.	A B C D E
	The teaching plan is clear, the links are complete, and the schedule is appropriate.	A B C D E
Teaching effect	Promote students to think positively, stimulate their curiosity, and the overall condition of students is good.	A B C D E

hierarchical model, and then compare the indicators at the same level to construct judgments. According to the constructed matrix, get the weight of each indicator, and finally get the combined weight of each indicator through weighted recursion [17].

The fuzzy analytic hierarchy process has two definitions for the matrix. They are as follows: if the fuzzy matrix $M = (m_{xy})n * n$ satisfies that any x, y, z has $m_{xy} = m_{xz} - m_{yz} + 0.5$, then the fuzzy matrix M is called a fuzzy consistent matrix; if the matrix $M = (m_{xy})n * n$ satisfies $0 \le m_{xy} \le 1$, $(x = 1, 2, \ldots, n; y = 1, 2, \ldots, n)$, then M is called a fuzzy matrix [18].

In the process of rectangle judgment, we can classify any element contained in C. The relative importance of this level and the related elements are compared, assuming that element C of the previous level is the same as elements $c1, c2$ of the next level. , . . ., c_n are related; then the fuzzy consensus judgment matrix can be expressed as

$$C = \begin{pmatrix} c_{11} & \cdots & c_{1n} \\ \vdots & \ddots & \vdots \\ c_{n1} & \cdots & c_{nn} \end{pmatrix}, \quad 0 \le c_{xy} \le 1, c_{xy} = 0.5, c_{xy} + c_{yx} = 1. \tag{1}$$

Among them, when element c_{xy} expression is c_x and c_y is compared with element C, elements c_x and c_y have a fuzzy relationship, that is, the subordination relationship of "...more important than...." The bigger c_{xy} is, the more important element c_x is than element c_y. What this paper uses is a quantitative comparison of the relative importance of the two factors, so that the fuzzy judgment matrix [19] can be obtained, as shown in Table 2.

Suppose the fuzzy complementary judgment matrix $M = (m_{xy})n * n$, the sum of the matrix $M = (m_{xy})n * n$ has

$$Mx = \sum_{x=1}^{n} m_x z, \quad x = 1, 2, \ldots, n. \tag{2}$$

Normalize matrix M to get

$$Q = (Q_1, Q_2, \ldots, Q_n)P, \tag{3}$$

where the Q vector satisfies

$$Qx = \frac{\sum_{y=1}^{n} m_{xy} - 1 + (n/2)}{n(n-1)}, \quad x = 1, 2, \ldots, n. \tag{4}$$

Assuming that both matrix $M = (m_{xy})n * n$ and matrix $O = (o_{xy})n * n$ are fuzzy judgment matrices, the compatibility index is obtained:

$$I(M, O) = \frac{1}{n^2} \sum_{x=1}^{n} \sum_{y=1}^{n} \left| m_{xy} + o_{xy} - 1 \right|, \tag{5}$$

when this indicator meets

$$I\left(M, \left(\frac{q_x}{q_x + q_y}\right)n^2\right) \le \beta. \tag{6}$$

The general value of β is 0.1, which means that the consistency of the decision-makers is higher and the rationality is stronger. Finally, the single sorting and total sorting between the elements can be performed according to the numerical value of the weight [20].

2.2.3. Hierarchical Cluster Analysis Method. Clustering refers to the classification of similar data in a data set into one category, and the dissimilar data into different categories. The similarity is determined by the characteristics of the specific data [21, 22]. Hierarchical clustering analysis is a relatively common method of clustering analysis. A hierarchical clustering algorithm will generate a phylogenetic tree that represents the nesting pattern and the similarity level of each grouping change. This analysis method expresses the similarity between a data point and all other data points by calculating the distance between them. If the distance between two data points is smaller, the similarity is higher [23]. The specific mode is shown in Figure 2.

Among them, MA represents the longest distance method. When calculating the distance between classes, select the sample distance with the farthest distance between classes, namely,

Table 2: 0.1-0.9 scale nine-scale method.

Scale	Definition	Description
0.5	Equally important	Both factors are equally important
0.6	Slightly important	One factor is slightly more important than the other
0.7	Apparently important	One factor is obviously more important than the other
0.8	Much more important	One factor is more important than the other
0.9	Extremely important	One factor is extremely important than the other
0.1-0.4	Inverse comparison	Inverse comparison of the above comparison

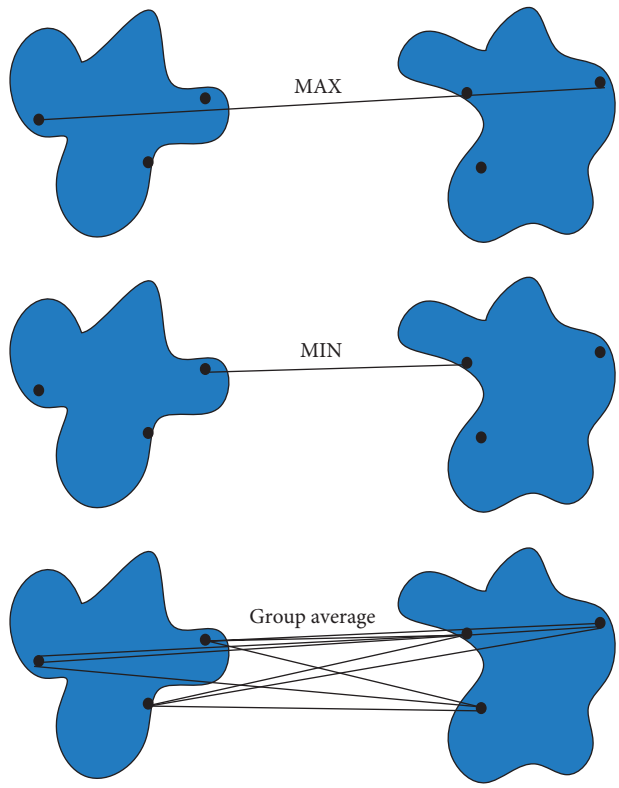

Figure 2: Class distance calculation method.

$$L_{PQ} = \max_{m \in K_P, n \in K_Q} l_{mn}. \tag{7}$$

After the two classes K_P and K_Q with the shortest distance are merged into a new class, the distances between any other classes are calculated in the same way, and the two classes with the smallest distance are merged until they are condensed into one class.

The MIN method represents the shortest distance. When calculating the distance between classes, select the sample distance with the closest distance between classes, namely,

$$L_{PQ} = \min_{m \in K_P, n \in K_Q} l_{mn}. \tag{8}$$

The group average method uses the average of the squared distances of all samples and takes the average of the distances between each sample in the class, which can more accurately represent the distance between classes than the MIN method and the MAX method [24, 25].

$$L_{PQ} = \frac{1}{t_P t_Q} \sum_{m \in K_P, n \in K_Q} l_{mn}^2. \tag{9}$$

2.2.4. BP Neural Network Method. BP neural network method is also a commonly used method in teaching evaluation and guidance system. The first step is to prepare the data that meet the evaluation and guidance indicators and then use the qualified data as the input training samples, build a neural network, train this network, and then obtain a real and effective neural network model [26]. The mathematical formulas involved in the training process of the BP neural network are

$$y_k = \frac{y_{\max} - y_k}{y_{\max} - y_{\min}}. \tag{10}$$

Among them, y_k is the input component and is the k-th nerve cell component before preprocessing and $y_{\min}$ and $y_{\max}$are the minimum and maximum values, respectively,

and are the minimum and maximum values of all input components of the k-th nerve cell.

$$hk(m) = \sum^{n} w_{kh} y_k(m) - c_h. \tag{11}$$

Among them, m refers to the number of samples in the m, h refers to the number of hidden layers, w_{kh} is the connection weight between the k-th input layer neuron and the h-th hidden layer neuron, and c_h refers to the hidden layer of the network.

The output function is

$$f(y) = \frac{1}{\left(1 + e^{-y}\right)}. \tag{12}$$

Among them, y refers to the input value of the hidden layer.

$$\begin{aligned} xk_n(m) &= \sum_{h=1}^{q} w_{hn} hn_h(m) - c_n, \\ xn_n(m) &= f\left(xk_n(m)\right). \end{aligned} \tag{13}$$

Among them, w_{hm} is the connection weight between the h-th neuron cell in the innermost hidden layer and the n-th output neuron cell and c_n refers to the threshold of the nth neuron cell in the hidden layer of the network.

$$F_t^k = 0.5 * \left(L_t^k - xn_t^k\right), \tag{14}$$

where L_t^k is the k-th expected output of the t-th sample after neural network training, F_t^k is the error value of the output, and xn_t^k refers the actual output of the sample.

3. Classroom Teaching Evaluation and Guidance System Experiment Based on GIS Mobile Terminal

3.1. Experimental Design. The classroom teaching evaluation and guidance system based on mobile terminals can help teachers and students carry out daily teaching activities and realize information management in an orderly manner. This system can collect various teaching evaluations and information and generate data analysis reports, so as to realize teaching guidance. According to this idea, the classroom teaching evaluation and guidance system shown in Figure 3 is designed. The system includes modules such as teaching evaluation management, evaluation result query, and information management.

For the entire teaching evaluation system, it needs to include several parts such as service terminal, database, communication network, wireless network, Internet, school internal terminal and server, and mobile terminal. It can be classified into two parts: server and client. By designing such a system, it is possible to evaluate, record, and track the teaching level development curve of the instructor and the teaching situation of other teachers in the same subject, conduct a comprehensive and systematic analysis of the teaching level of the instructor, and provide diagnostic opinions.

3.2. Experimental Method. This article adopts teaching experiment method and questionnaire survey method. Firstly, a data collection is conducted for all aspects of teaching evaluation by setting up questionnaires, and the evaluation system is optimized according to the different attitudes of teachers and students to evaluation indicators [28]. Then, the selected research objects are divided into the experimental group and the control group, GIS-assisted teaching and conventional teaching aids were used to evaluate teaching, and conclusions were drawn by combining qualitative and quantitative analysis.

3.3. Subjects. This article selects 100 teachers and 1,000 students from a middle school to conduct a comprehensive evaluation and analysis of teaching evaluation, teacher evaluation, and student evaluation.

3.4. Experimental Indicators. The experimental indicators in this article are based on some questions in the questionnaire survey based on the evaluation system, as well as different degrees of attitude, based on the variables, standard deviation, average, and reliability of the GIS mobile terminal evaluation system.

4. Classroom Teaching Evaluation and Guidance System Based on GIS Mobile Terminal Analysis

4.1. Teacher Evaluation Analysis. A total of 50 questionnaires were distributed in this evaluation survey, and 43 valid questionnaires were recovered, with a recovery rate of 86%. Through certain mathematical methods and GIS mobile terminals, the collected effective questionnaires were analyzed and processed, and some research findings were obtained.

It can be seen from Table 3 that the age of teachers participating in the professional development training of the subject teacher base is concentrated in the 20–50 years old, and the age range is wide. This shows that the professional development of teachers has increasingly become a hot spot of concern. Judging from the teaching age of the surveyed subjects, from normal students who have just started to work, and teachers with years of frontline work experience, more and more teachers are aware of the importance and necessity of promoting their own professional growth. It is generally believed that the development of the teaching and research activities of listening and evaluating courses can help oneself analyze and reflect on one's own teaching behavior, optimize and improve one's own teaching behavior, and then promote one's own professional development.

From the abovementioned teachers' understanding of the evaluation function of classroom teaching, as well as teachers' evaluation content, conduct investigations on all aspects of education and teaching. In order to understand the teacher's understanding and attitude towards the evaluation function, a questionnaire survey as shown in Table 3 was conducted.

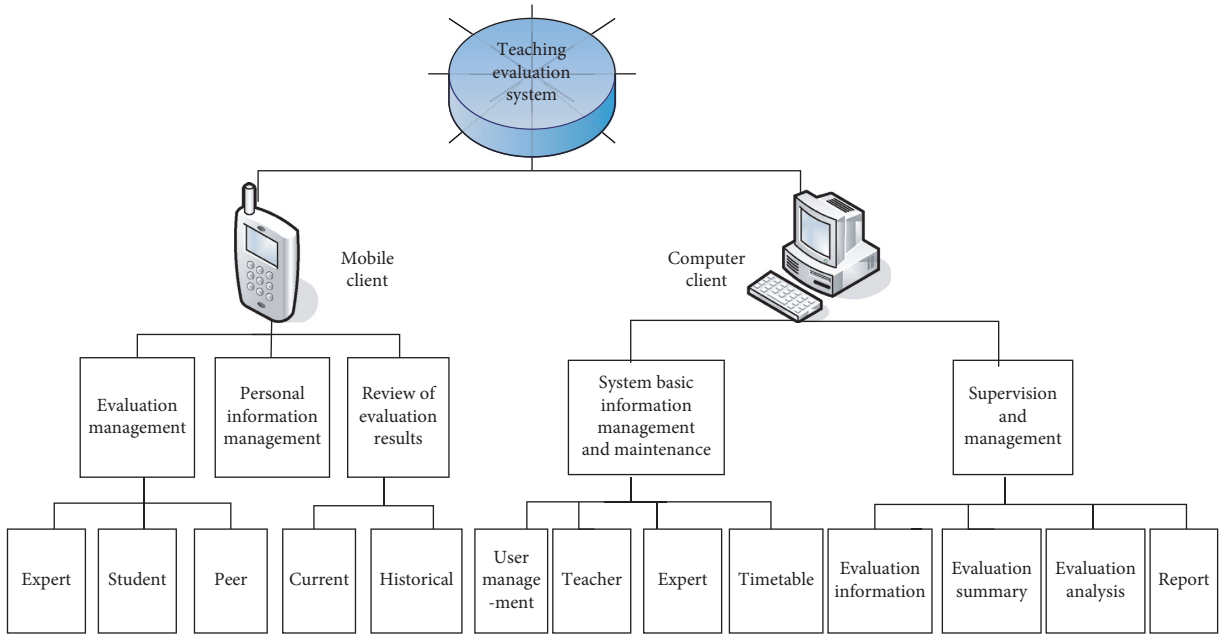

Figure 3: Design of function module of the teaching evaluation system.

Table 3: Basic information statistics of survey objects.

	Age		Teaching age		Gender	
Frequency	20–30	9	≤5	6	Male	20
	31–40	20	6–10	11		
	41–50	12	11–15	9	Female	23
	>50	2	16–20	11		
			>20	6		
Total number	43					

It can be seen from Table 4 that 81.4% of the teachers believe that the content of the exam is the content of the teaching and thus carry out a series of teaching design, prepare the corresponding exam questions to test the students' mastery of the knowledge taught in the classroom, and therefore pay special attention to evaluation of the identification function. Due to the short teaching age of the surveyed teachers, novice teachers accounted for a relatively large proportion. In order to show their own abilities more quickly, these teachers will unconsciously focus on the selection function of evaluation. It is difficult to be included in the evaluation of teachers. This point needs to be improved in time, otherwise it will hinder the development and progress of students to a certain extent.

In terms of allowing students to participate in the exchange of evaluation results, 94.4% of teachers are willing to open up the evaluation process and agree that students participate in the evaluation. But this is only an evaluation of teachers, and it needs to be improved in conjunction with student questionnaires or interviews. In teaching, 46.4% of teachers still have difficulty in converting their teaching goals into clear evaluation goals. Most of them are teachers with relatively short teaching years. Although they can draw teaching goals based on teaching design, there are still some teachers who make evaluations. However, teaching evaluation is usually difficult to formulate, and different students have different characteristics, which makes it difficult for teachers to quantitatively analyze and evaluate them. Therefore, there are often some prejudices in the selection of teaching evaluation content. Students' daily performance should be selected as the evaluation content, and students' daily behavior performance should be used to evaluate students, so as to better cultivate them to form a good outlook on life, values, attitudes, etc.

4.2. Analysis of the Teaching Evaluation System. In addition to teachers' evaluation of students and self-teaching, this research also sets up six dimensions, namely, perceived usefulness, perceived ease of use, perceived participation, task technology matching, satisfaction, and willingness to use to analyze the teaching evaluation system, as shown in Table 5. When analyzing the reliability of the internal consistency of the item, the reference is the alpha coefficient. Generally, when the alpha coefficient is greater than 0.7, the internal consistency is considered to be relatively high.

From the alpha coefficients obtained from the analysis of the question items in this questionnaire, the alpha coefficients in the three dimensions of perceived usefulness, perceived participation, and task technology matching are all greater than 0.7, which means that the items in these three dimensions are inherent and the consistency is quite good. Considering the entire questionnaire as a whole, its question items are effective for evaluating the effectiveness of the information technology classroom teaching evaluation system.

In addition, in order to test the effectiveness of GIS technology in teaching evaluation, this paper randomly selected 200 students out of these 1,000 students as the research objects, 100 of them were the experimental group, and the other 100 were the control group. The experimental

Table 4: Survey results of evaluation function awareness.

Title	Strongly disagree (%)	Disagree (%)	General (%)	Agree (%)	Strongly agree (%)
The content of the test is the content of teaching.	1.2	17.4	31.6	41.2	8.6
I will compare the student's learning results with the consistency of the teaching goals.	2.5	3.1	29.4	42.5	22.5
Students should participate in the exchange of evaluation results.	2.7	5.6	35.4	51.4	4.9
I often announce the placement of students in exams.	4.2	9.8	39.8	41.5	5.7
I can transform teaching goals into clear evaluation goals.	3.9	42.5	27.4	3.5	22.7

Table 5: Independent variables in the questionnaire.

Variation	Average value	Standard deviation	Samples	Reliability
Perceived usefulness	28.03	3.998	The evaluation results are helpful for teachers to reflect on teaching. This system can provide guidance for my teaching design and teaching observation.	0.824
Perceived ease of use	5.32	1.236	The system is simple to operate, easy to learn, and easy to master.	—
Perceived participation	12.37	3.142	I will actively use this system for class observation and evaluation.	0.692
Mission technology match	37.68	7.191	The evaluation indicators of this system are sufficient and complete. The observation points of the evaluation task of this system are usually simple.	0.853
Satisfaction	5.90	1.189	This system can meet my actual classroom teaching evaluation needs.	—
Willingness to use	10.21	2.896	If I have a mobile terminal in my hand, I will use this system when watching a class.	0.625
Total reliability of the questions: 0.923				

group adopts the GIS-based multimedia teaching evaluation method, and the control group adopts the traditional conventional teaching evaluation method, respectively, using GIS assistance and conventional teaching aids for teaching evaluation and guidance, and the data obtained are analyzed and summarized, and the results are obtained as shown in Figure 4.

It can be seen from Figure 4 that the teaching evaluation system using GIS mobile terminals is obviously superior to traditional teaching evaluation methods in all aspects. Among them, 73.4% of the students in the experimental group believed that this system helped to improve the authenticity of the evaluation, while 59.4% of the students in the control group agreed with this view. It can be seen that, after using this system, the students have a certain degree of credibility in the evaluation. The number of people who think the teaching evaluation system is useless has also dropped from 4.6% to 1.8%. In general, the teaching evaluation system using GIS mobile terminals can improve the communication and teaching diagnosis between teachers and students and help further improve teaching. In addition, 30 students in the experimental group believed that the teaching evaluation system was beneficial to teaching communication, while 20 students in the control group held the same opinion. It can be seen that the use of this system is conducive to teaching communication. This number has reached 69 in the experimental group, while 51 in the control group. It can be seen that the use of GIS mobile terminals is helpful for teaching evaluation and guidance.

In addition, the application of mobile terminals will also affect the evaluation scores. It can be seen from Table 6 that, from 2016 to 2020, with the increase of teaching projects, the teaching projects that students participate in gradually increase, and the evaluation scores of students for teacher teaching are also increasing year by year. The number of teaching activities students participated in has increased from 2 in 2016 to 15 in 2020, and the teaching evaluation score has also increased from 81.09 to 91.02. This shows that, with the use of GIS mobile terminals in teaching, it is possible to increase the number of teaching activities, so that students have more opportunities to participate, so that students can get better exercise, thereby increasing their satisfaction with teaching.

4.3. Teachers and Students' Understanding of Classroom Teaching Evaluation Analysis. This teaching guidance evaluation system is very helpful for school administrators, teachers, and students as a whole, and this system can understand and analyze their attitudes towards teaching evaluation from many aspects, so as to effectively guide teaching.

As shown in Figure 5, as for the understanding of the classroom teaching evaluation system among schools, teachers, and students, the views of the three are quite different. Among them, teachers and schools account for a relatively high proportion of students' learning effects. 44.5% of teachers believe that the use of this system can improve

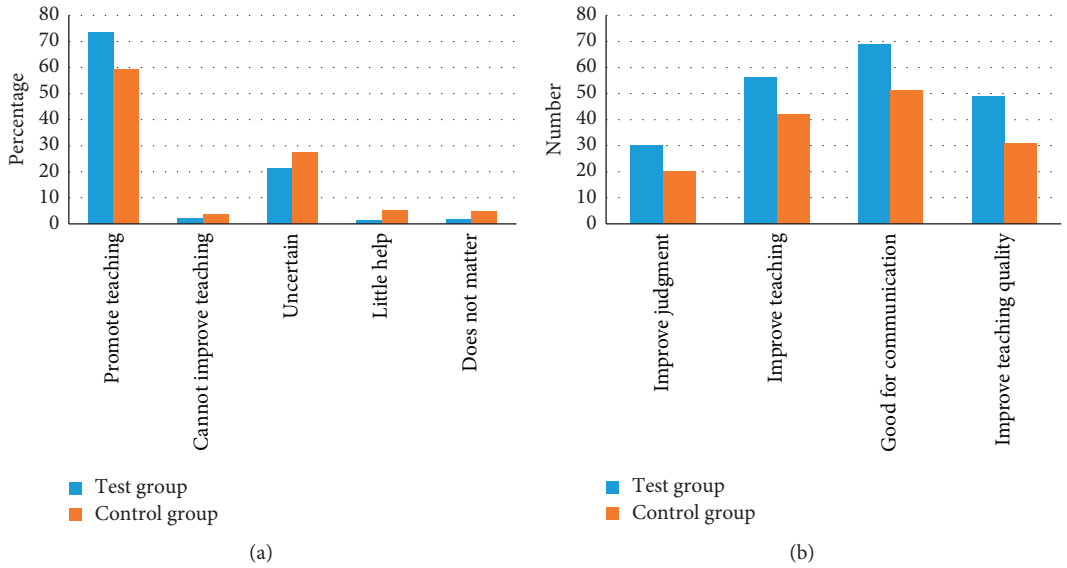

Figure 4: Comparison of different evaluation systems.

Table 6: Statistics on the number of students participating in projects and student evaluation scores.

	2016	2017	2018	2019	2020
Number of items	10	15	13	12	18
Number of students participating in projects	2	5	8	9	15
Student evaluation score	81.09	83.15	87.52	88.03	91.02

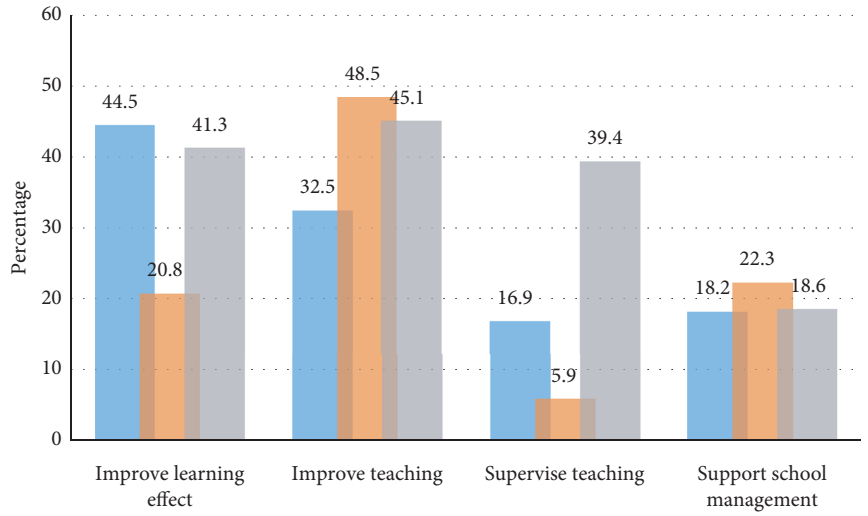

Figure 5: Understanding of teaching evaluation.

students' learning effects, while only 20.8% of students agree. In terms of improving teaching, most students and school administrators believe that this system can improve teaching, with students accounting for 48.5% and teachers accounting for 32.5%. In terms of supervising the teaching work of teachers, only 5.9% of students were in favor, while school administrators accounted for about 39.4%. With regard to supporting school teaching management, none of these three have a particularly strong attitude, with the highest proportion being students, at 22.3%. It can be seen that, for most teachers, this mobile terminal can improve the learning effect of students and their own teaching ability, but it is not suitable for school supervision and management. For most students, they think that using this system is more

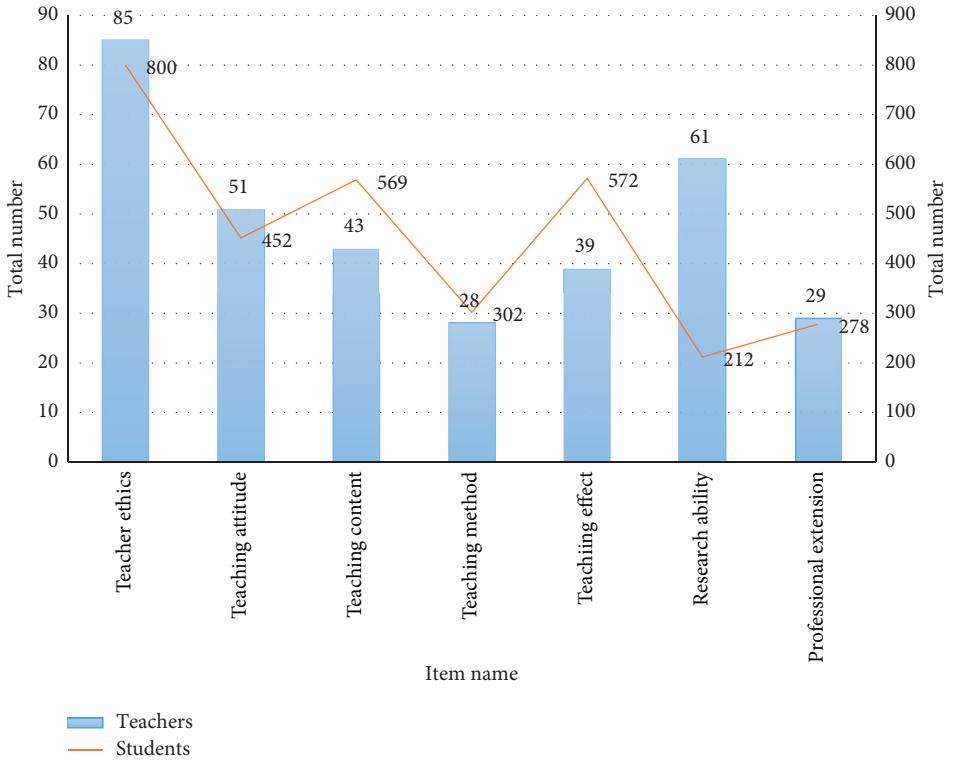

Figure 6: Selection of evaluation indicators.

conducive to improving the teaching work of teachers than directly improving their learning effects. The improvement of their learning ability is indirect.

The following are the results of the questionnaire survey of 100 teachers and 1,000 students in a middle school. The data is still sorted through the degree of recognition of each indicator by teachers and students, so as to understand the importance of each teaching evaluation indicator in their minds, and further make a good evaluation system that meets the expectations of teachers and students.

As shown in Figure 6, it can be seen that moral education occupies a large proportion of the teacher evaluation index. 800 students and 85 teachers have selected this evaluation index. It can be seen that it is a combination of the opinions of both students and teachers. But in terms of scientific research ability, the opinions of students and teachers are still different. 61% of teachers choose this indicator, while only 21.2% of students choose scientific research ability. It can be seen that, in the teaching process, teachers pay more attention to the improvement of their own scientific research ability, which is based on an evaluation of the teacher's own level; for students, they tend to emphasize the teacher's effectiveness in teaching (57.2%) and interesting teaching content in the classroom (56.9%). This analysis has a certain significance for teaching evaluation, and it occupies a relatively important proportion in the improvement of the evaluation system.

5. Conclusion

This article researches the teaching evaluation and guidance system based on GIS mobile terminal. Firstly, three teaching evaluation and guidance methods are introduced: index weighted evaluation method, fuzzy analytic hierarchy process, and BP neural network method. Subsequently, a teaching evaluation and guidance system was designed, which involved a number of teaching evaluation aspects, including teaching evaluation management, evaluation result query, information management, and other modules. In the analysis part, this research carried out teaching analysis, teaching evaluation system analysis, and evaluation cognition analysis. The conclusion of this research is as follows: GIS-based mobile terminal can indeed improve the efficiency of teaching evaluation and help teaching guidance. At the same time, this study also has some shortcomings, such as the lack of real-time feedback from the teaching evaluation system to the instructor and the evaluation teacher. For example, the evaluation teacher cannot see the status and use of other users in a timely manner during the evaluation process. The situation is as follows: the mobile terminal currently only stays at the operating level of the system. It is recommended to interact with the system status information in real time, such as the user's login status and report push and sharing, improve the interaction between the system and the user, and add personal-related information management.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares no conflicts of interest.

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